Angeles Link Q3 Quarterly Report Appendices (Phase One)

For the Period July 1, 2023, through September 30, 2023

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APPENDIX 1 – SOCALGAS RESPONSES TO COMMENTS

Response to Email/Letter Comments

No.	Comment Date	PAG/CBOSG Stakeholder Name and Organization	Email or Letter?	Comment	SoCalGas Response	Topic
1.	7/31/2023	Air Products (Miles Heller)	Email	SoCalGas's Limited Summaries Are Insufficient to Allow for Meaningful Feedback Air Products is concerned that the information being provided by SoCalGas in both the Scope of Work Descriptions, and in the July 18 and July 20 workshops, consists only of very cursory summaries of the proposed scopes of work for the Phase One studies, and lacks much of the specific detail that would typically be required to be included in any scope of work being provided to a third party consultant. SoCalGas proposes to conduct sixteen separate studies in Phase One, to comply with the obligations set forth in D.22-12-005, including making findings required before SoCalGas can proceed with Phase Two. Yet the Scope of Work Descriptions for all sixteen studies consist only of twenty-nine pages of text, averaging less than two pages per study. As a number of parties noted in the July 18 and July 20 workshops, the summary and cursory nature of the summaries significantly limits PAG members' ability to provide substantive and meaningful feedback. The workshops were described as an opportunity for PAG members to "roll-up-your-sleeves" and engage in substantive discussions concerning the various scopes of work. But the lack of detail significantly limited the ability to engage. In order to allow PAG members to meaningfully participate in the development of the scopes of work, Air Products strongly urges SoCalGas to provide the actual scopes that will or have been provided to its consultants. Only then will PAG members be able to meaningfully engage on the substance of the Phase One studies. There is no reason for SoCalGas not to provide the same level of detail to the PAG as it is providing to the consultants that will conduct the required Phase One studies. At a minimum, Air Products urges SoCalGas to post the final Scopes of Work, in their entirety, at the same time those Scopes are provided to the consultants conducting the work.	SoCalGas has committed to a transparent and robust stakeholder engagement process, and our actions throughout the Phase One feasibility study process have upheld this commitment. The Scope of Work descriptions and Technical Approach documents shared with PAG and CBOSG members and discussed at the workshops and quarterly meetings present accurate descriptions of the Phase One work being performed by SoCalGas and their consultants. As Scope of Work descriptions and Technical Approach documents are modified based on feedback from PAG and CBOSG members and in response to other refinements as analyses progress, updates will be shared with PAG and CBOSG members on an ongoing basis. Additional details of the studies, including initial findings and draft reports, have been and will continue to be shared with PAG and CBOSG members during future milestones. In addition, contracts to perform Phase One feasibility studies were submitted by SoCalGas to the Public Advocates Office on August 15, 2023, with an accompanying General Order 66-D Confidentiality Declaration based on confidential business information, in response to issuance of a formal data request.	General

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2.	7/31/2023	Air Products (Miles Heller)	Email	SoCalGas Must Consider Private Sector Investment As D.22-12-055 recognizes, there is an existing and rapidly growing hydrogen industry in California. The Alliance for Renewable Energy Clean Hydrogen Energy Systems (ARCHES), California's public-private hydrogen consortium, is also working to accelerate the development and deployment of clean, renewable hydrogen projects and infrastructure. Because of the importance of these efforts, D.22-12-055 directed SoCalGas to join with ARCHES members to support the State of California's application for federal funding. A number of PAG members have raised concerns about how SoCalGas's efforts related to the Angeles Link could impede private sector investment, and stifle innovation. In addition to potentially undermining market competition, SoCalGas's efforts pose a risk that ratepayers fund efforts that could be more quickly and cost-effectively developed by the private sector. Significant questions remain concerning the appropriate role of SoCalGas, and other public utilities, in development of hydrogen infrastructure. The Angeles Link is not being developed in a vacuum. Ongoing private sector investment will likely impact the need for, and the purpose of an Angeles Link trunkline, and will impact the extent to which ratepayer funding is needed or appropriate to advance access to clean hydrogen. For example, private sector investment in on-site production and/or local distribution systems may obviate the need for trunkline service in some areas. SoCalGas's Phase One studies must therefore explicitly evaluate and consider the private sector's ongoing and planned investment in hydrogen projects and infrastructure, and private sector alternatives to a trunkline.	The purpose of the Angeles Link project is to support the State of California's decarbonization goals, optimize service to all potential end-users, enhance energy system reliability, resiliency, and flexibility, and provide a cost effective and affordable open access clean renewable hydrogen transportation system, among other goals. The project could provide reliable, lower cost hydrogen to various end-users, both in the public and private sectors. Regulated, open-access, common carrier hydrogen pipelines dedicated to public use in California can facilitate market growth and scalability and is consistent with the Department of Energy's Pathways to Commercial Liftoff: Clean Hydrogen materials. (Pathways to Commercial Liftoff: Fireside Chat and Clean Hydrogen Deep-Dive (https://www.youtube.com/watch?v=3i7qZfJ5G9Q , 34').) Such infrastructure is pivotal for supporting the burgeoning hydrogen economy and making clean renewable hydrogen accessible to multiple hard –to-electrify sectors within the LA Basin and throughout the Central and Southern California region. To date, SoCalGas is not aware of any proposed unregulated infrastructure investment that would serve the same function as Angeles Link, which is specifically proposed to transport clean renewable hydrogen into the Los Angeles Basin and in the broader Central and Southern California region and serve multiple end users through an open-access pipeline system. However, we are committed to staying informed about the hydrogen market's evolution. Our engagement with initiatives like ARCHES should allow us to remain updated on other hydrogen projects and explore how Angeles Link can complement and accelerate these developments. In our Phase One studies, we will incorporate relevant information from ARCHES and other sources, as feasible, available and appropriate. It is also worth noting that the alternative delivery options we are studying in the Alternatives Analysis do consider unregulated transport methods, such as hydrogen trucking.	General

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3.	7/31/2023	Air Products (Miles Heller)	Email	D.22-12-055 restricts the Angeles Link Project to transportation of "clean hydrogen." Any evaluation of the potential for "clean renewable hydrogen demand" must distinguish between demand for "clean hydrogen" as defined by D.22-12-055, and hydrogen demand generally. Potential demand for hydrogen generally is not necessarily reflective of demand for clean hydrogen.	CPUC Decision 22-12-055, page 42, directs SoCalGas to "restrict[] any future hydrogen transported in the Angeles Link Project to not exceed a standard of four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram of hydrogen produced . . . [and] further restrict the eligibility of any future hydrogen which uses any fossil fuel in its production process. Accordingly, the Demand Study is focused specifically on demand for clean renewable hydrogen, including demand for clean renewable hydrogen driven by zero-carbon and zero-emission policies and legislation. These policies and legislation, including Executive Order N-79-20, SB100, California's Cap-and-Trade program, and SB 596, are primary factors used to determine future hydrogen adoption across the mobility, power generation, and industrials sectors.	Demand Study
4.	7/31/2023	Air Products (Miles Heller)	Email	The Demand Study also states that assumptions will be validated through interviews with potential end users, industry participants across the value chain, and key industry and subject matter advisories. The Demand Study should identify how interviewees were selected, the criteria used to select the interviewees, as well as a detailed list of those interviewed. The Demand Study should also specifically identify all sources of information used to establish demand, including both direct communications with potential users, and third-party studies or other data.	SoCalGas reached out to numerous interviewees based on various factors such as number of facilities and/or presence in SoCalGas's territory, size of current emissions footprint and/or fuel consumption, and announcements regarding hydrogen R&D and projects. Questions asked and input received included current fuel usage, future hydrogen plans, and hydrogen adoption rate factors. Any degree of acknowledgement of interviewees and their contributions may depend on further discussions and permissions from those interviewees. The draft Demand Study includes references to third party studies that were used to inform the demand analysis.	Demand Study
5.	7/31/2023	Air Products (Miles Heller)	Email	The Demand Study should also set forth the criteria used to determine what constitutes demand, where demand would be located, and the timing of any demand.	The Demand Study considers three main sectors (mobility, power generation, and industrials) and various subsectors within those sectors. The Demand Study used four main factors (technology feasibility, commercial feasibility, business readiness, and policy & legislation) to determine demand. The output of the study will also include a locational and timing aspect as well.	Demand Study
6.	7/31/2023	Air Products (Miles Heller)	Email	This study is intended to include an evaluation of "potential sources of clean renewable hydrogen production from renewable energy resources such as solar and wind, the input requirements, the estimated cost of production, and policies, procedures, and other methods to meet clean renewable hydrogen standards." However, as explained in some detail in recent decisions in the Commission's Integrated Resource Plan proceeding (R.20-05-003) and Resource Adequacy proceeding (R.21-10-002), electric load-serving	The Production Planning & Assessment Study evaluates the availability of renewable resources that could be added, rather than reallocated from load-serving entities' current obligations, for clean renewable hydrogen production. The study also evaluates how existing renewables on the CAISO grid	Production Planning & Assessment

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				entities are currently struggling to meet mid-term reliability procurement requirements, and development challenges, including interconnection delays, supply chain disruptions, and permitting delays have further exacerbated the challenges faced by load-serving entities in procuring required capacity. These challenges will only increase as the load increases as a result of increasing electrification. In determining what renewable energy resources might be available for hydrogen production, this Study should distinguish between generation sources needed by load-serving entities to meet current and future demand, and those renewable generation sources that are available for hydrogen production. Hydrogen production should not be competing for resources with load-serving entities seeking to procure electric capacity necessary to ensure reliability.	that are curtailed may be reused for clean renewable hydrogen production.	
7.	7/31/2023	Air Products (Miles Heller)	Email	For the production capacity modeling included in this Study, the Study also should specify the assumptions used concerning production capacity for various technologies and projects, and how those assumptions were determined.	The production capacity modeling includes details on the assumptions used, including how they were determined.	Production Planning & Assessment
8.	7/31/2023	Air Products (Miles Heller)	Email	The Production Planning and Assessment should also set forth the criteria used to determine the locations of potential hydrogen and renewable energy production, and when those projects would come online.	The Production Planning & Assessment Study will provide details on how potential renewable energy and clean renewable hydrogen production areas were identified. In terms of when specific projects come online, this will depend on the availability of information publicly available and inputs from other studies such as the Demand Study.	Production Planning & Assessment
9.	7/31/2023	Air Products (Miles Heller)	Email	As explained in the General Comments above, SoCalGas should weigh private sector current and future infrastructure investments as compared to the cost of ratepayer-funded infrastructure developed by investor-owned utilities. In particular, the Project Alternatives contemplated in the current Scope of Work should include private sector projects, products, and services, to be compared to the costs and timing of ratepayer-funded efforts.	See response to Comment No. 2. As noted, SoCalGas is not aware of any proposed unregulated infrastructure investment that would serve the same function as Angeles Link, which is specifically proposed to transport clean renewable hydrogen in central and southern California through an open-access, common carrier pipeline system dedicated to public use.	Project Options and Alternatives
10.	7/31/2023	Air Products (Miles Heller)	Email	The current Scope of Work also proposes to develop a methodology to evaluate the cost effectiveness of Project Alternatives. Developing an appropriate methodology will be critical to accurately evaluating the various Project Alternatives—errors or omissions in the cost-effectiveness methodology can obviously improperly skew the evaluation	The Technical Approach document, which was shared with PAG members on September 7th, 2023, sets forth options and alternatives that may meet the purpose, need, and objectives of the project, as well as options identified by the CPUC. The High-Level Economic Analysis & Cost Effectiveness Study provides a methodology to	Project Options and Alternatives

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				of Project Alternatives. Air Products therefore suggests that SoCalGas share a draft of its cost-effectiveness methodology, and provide PAG member input, prior to conducting the Project Alternatives evaluation. SoCalGas should also identify the specific sources of all data used in conducting the cost-effectiveness evaluation.	measure cost effectiveness that includes gathering cost estimates, performing economic analysis to determine the potential levelized cost of clean renewable hydrogen to be delivered to end-users, and comparing the cost effectiveness of the Project against various potential project alternatives. The technical approach for the High-Level Economic Analysis & Cost Effectiveness Study was shared in the September PAG meeting.	
11.	7/31/2023	Air Products (Miles Heller)	Email	Air Products also requests that SoCalGas identify the criteria by which it chooses the specific Project Alternatives to study, and that it also identifies any Project Alternatives that it chooses not to study, and reasons why those Alternatives were omitted.	The Technical Approach document, which was shared with PAG members on September 7th, 2023, sets forth options and alternatives that may meet the purpose, needs, and objectives of the project, as well as options identified by the CPUC. The several underlying purposes that Angeles Link is intended to fulfill were provided in the Project Options & Alternatives Scope of Work and the criteria and technical approach for Project Options & Alternatives was shared in the September PAG meeting.	Project Options and Alternatives
12.	7/31/2023	Air Products (Miles Heller)	Email	Finally, any evaluation of Project Alternatives should evaluate the environmental impacts of each Alternative. The Scope of Work outlined in the Environmental & Social Justice Analysis seems to imply that this will be done, but Air Products requests that SoCalGas confirm its intent to include environmental impact analysis as part of its evaluation of Project Alternatives.	SoCalGas will include a high-level environmental analysis as part of the overall Phase One evaluation of project alternatives. Specifically, the Environmental & Social Justice Analysis will analyze the potential environmental impacts of the project and the alternatives to enable a consideration and evaluation of project alternatives as compared to the project, per the Final Decision Ordering Paragraph 5(e).	Project Options and Alternatives
13.	7/31/2023	Air Products (Miles Heller)	Email	The purpose of this study is to "identify potential sources [of] clean renewable hydrogen generation and water and estimate the costs of the hydrogen for the Project." To the extent the identified potential sources are not collocated with the production sites, SoCalGas should evaluate energy needs associated with water pre-treatment, and how those energy needs would be met, as well as evaluating how the water will be transported to the production site, and the energy sources and emissions associated with that transportation.	A high-level estimate for third-party operation and maintenance costs for water treatment will be developed, which will include estimates of the power demands and costs for treatment. SoCalGas's overall approach is to provide a range of costs that reflect the potential variability in cost inputs (i.e., probable, high, and low "bookends" of costs). The same approach will be used for estimating power costs. SoCalGas expects that third-party clean renewable hydrogen developers may utilize various water supply arrangements to meet their energy requirements for water treatment and hydrogen generation, such as onsite generation and direct power purchase from power grids. However, the exact arrangement that might be adopted by third-party clean renewable hydrogen developers would be facility specific. The study will provide the bookend power costs by assuming onsite generation being the lower end and direct purchase	Water Resource Evaluation

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					from the power grid being the upper end of the power costs. For the low end of power costs, wholesale power costs will be assumed as a proxy for the costs of onsite power generation. Representative costs for retail and wholesale power will be compiled and used to develop these estimates. The Water Resource Evaluation study will also identify potential water sources (e.g., recycled water, advanced treated water, surface water through water exchanges) that third-party producers may choose to draw upon for clean renewable hydrogen production.	
14.	7/31/2023	Air Products (Miles Heller)	Email	As with the renewable energy resources needed for production, any water sources for production may be subject to competing demands for the resource. SoCalGas should also evaluate competing demands for the resource, and the potential impacts, including cost impacts, associated with using the water resource for hydrogen impacts rather than the competing alternate use or uses.	Please see response to Comment No. 13. In addition, due to the highly dynamic relationship between water supply and demand, competing water demands will continue to develop as analyses related to water supply for clean renewable hydrogen production are conducted. For purposes of the Angeles Link Phase One analyses, the Water Resource Evaluation study will identify potential water sources (e.g., recycled water, advanced treated water, surface water through water exchanges) that third-party producers may choose to draw upon for clean renewable hydrogen production. The identified potential water sources will be summarized.	Water Resource Evaluation
15.	7/31/2023	Air Products (Miles Heller)	Email	The “Study Approach” for this Scope of Work states that a consultant “will estimate NOx” and, “[w]here applicable, the consultant will rely on specific technical information (about facilities, equipment, processes, throughputs, etc.) that is available.” This broad description fails to provide any clarity on the methodology or methodologies that will be employed to calculate potential NOx emissions, or the sources of data that will be relied upon in developing that calculation. Nor does the Scope of Work provide any specificity regarding how the “consultant will develop estimates based on availability of related data or documented assumptions.” A revised and much more detailed Scope of Work should be developed and circulated to PAG members for input on methodology,	The Technical Approach document, which was shared with PAG members on September 7th, 2023, details the methodologies that will be employed for calculating potential NOx emissions. This document includes a description of the potential data sources utilized, the criteria for their selection, and the approach taken when data is not readily available. In the development of these estimates, technical information about equipment, processes, and estimated demand from the demand study will be relied upon. In cases where data is not accessible, the consultant will develop estimates based on related data or well-documented assumptions.	Nitrogen Oxide and other Air Emissions Assessment

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				data sources, and development of estimates in the absence of data sources.		
16.	7/31/2023	Air Products (Miles Heller)	Email	Similar to the Scope of Work for Nitrogen Oxide and other Air Emissions Assessment, the current scope of work, under "Study Approach," simply states that the "consultant will evaluate potential sources of hydrogen leakage," and "will rely on specific technical information that is available…" A revised and much more detailed Scope of Work should be developed and circulated to the PAG members for input on methodology and data sources.	The technical approach was outlined in a manner that allowed for investigation of available and accessible information regarding hydrogen leakage. The methodology shared with the PAG members on September 5, 2023, details a process where potential leakage sources would be identified, and leakage estimation methodologies would be determined based on available related data or well-documented assumptions to develop leakage estimations.	Hydrogen Leakage Assessment
17.	7/31/2023	Air Products (Miles Heller)	Email	Similar to the Scopes of Work for Nitrogen Oxide and other Air Emissions Assessment and Hydrogen Leakage Assessment, the Scope of Work for Greenhouse Gas Emissions Assessment fails to provide any details concerning methodology, data sources, or the development of estimates in the absence of data sources. A revised and much more detailed Scope of Work should be developed and circulated to PAG members for input on methodology, data sources, and development of estimates in the absence of data sources.	The technical approach was provided on September 7th and provided the methodology for the study. The evaluation of available related data, research and well documented assumptions necessary to provide the level of detail requested had not been completed. The requested information and detail will be available for comment and consideration as part of the Greenhouse Gas Emissions Evaluation preliminary data and findings and draft report.	Greenhouse Gas Emissions Evaluation
18.	7/31/2023	Air Products (Miles Heller)	Email	Air Products appreciates the opportunity to provide this input on the general Scopes of Work provided by SoCalGas on July 6. Air Products urges SoCalGas to provide more detailed Scopes of Work to the PAG to allow adequate feedback on those Scopes prior to the commencement of any work by consultants. Failing to fully vet the proposed Scopes of Work with PAG members may result in faulty studies that fail to provide analyses suitable to meet the requirements of D.22-12-055.	Please see response to Comment No. 1.	General
19.	7/31/2023	Climate Action Campaign (Ayn Craciun)	Email	The proposal ignores hydrogen costs and energy insecurity. Low-income families pay a disproportionate percentage of their income on energy. The largest survey of people experiencing homelessness in California in decades was published in June 2023, and it found that as little as $300 per month in income, about the same cost as an average California utility bill ($243 per month according to PG&E) would have kept up to 70% of them in housing. It is well known that hydrogen is expensive – approximately $16 per gallon equivalent when compared to gasoline – underscoring the	In addition to providing safe, clean, and reliable sources of energy for homes and businesses, SoCalGas is committed to exploring opportunities to prove energy as affordably as possible. D. 22-12-055 requires SoCalGas to share with the Commission its "plans for addressing and mitigating affordability concerns" before proceeding with Phase Two. The CPUC is also committed to affordability and is responsible for regulating the state's investor-owned utilities and sets and approves rates that utilities can charge their customers. The concept of "just and reasonable rates" is a fundamental principle in utility regulation. As Angeles Link progresses, SoCalGas will continue to assess affordability impacts and concerns.	Environmental & Environmental Social Justice Analysis

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				importance of hydrogen costs as an equity issue. Utility bills can make or break a family economically, so when we consider energy policy decisions, these realities must be considered first. In light of this, it is concerning that the question I asked during the meeting regarding ratepayer impacts was not answered – "Will the economic analysis for the Angeles Link proposal include impacts on ratepayers?" This question must be answered before the project is allowed to move forward. Costs from the Angeles Link proposal could force California families into homelessness and pretending that the costs of the project are not material to the proposal is a reckless denial of the needs and economic realities of California families – particularly those in communities of concern.	There is a growing number of studies that show how sources of clean firm power, like clean renewable hydrogen, are key to affordably and reliably transitioning California to a decarbonized energy system. For example, a 2021 study prepared by the Environmental Defense Fund, Clean Air Task Force, E3, Princeton University, and Stanford University, assessed how California can affordably and reliably decarbonize its electricity sector by 2045 and concluded that meeting SB 100's 100% carbon-free electricity mandates in the absence of "clean firm power" (i.e., power available on demand without dependence on weather) would lead to an approximately 65% increase in wholesale electricity rates by 2045. (Long et al., *Clean Firm Power is the Key to California's Carbon-Free Energy Future*, Issues in Science and Technology (March 24, 2021), available at https://issues.org/california-decarbonizing-power-wind-solar-nucleargas/.) On the other hand, if approximately 30 GW of clean firm power (e.g., combustion turbines using green hydrogen) were available, California could take significant strides toward achieving SB 100 mandates with wholesale generation and transmission supply costs on par with current averages. (*Id.* at p. 39.) Similarly, SoCalGas's 2021 report on the role of clean fuels and gas infrastructure in achieving California's net zero climate goal, which was independently verified by experts from UC Irvine and UC Davis, concluded that "[c]ombining the strengths of renewable electricity from solar and wind (clean electrons) with clean hydrogen, RNG, syngas, and biofuels (clean molecules) is the most affordable . . . path to carbon neutrality." (See SoCalGas, *The Role of Clean Fuels and Gas Infrastructure in Achieving California's Net Zero Climate Goal Summary Report* (October 2021), available at https://www.socalgas.com/sites/default/files/202110/SCG_Whitepaper_Full-Report.pdf.) Finally, as part of Phase One, SoCalGas is preparing a High-Level Economic Analysis and Cost-Effectiveness Study that will examine clean renewable hydrogen delivery cost on a $/kg basis for the Project and will compare these costs to a localized hub and hydrogen delivery alternatives. Based on this, SoCalGas will compare the cost of clean	

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					renewable hydrogen to other decarbonization alternatives and strategies that have been identified to help meet the State's decarbonization goals, including electrification, energy efficiency, renewable natural gas, continued use of traditional fuels with carbon management, and alternatives to hydrogen pipeline delivery (trucking, train, marine and electric transmission of renewable power for hydrogen production in-basin).	
20.	7/31/2023	Climate Action Campaign (Ayn Craciun)	Email	The proposal to allow fossil fuel-based hydrogen ignores climate realities and could increase climate impacts. It was also troubling to hear that SoCalGas intends for Angeles Link to carry hydrogen created from both fossil fuels and renewable sources. SoCalGas representative Neil Navin said during the meeting that Angeles Link would be an "open access pipeline" for all sources of hydrogen. However, the sources of hydrogen are of the utmost importance. SoCalGas representatives stated during the meeting that their intention is to provide clean hydrogen, but if Angeles Link transports hydrogen sourced from methane gas, dirty grid electricity or other fossil sources, it would facilitate increased GHG intensity in our energy supply. As NRDC explained in their recent analysis on clean hydrogen deployment: "A new study by Evolved Energy Research casts compelling insight into the heated debate around the IRA 45V clean hydrogen tax credits. The study finds that the three pillars of 1) new clean supply, 2) hourly matching and 3) deliverability will support substantial deployment of clean hydrogen in this decade. The study also concludes that all three pillars are the minimum guardrails against large carbon emissions increases from hydrogen production and derailing U.S. climate progress. The study – which can be added to the pile of evidence in favor of the three pillars—further crumbles unsubstantiated claims by proponents of looser rules that the three pillars will hobble industry growth. Those unsubstantiated claims are, yet again, proven to be resoundingly FALSE."	The Phase One studies only clean renewable hydrogen in accordance with Decision D.22-12-055, Ordering Paragraph 3(a), which provides that "Feasibility studies for the Angeles Link Project shall be restricted to the service of clean renewable hydrogen that is produced with a carbon intensity equal to or less than four kilograms of carbon dioxide equivalent produced on a lifecycle basis per kilogram and does not use any fossil fuel in the production process."	General

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				NRDC's statements are also supported by recent reports from Energy Innovation and Princeton University's ZERO Lab, which found that the three pillars of clean hydrogen are necessary to prevent significant emissions increases and a grim reversal in clean energy progress for the power sector and our economy. Based on the information presented at the June 22, 2023, CBOSG stakeholder meeting, SoCalGas is not developing the Angeles Link project with the three pillars of clean hydrogen in mind and is ignoring the Princeton University, Energy Innovation and Evolved Energy Research studies mentioned above. We do not have time for hydrogen sourced from fossil fuels. The recent Intergovernmental Panel on Climate Change (IPCC) report says continued dependence on fossil fuels is not consistent with a livable future, with communities of concern feeling the impacts first and the worst. We do not have time for hydrogen sourced from fossil fuels.		
21.	7/31/2023	Climate Action Campaign (Ayn Craciun)	Email	Misinformation presented regarding SoCalGas "culture of safety." During the meeting, SoCalGas representative Emily Grant said, "SoCalGas has a culture of safety," but in 2015, SoCalGas was responsible for the largest methane gas leak in U.S. history, which dumped 100,000 tons of toxic chemicals into the air north of Los Angeles for months, forcing more than 8,000 families to flee their homes. Last year, SoCalGas and Sempra paid $1.8 billion to settle with thousands of residents sickened by the blowout at Aliso Canyon. During the Angeles Link meeting, SoCalGas representatives did not discuss their failures at Aliso Canyon or explain how SoCalGas would ensure the company would guarantee the public would not be harmed by the Angeles Link project or other operations in the future. SoCalGas has demonstrated that it cannot be trusted to safeguard community health or safety, and their decision to misrepresent their record of harm to the community during the Angeles Link meeting should prompt closer review of their proposal.	At SoCalGas, safety is a core value and is at the foundation of everything we do. This commitment to safety is embedded in our culture and dedicated employees who work to safely and reliably operate the gas system to serve our customers. SoCalGas' safety culture fosters a work environment where employees at all levels, work locations, and departments are empowered to continuously enhance the safety of our operations. Just as importantly, our culture and practices encourage employees to raise safety concerns including to "Stop The Job" if someone is ever concerned with the safety implications of a particular situation. Very simply, our employees take pride in their work and ownership for safety. While a strong safety culture exists at SoCalGas today, we are committed to continuously enhancing the maturity of our safety culture and approach to safety. To that end, SoCalGas has implemented a comprehensive safety management system (SMS)	Plan for Applicable Safety Requirements

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				Though the presentation decks from the July 20 and 21 CBO workshops mention safety, they did not address these concerns.	consistent with American Petroleum Institute Recommended Practice 1173 (API RP 1173) and is engaged in continuous learning and improvement through Safety Forward, a concerted effort to foster learning and further improve company safety culture and systems. The Decision requires (OP 6 (f)) SoCalGas to evaluate safety concerns involved in pipeline transmission, storage and transportation of hydrogen applicable to the Project. This safety study will include an assessment of applicable safety requirements for employee, contractor, system and public safety. A focus on all aspects of safety and consideration of the physio-chemical properties of hydrogen will be addressed. For further information on the scope and technical approach of the safety study, please see the 'Living Library' developed for the PAG and CBOSG.	
22.	7/31/2023	Climate Action Campaign (Ayn Craciun)	Email	SoCalGas lacks credibility due to ongoing proposals to blend hydrogen and methane gas in buildings. In September 2022, SoCalGas proposed to blend to spend $13 million in ratepayer dollars to pipe, blend and burn a dangerous, experimental, and toxic mix of hydrogen and methane gas in ovens, furnaces, water heaters, dryers, and boilers in a 2,500-student UC Irvine freshman dormitory and numerous other student and faculty buildings on campus. UC Irvine administrators rejected the proposal in March 2023 based on safety and environmental justice concerns from the UC Irvine community, including the fact that SoCalGas planned to locate the project in a freshman dorm, thereby ensuring students would have no knowledge of or ability to consent to the project before matriculation. None of the dozens of students or faculty we spoke to about the project had heard of it, even though SoCalGas' project timeline stated that community engagement had been ongoing for several months. SoCalGas' decision to design the proposed UC Irvine project to ensure impacted communities would have no knowledge of or ability to consent to it demonstrates an ongoing practice of ignoring community safety, consent, and participation to advance SoCalGas interests. SoCalGas continues to pursue a hydrogen/methane blending pilot at UC Irvine, despite broad consensus that there is no need to incur all the uncertainty, costs, health, and safety risks that come with hydrogen	The Angeles Link Project is a proposed open-access, common carrier 100% clean renewable hydrogen pipeline transportation system. The project itself is not designed to blend hydrogen with natural gas; rather, it is focused solely on the delivery of clean renewable hydrogen. Any consideration of hydrogen blending pertains to potential end-use applications, specifically for early adoption by certain hydrogen end users such as power generation, which may opt to blend hydrogen with natural gas "behind-the-meter" – a decision that is outside of SoCalGas' control. The Demand Study, which is one of sixteen Phase One feasibility studies, is examining potential demand for clean renewable hydrogen within SoCalGas's service territory through 2045, spanning across mobility, power generation, and industrial sectors. In the context of power generation, the study is exploring thermal power generation options at facilities like Scattergood, aligning with LADWP's plans. This includes the consideration of a strategy for gas-fired power plants to move from a blend of 30% hydrogen and 70% natural gas towards 100% hydrogen, to achieve California's carbon neutrality goals. As explained above, the Angeles Link is designed to transport only 100% clean renewable hydrogen. The project is committed to supporting California's transition to a decarbonized energy system,	General

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				blending experiments when electrification is a pollution-free option for decarbonizing buildings today. SoCalGas' approach in the UC Irvine pilot project demonstrates that the company continues to act in bad faith and that their stated intent to pursue clean hydrogen through Angeles Link lacks credibility, particularly when considered with the other issues mentioned in this letter.	and any discussions of blending are strictly related to potential end-user decisions for their specific applications, which are not within SoCalGas control. Separate from Angeles Link, on September 8, 2022, SoCalGas, SDG&E, and Southwest Gas Corporation filed a joint application (A.22-09-00) to establish hydrogen blending demonstration projects. The purpose of SoCalGas's project, which is being developed in collaboration with UCI, is to gather and analyze field-testing data using increasing concentrations of blended hydrogen to develop hydrogen injection standards compatible with current steel and plastic distribution pipelines (and potentially steel transmission pipelines) and end-user appliances and equipment. On December 15, 2022, in a separate proceeding, the Commission approved D.22-12-057, which requires SoCalGas and the other utilities to file a new application or amend its existing application to test hydrogen blending in natural gas at concentrations in increasing increments from 0.1 to five and five to twenty percent. While we believe hydrogen blending is an important subject for additional research and demonstration projects, SoCalGas's blending proposals are unrelated to Angeles Link, which will be exclusively dedicated to transporting clean renewable hydrogen.	
23.	7/31/2023	Communities for a Better Environment (Theo Caretto)	Email	The Angeles Link project's first phase is slated to take over 12 to 18 months. During that period, SoCalGas asked the Commission to focus on "preliminary engineering, design, and environmental studies to study supply, demand, possible end users, pipeline configuration and storage solutions and to analyze project alternatives." As of this letter's submission, "Phase One" has been ongoing for over 7 months, between one third and one half of the allotted time. In this time, SoCalGas has shared little concrete information about the above focus areas beyond vague study descriptions and information already discussed in their Commission filings. SoCalGas must share full study descriptions rather than sanitized summaries which do not discuss specific study scopes or inputs necessary to evaluate the work SoCalGas will conduct. The lack of transparency present in quarter one continues to plague Angeles Link. CBE asked SoCalGas to provide all meeting materials in advance of public meetings and provide recordings promptly after each	Please see Response to Comment No. 1. Our actions throughout the Phase One feasibility study process have upheld SoCalGas's commitment to conduct a robust stakeholder engagement process consistent with the requirements of Decision 22-12-055, which calls for quarterly stakeholder engagement meetings with parties in the Angeles Link proceeding and affected interest groups, including but not limited to disadvantaged communities (DACs) and Environmental and Social Justice (ESJ) communities, ratepayer advocacy groups, union organizations, and state agencies. As the project develops, we will enhance our community outreach and engagement to include stakeholders directly impacted by the project. For example, once preliminary pipeline routing alternatives are established, we will use this information to identify and engage with the communities that may be directly affected.	General

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				meeting. Despite asking participants to attend between 10 and 20 hours of meetings during the week of July 17th, SoCalGas has not made meeting recordings available to Angeles Link participants. SoCalGas still has a long way to go to meet the transparency and collaboration standards set for it by the Commission. Communities for a Better Environment look forward to sharing additional feedback as soon as possible.	Additionally, in recognition of the large amount of material provided to stakeholders and in response to feedback received, SoCalGas has amended the outreach process to include: delivering meeting materials at least one week prior to meetings, with a goal of two weeks prior, allowing additional time post-meeting for stakeholders to provide feedback and review materials, offering the possibility of dedicated one-on-one time with subject matter experts, and posting all presentation decks, transcripts, and meeting recordings to a stakeholder "Living Library".	
24.	7/31/2023	Defend Ballona Wetlands (Robert van de Hoek)	Email	As an environmental scientist, wildlife biologist and botanist, trained also in Geology, Hydrology and Anthropology, I am concerned about the Scope of Work Descriptions for Phase One Studies. In that spirit I would like to offer that the following topics must be added and addressed: A. Study and Consideration of Sacred Sites locations and a much greater involvement with the Indigenous Tribal Leaders of our region. … C. Study of Flora and Fauna that will be impacted by the Angeles Link.	Potential impacts to natural resources, including cultural and tribal resources, habitat and sensitive species, are being assessed at a high level in the Environmental & Environmental Social Justice Analysis. More in-depth analysis of the project's potential impacts to natural resources and cultural and tribal resources will be evaluated as more details of the project are developed in subsequent phases of the project. Consultation with tribes regarding potential impacts to resources and possible impact avoidance/minimization strategies will also be conducted in subsequent Phases of the project when preliminary project alignment and routing alternatives are identified.	Environmental & Environmental Social Justice Analysis
25.	7/31/2023	Defend Ballona Wetlands (Robert van de Hoek)	Email	In that spirit I would like to offer that the following topics must be added and addressed: … B. Study of whether existing pipeline rights of way are the best locations for the Angeles Link (considering current knowledge of seismic issues not known or understood when the original rights of way for methane gas pipelines were approved.)	Part of our analysis assesses whether existing rights of way are the preferred locations for Angeles Link. That analysis includes reviewing existing public franchise agreements and easements to assist with potential routing. The engineering and routing analysis will assess potential routing with consideration of potential risks, including seismic and other issues, and pipeline engineering will follow all applicable standards.	Preliminary Routing/Configuration Analysis
26.	7/31/2023	Defend Ballona Wetlands (Robert van de Hoek)	Email	In that spirit I would like to offer that the following topics must be added and addressed: …	See response to Comment No. 22. The project is committed to supporting the transition to a decarbonized energy future, and any discussions of blending in the Phase One studies are strictly related to end-user decisions for their specific applications, which are not within SoCalGas's control.	General

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				D. Study of EXACTLY how long it will take to remove Methane Gas from the Hydrogen/Methane Gas mix.		
27.	7/31/2023	Defend Ballona Wetlands (Robert van de Hoek)	Email	CBO compensation: When I was informed about the mandate from the CPUC to SoCalGas to form a group of Community Based Organizations to learn about and review plans for the Hydrogen Link, I was informed that participants would be receiving individual stipends directly for the time and effort we would be making. After I completed compensation forms, I was told differently, and have, thus, still been left not compensated as promised. The CPUC and SoCalGas may not be aware, but after 9-11, banks made the decision not to open accounts unless a group is incorporated – this was a huge change. Defend Ballona Wetlands is a community coalition, and we do not have a bank account. I hope that you can fix this situation and pay directly, as we have been told that would happen and have been patiently waiting for payment for 4 meetings now. Thank you for considering my comments.	SoCalGas provides compensation to non-profit organizations directly and not to individuals as payment for participation in stakeholder engagement meetings. Compensation will be provided in accordance with the Detailed Plan and Set of Procedures for Community Based Organization Compensation approved in Advice No. 61461. For smaller non-profit organizations that do not hold official 501(c)(3) status it is customary for fiduciary responsibilities to be handled by another 501(c)(3) organization on their behalf.	General
28.	7/31/2023	Environmental Defense Fund (Joon Hun Seong)	Email	EDF suggests that SoCalGas and Insignia Environmental examine all possible research and literature around this [hydrogen leakage]. Specifically, EDF recommends the following resources be included in the Phase One study: • Warwick, N. J., Archibald, A. T., Griffiths, P. T., Keeble, J., O'Connor, F. M., Pyle, J. A., and Shine, K. P.: "Atmospheric composition and climate impacts of a future hydrogen economy", Atmos. Chem. Phys. Discuss. [preprint], https://doi.org/10.5194/acp-2023-29, in review, 2023. • Hauglustaine, D., Paulot, F., Collins, W. et al. "Climate benefit of a future hydrogen economy", Commun Earth Environ 3, 295 (2022). https://doi.org/10.1038/s43247-022-00626-z • Bertagni, M.B., Pacala, S.W., Paulot, F. et al. "Risk of the hydrogen economy for atmospheric methane", Nat Commun 13, 7706 (2022). https://doi.org/10.1038/s41467-022-35419-7 • Fabien Paulot, David Paynter, Vaishali Naik, Sergey Malyshev, Raymond Menzel, Larry W. Horowitz, "Global modeling of hydrogen using GFDL-AM4.1: Sensitivity of soil removal and radiative forcing", International Journal of Hydrogen Energy, 46, Issue 24, 2021,13446-13460, ISSN 0360-3199, https://doi.org/10.1016/j.ijhydene.2021.01.088.	SoCalGas recognizes that hydrogen leakage is a critical issue that can have implications for safety and environmental impacts. The Hydrogen Leakage Assessment study will include a comprehensive review of existing studies, reports, and scientific literature on hydrogen leakage including the studies referenced by EDF ("As Climate Concerns About Hydrogen Energy Grow, New Tech Unveiled at CERA Week Delivers Unprecedented Results Measuring Leaks, Other Emissions"). Our goal is to integrate this knowledge into the design, operation, and maintenance of Angeles Link to minimize leakage and its associated impacts.	Hydrogen Leakage Assessment

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				• Ocko, I. B. and Hamburg, S. P.: "Climate consequences of hydrogen emissions", Atmos. Chem. Phys., 22, 9349–9368, https://doi.org/10.5194/acp-22-9349-2022, 2022. • Sand, M., Skeie, R.B., Sandstad, M. et al. "A multi-model assessment of the Global Warming Potential of hydrogen", Commun Earth Environ 4, 203 (2023). https://doi.org/10.1038/s43247-023-00857-8 • Esquivel-Elizondo, Sofia, Alejandra H. Mejia, Tianyi Sun, Eriko Shrestha, Steven Hamburg, and Ilissa Ocko. 2023. "Wide Range in Estimates of Hydrogen Emissions from Infrastructure." OSF Preprints. April 13. https://doi.org/10.31219/osf.io/unzrm Additionally, EDF recommends the following resource for leakage analysis included in the Phase One study, in particular related to detection technology. • Environmental Defense Fund, "As Climate Concerns About Hydrogen Energy Grow, New Tech Unveiled at CERAWeek Delivers Unprecedented Results Measuring Leaks, Other Emissions", March 5, 2023.		
29.	7/31/2023	Environmental Defense Fund (Joon Hun Seong)	Email	Phase One study should examine all other possible sources of hydrogen emissions, including, but not limited to, venting, and purging of hydrogen, in addition to hydrogen leakage; and include those other possible sources in Phase One study calculations.	SoCalGas acknowledges the importance of including various potential emission points, such as venting and purging, alongside hydrogen leakage. Potential sources of hydrogen leakage including venting and purging are considered in the Phase One Hydrogen Leakage Assessment study. The study assumes that any intentional venting of hydrogen would be captured and not emitted to the atmosphere as part of the Project (mitigation efforts can include recapturing vented hydrogen and re-routing to process).	Hydrogen Leakage Assessment
30.	7/31/2023	Environmental Defense Fund (Joon Hun Seong)	Email	Will hydrogen emissions be included and/or considered in the GHG emissions impact calculations? Will SoCalGas and Insignia provide a full range of GHG emissions considered?	The Greenhouse Gas Emissions Evaluation study is designed to assess the potential GHG emissions that may arise specifically from the combustion of hydrogen. Part of the Phase One study report will address hydrogen leakage and its potential relationship to GHG emissions.	Greenhouse Gas Emissions Evaluation
31.	7/31/2023	Environmental Defense Fund (Joon Hun Seong)	Email	Are SoCalGas and Insignia planning any empirical measurements around the emissions sources?	The scope of work and timeline for the Phase One emissions studies do not include empirical measurements. Total value chain and component-level leakage estimation approaches were evaluated to determine the best approach for conducting leakage estimation calculations for this study.	Greenhouse Gas Emissions Evaluation

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32.	7/31/2023	Environmental Defense Fund (Joon Hun Seong)	Email	Will NOx emissions include emissions related to industrial, commercial, or residential hydrogen combustion? EDF recommends that those sources be included if hydrogen use in relevant sectors are considered within the Phase One study.	The Demand Study assesses potential demand for clean renewable hydrogen for the mobility, hard-to-electrify industrial, and power generation sectors. The NOx and other emissions studies evaluate the potential for NOx and opportunities to reduce NOx from these sectors during Phase One. While the Phase One studies will focus on mobility, industrial, and power generation end-users, it is noted that it may be appropriate to consider emissions in the commercial sector in future phases.	Nitrogen Oxide and other Air Emissions Assessment
33.	7/31/2023	Environmental Defense Fund (Joon Hun Seong)	Email	The Phase One study should also cover adjustments necessary to achieve NOx emissions from hydrogen use that would be "no worse" than corresponding fossil fuel use, including any changes in after-treatment performance and generation load with hydrogen combustion.	Opportunities to control NOx emissions associated with hydrogen combustion, including changes to after-treatment performance and generation load, are included in the NOx and other air emissions assessment based on information currently available in the existing literature.	Nitrogen Oxide and other Air Emissions Assessment
34.	7/31/2023	Go Green Initiative (Jill Buck)	Email	My one suggestion would be to consider adding a vocabulary/glossary slide at the beginning of each session. There are stakeholders with varying degrees of understanding, and it might be good to do some level setting in the beginning, so they feel more confident with the subject matter.	Please see response to Comment No. 23. SoCalGas has prepared a "Living Library" of resources related to the Project and clean renewable hydrogen, and this includes a glossary of terms. SoCalGas will look to add session-specific glossary of terms as part of planning for future sessions.	General
35.	7/31/2023	Los Angeles Department of Water and Power (Jesse Vismonte)	Email	With respect to Angeles Link and one of its expressed goals to "enhance energy system reliability, resiliency, and flexibility," it is important that Phase 1 include two assessments of the proposed infrastructure against chronic and acute events that may threaten its operation. As LADWP decarbonizes its power system with variable energy resources like solar and wind, it will need green-hydrogen-fueled firm power generation to maintain system reliability and resiliency. It is critical that the green hydrogen supply is available when called upon. If not, this will directly threaten power system reliability and resiliency and result in load-shedding events. The path toward decarbonization will bring a growing reliance on electricity for end-use energy demand, which means disruptions to electricity will be more impactful to customers. One definition of resilience is the ability to anticipate, prepare for, respond to, and recover from potentially disruptive events, ideally while maintaining an adequate level of system function with minimum damage or adverse impact.	Energy system reliability and resiliency are critical concerns as California transitions to a decarbonized energy system. Clean renewable hydrogen could replace the role that natural gas currently plays in supporting on-demand power and, by extension, grid reliability and resiliency. As noted in the CEC's Draft 2023 Integrated Energy Policy Report (IEPR), in 2021, fossil gas made up about 40% of the state's total power generation mix and it continues to play "an important role in maintaining electric reliability because of its ability to be dispatched on command." (Draft 2023 Integrated Energy Policy Report, p. A-1, available at https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2023-integrated-energy-policy-report.) The 2023 Draft IEPR notes that research is "needed on the potential value of hydrogen as a firm dispatchable resource or long-duration energy storage for grid reliability." (*Id*. at p. 83.) *See also*, reliability discussion in response to Comment No. 19.	Pipeline Sizing & Design Study

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					The California Air Resources Board ("CARB") has also noted the role hydrogen can play in replacing natural gas to help decarbonize the electricity sector. For example, CARB's 2022 Scoping Plan considers four scenarios that CARB identified as a pathway to carbon neutrality—and all contemplated green hydrogen as a necessary component. (CARB, Final 2022 Scoping Plan, at 64, available at https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.) CARB explained that "[d]ecarbonizing the electricity sector is a crucial pillar" of meeting California's climate goals and "[h]ydrogen produced from renewable resources and renewable feedstocks can serve a dual role as a low-carbon fuel for existing combustion turbines or fuel cells, and as energy storage for later use." (*Id*. at pp. 109, 204.) In Phase One, clean renewable hydrogen's role in promoting grid reliability and resiliency will be considered at a high-level in the Pipeline Sizing and Design Criteria Study. SoCalGas will include an electric reliability literature review as part of the Pipeline Design and Configuration workstream. The primary purpose of the reliability literature review is to summarize the conclusions of relevant studies with respect to the use of hydrogen as a clean generation fuel to enable bulk electric grid reliability that are increasingly supplied by intermittent renewables and intraday energy storage.	
36.	7/31/2023	Los Angeles Department of Water and Power (Jesse Vismonte)	Email	One possible risk scenario, for example, threatens LADWP's transmission system infrastructure: during wildfires that encroach on LADWP's transmission system, it may result in reduced or the complete loss of electrical import capability. In such scenarios with concurrently high electrical load, it will become necessary to depend on local, firm generation to avoid widespread blackouts (e.g., hydrogen-fueled power generation at LADWP generating stations). Future hydrogen pipelines may be exposed to the same risks moving forward, especially if they are to import green hydrogen from outside the LA Basin (while recognizing limited local, in-basin hydrogen storage solutions exist). Resiliency risk assessments are becoming increasingly important in the face of climate-driven threats and are requiring energy planners to think carefully about the associated impacts and mitigative	Please see response to Comment No. 35. The Pipeline Sizing and Design Criteria study will consider resiliency and reliability at a high-level during Phase One and will address concepts related to system reliability, resiliency, and flexibility related to Angeles Link's operation as a clean renewable hydrogen transportation system and the broader California power sector.	Pipeline Sizing & Design Criteria

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				solutions. Besides wildfires, other risks include protracted heat waves, heavy precipitation, storm surge, sea-level rise, and earthquakes. Considerations of these events and their impacts to system resiliency must be assessed and incorporated into the Angeles Link studies. From LADWP's review of PAG meeting documentation, the idea of resiliency is largely absent in PAG meetings to-date. LADWP expects to participate more in PAG meetings moving forward. Thank you again for the opportunity to provide comments and do not hesitate to reach out to me with any questions.		
37.	7/31/2023	Parents, Educators/Teachers, and Students in Action (Sydney Rogers)	Email	With that being said, there is still some technical things, fear and stigma that the public will still have when it comes to a big company and a conglomerate that will be hard to wash off and it will take a lot more outreach, forums and understanding on your part than ours to build that trust that has been diminished due to land ownership, land taken, misuse and people not having opportunities like others for decades. From sitting for just two days, people are still seething from years of mistreatment that I know that most of us have nothing to do with but will have to deal with the consequences for sure. It was eye opening and from a macro social work perspective gave me such an insight on what environmental justice looks like and what kind of impact I could really do once I finish my MSW and get out into the world. As you may have noticed, I have been known to be inquisitive. I speak my mind, but I will always want to know the truth, the good and the bad and find an equal footing. That is the only way we can really find the true path I feel, and I think SoCalGas is on its way to something real. But (yes there is but) my time is valuable, and sitting there for hours takes a lot and coming back will take a lot more. My internship is over, and I am finishing school at the end of the year. But I want to stay involved. The good and the bad right? Let me know how I can be involved in some way.	Please see response to Comment No.1 and 23. SoCalGas will continue to provide transparency to and engage with the CBOSG and PAG members as the Phase One feasibility studies progress. In response to stakeholder feedback, SoCalGas has added the development of an Environmental Justice Community Stakeholder Engagement Plan to be implemented in Phase Two to gather information regarding community concerns and evaluate methodologies to mitigate impacts to historically marginalized communities. SoCalGas will also consider this feedback when developing stakeholder outreach activities in future phases of the project.	Environmental & Environmental Social Justice Analysis

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38.	7/31/2023	Protect Playa Now (Faith Myhra)	Email	According to CPUC's Order Number (3) Letter (e) in (REV. 1) A.22-02-007 Decision Approving the Angeles Link 12/13/2022, SoCalGas is required: "to conduct quarterly stakeholder engagement meetings, including quarterly meetings with Planning Advisory Group members. SoCalGas shall also identify and invite participation from community-based organizations that may potentially be impacted by the Project, including disadvantaged communities and environmental social justice groups, in either the quarterly Planning Advisory Group meetings or some other stakeholder engagement process." Though SoCalGas is conducting these meetings quarterly thus far, they are not covering all the necessary information at these quarterly meetings resulting in the necessity of CBO stakeholders needing to attend additional workshops to cover the essential information in the 'Study Description'. This has resulted in CBOs that do attend these extra workshops being overburdened with having to give more time than originally committed to fully represent their community, and other representatives not being able to attend these additional workshops and not being able to fully represent their community. Though I appreciate that SoCalGas, and their facilitating partners put together these workshops when they received feedback that CBO stakeholders did not feel like they got enough information, I do not think that was sufficient for properly adhering to environmental justice principles or conducting robust stakeholder engagement meetings. I feel strongly the answer is extending our next deadline 'Phase 1 Study Technical Approach' and covering all the information over 2 quarterly meetings. This will lessen the unexpected burden on CBO Stakeholders while still allowing us to represent our communities and give feedback. Considering how large a project it is, and the impact it will have on communities, energy infrastructure, climate goals, and public funds, we need to take the proper time. I asked about the length of the process to 2 SoCalGas employees at the last-minute workshop on July 19, 2023, and they implied the short timeline was coming from the CPUC. I have since emailed asking for confirmation on if it is the CPUC or SoCalGas who insisted on the short timeline and have not yet received a response. On February 17, 2022, SoCalGas estimated to the CPUC that Phase 1 would take approximately 12-18 months. At the moment it is on a schedule of 13 months, which is clearly not enough time. I do not believe this rushed process is indicative of responsible engagement.	SoCalGas values the time and contributions of all stakeholders involved in the Angeles Link Project and acknowledges the concerns raised about the additional time commitment required to participate in extra workshops. For each milestone, SoCalGas provides detailed material for each applicable study based on the milestone, which are discussed during the workshops and quarterly meetings. SoCalGas's primary objective is to focus on member-driven questions to enhance feedback from the PAG/CBOSG members. The additional interim meetings are held to give members ample opportunity to engage in a deeper analysis into the details of each study and provide additional feedback. We also note that in Q3, SoCalGas extended the schedule for stakeholder study review to provide additional opportunities for input. Through SoCalGas's memorandum account application, we proposed that Phase One would be completed in 12-18 months and estimated the $26 million that was approved in Decision 22-12-055 for memo account treatment to complete Phase One work within this timeline. PAG/CBOSG members will have the opportunity to provide feedback for all milestones (Scope of Work, Technical Approach, Preliminary Findings and Draft Reports) throughout the Phase One process.	General

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39.	7/31/2023	Protect Playa Now (Faith Myhra)	Email	According to CPUC's Order Number (8) Letter (b) in (REV. 1) A.22-02-007 Decision Approving the Angeles Link 12/13/2022, SoCalGas is required to: 'proactively identify and invite the involvement from CBOs, including ESJ and DAC groups, that are equipped to serve the communities that will be impacted by the Angeles Link Project.' It has become very clear that most of the local tribes are not represented in the process. Environmental Justice requires them to be represented in this process. Stakeholders have raised these concerns on multiple occasions. The answer we keep hearing is, "we will work on it" but thus far that has not happened.	To date, SoCalGas has reached out to and engaged with several tribal organizations, including the Los Angeles Indigenous People's Alliance, California Native Vote Project, and Comunidades Indigenas en Liderazgo (CIELO), which are now members of CBOSG. Additionally, we are in ongoing discussions with representatives of local, non-federally recognized tribes to encourage their participation in the PAG and/or the CBOSG. Also, as noted in response to Comment No. 37, a community-based stakeholder engagement plan is being prepared as part of the Environmental & Environmental Social Justice analysis. Native American tribes are one of the many potential stakeholder groups that will be identified in the plan. More direct outreach with stakeholders will be included in subsequent phases of the project when preferred project alignment and routes have been identified.	Environmental & Environmental Social Justice Analysis
40.	7/31/2023	Protect Playa Now (Faith Myhra)	Email	According to CPUC's Order Number (8) Letter (a) in (REV. 1) A.22-02-007 Decision Approving the Angeles Link 12/13/2022 SoCalGas is required to: "provide compensation to CBOs for their participation which may include a per-diem stipend for participation at quarterly stakeholder meetings." I am a part of a CBO that is grassroots and unincorporated. All our members are volunteers and already give what little time they have serving and raising the voices of our community. However, we have been told that in the absence of incorporation they cannot pay individuals. The only solution they have offered is fiscal sponsorship with an incorporated organization. This has proven to be difficult as now I am having to take more time that I as a volunteer don't have to try and find an organization that 1) shares most of our CBO's values and 2) is willing to take a check from a fossil fuel company (not something most environmental justice groups are willing to do understandably.) This puts an unnecessary burden on participating CBO Stakeholders. I just received an email from Emily Grant letting me know they are going to try and approach the CPUC and discuss options for compensating individual stakeholders. I hope that the CPUC works with her in resolving this obstacle. It has come to my attention that several of the CBO Stakeholder organizations take regular donations from SoCalGas. Though I don't believe this should exclude them from participating in this important	Please see response to Comment No. 27. Per stakeholder request, SoCalGas met with Energy Division shortly after the issuance of Advice No. 61461. At the meeting, Energy Division and SoCalGas agreed to continue implementing the previously approved protocol.	General

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				process, I do believe it should be transparent to the other CBO Stakeholders and the CPUC.		
41.	7/31/2023	Protect Playa Now (Faith Myhra)	Email	It is clear the CPUC required these engagement meetings to create transparencies and gather valuable stakeholder feedback. I have concerns that SoCalGas is not being honest in this process. At the quarterly meeting on June 22, 2023, SoCalGas employee, Neil Navin, responded to a question stating that there are 2,000 miles of Hydrogen pipelines currently in the United States. At the workshop on July 19, 2023, SoCalGas employee, Amy Kitson, responded to a question stating that there are 1,600 miles of Hydrogen pipelines currently in the United States. The lack of consistent numbers concerns me greatly. This either implies that their senior employee on the project does not understand the current use of hydrogen for energy in the United States or they use what number best suits them. At the workshop on July 22, 2023, SoCalGas employee, Darrell Johnson, stated in his presentation that Hydrogen is not a greenhouse gas. Hydrogen is an indirect greenhouse gas. I feel his answer was purposely misleading. He also said that the IPCC report did not find that Hydrogen has a greenhouse gas impact on the planet. The IPCC report, in fact, did not study Hydrogen's indirect greenhouse gas impact on the planet and it won't address it until the next report in 2026. This is a serious manipulation of the facts to benefit the bottom-line of SoCalGas.	Please see response to Comment No. 1. Per the transcript taken on June 22, 2023, for the quarterly meeting, Mr. Navin stated that there were "less than 2,000 miles", which aligns with the figure provided by the Congressional Research Service. According to the Congressional Research Service: "As of December 2020, there were 1,608 miles of hydrogen pipeline in the United States." Please see 'Pipeline Transportation of Hydrogen: Regulation, Research, and Policy' available at: https://crsreports.congress.gov/product/pdf/R/R46700 By comparison, Europe is planning to build tens of thousands of miles of hydrogen pipelines by 2040 to connect countries with each other and with projects that generate, store and transport hydrogen. According to the EHB's 2030 hydrogen infrastructure map, a total length of approximately 28,000 km in 2030 (17,400 miles) and 53,000 km by 2040 is envisioned in the 28 European countries involved with 23,365 km of dedicated hydrogen pipelines available by 2030. The comment regarding greenhouse gases made during the workshop was intended to convey that, as of now, the Intergovernmental Panel on Climate Change (IPCC) has not assigned a Global Warming Potential (GWP) value to hydrogen. We recognize that scientific understanding and research on this topic are continually evolving, and we are committed to staying informed about the latest findings and incorporating them into our discussions and analyses.	General
42.	7/31/2023	Protect Playa Now (Faith Myhra)	Email	At the workshop on July 19, 2023, SoCalGas employee, Katrina Regan, stated: "So simply stated, to become a fire hazard, hydrogen must first be confined." This entire project revolves around confining and containing Hydrogen. This alone makes me concerned. At the workshop on July 19, 2023, the news broke that there was a Hydrogen explosion in Kern County at a bus fueling station. (This was	Hydrogen gas has been safely used in the industry for over 100 years. When safety incidents do occur, important lessons are learned so that we can enhance and strengthen our existing safety practices. Part of our Angeles Link Phase 1 safety study will evaluate natural gas and hydrogen incidents like this one to help inform the engineering design	Plan for Applicable Safety Requirements

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				while we were discussing safety at the workshop). A CBO Stakeholder shared this information in the zoom chat. SoCalGas did not address the comment. A CBO Stakeholder who was attending in person raised their hand and shared this information. SoCalGas stated that they did not want to speculate on the event and moved on. The CBO Stakeholder group has still not gotten any response from SoCalGas on this current and relevant event.	of Angeles Link as a hydrogen transport system that maximizes safety for our customers and the communities we serve. The facilities involved in the Kern County incident are not operated by SoCalGas, and we understand based on publicly available information that a thorough investigation is currently underway to determine the cause and any contributing factors.	
43.	7/31/2023	Public Advocates Office (Arthur Fisher)	Email	To enable a fair comparison between potential alternatives and ensure the widest range of reasonable alternatives for evaluation by stakeholders and the Commission, a local hub scenario should be developed and evaluated in the following studies identified in the Scope of Work: • Water Resource Evaluation; • Demand Study; • Production Planning & Assessment; • High-Level Economic Analysis & Cost Effectiveness; • Project Options and Alternatives; • High-Level Feasibility Assessment & Permitting Analysis; • Preliminary Routing/Configuration Analysis; • Environmental & Environmental Social Justice Analysis; and • Greenhouse Gas Emissions (GHG) Evaluation. A local hub scenario should assess the availability of the precursors for hydrogen generation and the feasibility of generating hydrogen near the main source of demand. Such a scenario would evaluate both the existing water and energy transmission infrastructure, and the ability to expand such infrastructure to facilitate the development of hydrogen generation near the main source of demand. Both pipeline and hub scenarios should be informed by the Demand Study and the Water Resource Evaluation, but additional analysis of	Consistent with the requirements in the Final Decision, Ordering Paragraphs 5(e) and 6(d), Phase One will involve the evaluation of the Project against a range of options or "project alternatives", including a localized hydrogen hub option, that may meet the Project's purpose, and compare such costs and potential environmental impacts. Angeles Link is intended to fulfill several underlying purposes, including supporting California's decarbonization goals as set forth in full in the Scope of Work Descriptions document. The Project Options and Alternatives Study will identify and provide a detailed description of a potential localized hydrogen hub. The High-Level Economic Analysis and Cost Effectiveness Study will evaluate the costs associated with and the cost effectiveness of the localized hydrogen hub. That study will determine a methodology to measure cost effectiveness that includes evaluating cost estimates, performing economic analysis to determine the potential levelized cost of clean renewable hydrogen to be delivered to end-users, and comparing the cost effectiveness of the Project against various project alternatives. The preliminary routing and configuration study will identify and evaluate pipeline criteria to be considered for preferred route selection. These criteria fall into three main categories of engineering, environmental, and social analysis. The pipeline sizing & design criteria study will include a literature review and report of relevant studies that assess the use of hydrogen as a clean generation fuel to enable bulk electric grid reliability in grids that are primarily supplied by intermittent renewables, imports, and intraday energy storage. The Environmental and Social Justice Study will also provide a high-level analysis of the potential environmental impacts of the localized	Demand Study

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				existing energy infrastructure, as well as potential land use and zoning constraints is also needed.	hydrogen hub, including impacts related to air quality and potential greenhouse gas emissions. In addition, the Demand Study includes a locational factor, which when integrated with the Production Planning & Assessment Study, will inform the pipeline scenarios, including the localized hydrogen hub. The analysis summarized above will provide the opportunity to evaluate the Project against a potential localized hydrogen hub alternative.	
44.	7/31/2023	Public Advocates Office (Arthur Fisher)	Email	During the July 20, 2023, PAG workshop, SoCalGas confirmed that its analysts would be assessing water availability across the whole of the LA Basin; this would include the availability of raw, waste, and brine water sources that could be used as for hydrogen generation. Looking at these water sources is a good start towards evaluating the widest range of solutions. SoCalGas should also assess the spare capacity and/or feasibility of expanding existing capacity to electrical infrastructure to support a hub. In addition, SoCalGas should identify land use and zoning opportunities and barriers that would affect development of a hydrogen hub. The availability of both existing water and energy in concert with zoning and land use opportunities are likely to drive the ultimate location of hydrogen generation and thus the need for hydrogen transmission pipelines.	Water availability is being evaluated as part of the Phase One Water Resources Study. Evaluating the technical feasibility to address spare capacity or expanding existing electrical transmission/distribution capacity to support a hydrogen hub is not currently being evaluated in Phase One of the Angles Link Project. The above assessment could be included in future phases of the Angeles Link Project. Clean renewable hydrogen production will be reviewed in the Production Study and the associated costs will be considered in the High-Level Economics and Cost Effectiveness Study. The Production Study will use third-party data sets that factor in land use opportunities and barriers (e.g., cultural and environmentally sensitive areas, wetlands, highways, transmission lines). Zoning opportunities for hydrogen production are not currently being evaluated in the Phase One Production Study. Land use designations for hydrogen production are being evaluated as part of the Phase One Environmental Study.	Water Resource Evaluation
45.	7/31/2023	Public Advocates Office (Arthur Fisher)	Email	Cal Advocates recognizes that development of these studies is an iterative process. Both pipeline and hub scenarios can be informed by and in turn inform the GHG studies, Environmental & Environmental Social Justice Analysis, and the High-Level Feasibility Assessment & Permitting Analysis. Ultimately, as a part of the analysis SoCalGas should compare the cost effectiveness and feasibility of a transmission pipeline solution against a local hub solution. For both hub and pipeline scenarios SoCalGas should provide clear and concise descriptions, including all assumptions and parameters used to define the scenarios. Indeed, a hub system could well be a “least-regrets” start if broader hydrogen initiatives move more slowly or if greater hazards than benefits arise with the installation of a hydrogen pipeline crossing the entirety of the LA Basin.	Please see response to Comment No. 43.	High-Level Economic Analysis & Cost Effectiveness

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46.	7/31/2023	Public Advocates Office (Arthur Fisher)	Email	A hub versus pipeline comparison provides the greatest contrast in potential solutions to the development of hydrogen infrastructure. By using two distinct planning scenarios i.e., one that assesses the feasibility of co-locating hydrogen generation with the demand versus a scenario that assumes the hydrogen generation will be located at a distance from demand, SoCalGas will avoid prematurely precluding potentially viable alternatives. Further, the use of two distinct planning scenarios would enable both stakeholders and decisions makers to fully understand the trade-offs that would be necessary to develop hydrogen infrastructure in California.	Please see response to Comment No. 43.	Production Planning & Assessment
47.	7/31/2023	Reimagine LA Foundation (Rashad Rucker-Trapp)	Email	I will admit that it was very complex and sometimes hard to follow. How do we simplify that so the organization when the time comes down explains to the community without losing them? Maybe more visuals.	Please see response to Comment No. 23. SoCalGas agrees that the Phase One study materials are very complex. In an effort to enhance our outreach and engagement efforts, SoCalGas will continue to condense technical information and add more visuals to CBOSG presentation materials to help simplify messaging. We have also changed the format of our quarterly meetings to engage in breakout sessions with subject matter experts and facilitators. We are also open to your ongoing feedback on how to better engage with our stakeholders.	General
48.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	If awarded by the Department of Energy (DOE), how [will] a localized hydrogen hub work in conjunction with the Angeles Link along with efforts to produce and store hydrogen at the Intermountain Power Project (IPP).	ARCHES was selected to receive up to $1.2 billion in funding from the Department of Energy to produce and create a market for renewable hydrogen in California. For additional information about ARCHES' vision, please see ARCHES' fact sheet at https://archesh2.org/wp-content/uploads/2023/10/Meet-Arches_October-2023.pdf. Distinct from the ARCHES hub, which is statewide, D.22-12-055 requires SoCalGas to evaluate the feasibility of a localized clean renewable hydrogen hub in the Los Angeles Basin. Please refer to Comment No. 43 for additional information about the evaluation of a localized hub as an alternative to Angeles Link. While Phase One is assessing in-state hydrogen generation, we remain open to the possibility of incorporating clean renewable	Project Options and Alternatives

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					hydrogen produced outside of California. This approach aligns with the vision outlined in the Department of Energy's Hydrogen Roadmap, which contemplates the development of interconnected hydrogen infrastructure that spans across regions, which could include out-of-state production or storage such as that at IPP.	
49.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The potential to combine efforts with the state H2 Hub along with the IPP efforts are needed to ensure duplicative efforts are not being undertaken.	Please see response to Comment No. 48, In addition, SoCalGas acknowledges this comment and will continue to coordinate with ARCHES and other entities to avoid duplicative efforts.	Project Options and Alternatives
50.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Clear definitions for the localized H2 Hub and project alternatives should be provided to ensure transparency and understanding.	Please see response to Comment No. 43. In addition, SoCalGas will be defining the localized hydrogen hub and project alternatives definitions in the Project Options and Alternatives Study.	Project Options and Alternatives
51.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	It is recommended to clarify the terminology for “project alternative” for clarity and consistency.	Please see response to Comment No. 43. In addition, SoCalGas acknowledges this comment and will make sure to be clear in our terminology in all materials and presentations.	General
52.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The project goals should be more specific, and particular emphasis on public health considerations should be addressed.	The purpose and need of Angeles Link, including the benefits to air quality and public health, are discussed in Application 22-02-007 and CPUC Decsion.22-12-055 and will be further addressed in the environmental impacts study. There is literature including the Green Hydrogen Coalition, HyBuild Los Angeles Phase 2 Report: Architecting the Green Hydrogen Ecosystem Vision For a Deeply Decarbonized LA[1] that “quantify some of the significant community benefits — including air quality, public health, and job creation — that can be realized from the HyBuild LA vision.”	Project Options and Alternatives Study
53.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The analysis of project alternatives should incorporate current natural gas consumption for the residential sector.	The residential sector is outside the scope of the Project.	Project Options and Alternatives
54.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Mobility (vehicles) usage is currently a substantial demand for Renewable Natural Gas (RNG), and its inclusion in the analysis will be crucial.	SoCalGas understands this comment to request consideration of usage of RNG as a potential alternative to the Angeles Link Project.	Project Options and Alternatives

[1] The report is available at https://static1.squarespace.com/static/5e8961cdcbb9c05d73b3f9c4/t/641cc20e09d7604ba7839c4f/1679606290577/GHC-HyBuild-LA-Phase-2-Report.pdf.

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					The Project Options and Alternatives Study will identify potential alternatives to the project, including potential non-hydrogen project alternatives. RNG is being evaluated as an alternative to the Project.	
55.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	In addition to hydrogen pipeline delivery, SoCalGas should explore the feasibility of localized microgrids along with local hydrogen hubs as potential alternatives.	With respect to the analysis of a potential localized hydrogen hub, please see Response to Comment No. 43. While localized microgrids are outside the scope of the Phase One study, we acknowledge the growing interest in the use of clean renewable hydrogen for clean backup power and microgrids and may be included in future phases of the Project.	Project Options and Alternatives
56.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Anticipate the potential demand for hydrogen demand in transportation for both Heavy-Duty and Light-Duty vehicles by 2027 along with incorporating hydrogen demand for fuel cell locomotives along with other uses for hydrogen such as cargo handling equipment, back-up generators, and power generation in microgrids for changing battery electric trucks and vehicles.	The Demand Study evaluates potential demand for clean renewable hydrogen through 2045 across the mobility, power generation, and industrial sectors. Analysis of the mobility sector includes potential demand from heavy-duty vehicles, medium-duty vehicles, and off-road vehicles (e.g., cargo handling equipment, ground support equipment, agriculture, construction and mining, commercial harbor craft, and ocean going vessels). Fuel cell locomotives were not covered in this phase of the demand analysis but may be considered in future phases. In addition, hydrogen demand for Light-Duty Vehicles was not included in this phase as there is a considerable debate on share of FCEVs in the Light-Duty sector, which complicates its forecasting. For the power generation sector, the Demand Study is also designed to encompass a broad spectrum of potential uses for clean renewable hydrogen, including cogeneration and backup power applications, which are integral to the reliability and resiliency of our energy systems. While the current phase of the Demand Study is focused on cogeneration needs and the role of clean renewable hydrogen in natural gas peaker plants, SoCalGas acknowledges the growing interest in the use of clean renewable hydrogen for clean backup power and microgrids. Although clean renewable hydrogen demand associated with these technologies are not currently quantified,	Project Options and Alternatives

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					SoCalGas notes that they could serve to drive hydrogen demand beyond that currently assessed in the Demand Study. During future phases of Angeles Link, we anticipate refining our understanding of clean renewable hydrogen demand. This will involve a more detailed consideration of various off-take opportunities, which could include the potential integration of clean renewable hydrogen into clean backup power and microgrid solutions.	
57.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Cost analysis for hydrogen production should provide delivered pipeline cost on a per kg basis for hydrogen compared to other delivery methods such as a local hub or transport by trucks and/or rail.	The High-Level Economic Analysis and Cost-Effectiveness Study analysis will include clean renewable hydrogen delivery cost on a $/kg basis for the Project and will compare these costs to a localized hub and non-pipeline hydrogen alternatives.	High-Level Economic Analysis & Cost Effectiveness
58.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Current electricity market rates reflect periods of time when renewables are curtailed due to overgeneration. Renewable overgeneration periods result in inexpensive electricity that can be used for electrolysis. However, other efforts like the IPP and local hydrogen hub may also be focused on using these periods of inexpensive electricity for hydrogen production and the resulting cost benefit for hydrogen production is no longer valid. Analysis needs to be conducted to ensure the electricity prices used in future scenarios account for other hydrogen production from other projects.	The Production Planning & Assessment Study will assess the potential for clean renewable hydrogen production using curtailed renewables, considering factors that may impact the outlook of forecasted curtailments.	High-Level Economic Analysis & Cost Effectiveness
59.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The analysis should take into consideration the Low Carbon Fuel Standard (LCFS) credits to determine cost-effectiveness.	The High-Level Economic Analysis and Cost-Effectiveness Study scope includes LCFS credits to help determine cost-effectiveness.	High-Level Economic Analysis & Cost Effectiveness
60.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Environmental considerations related to air quality impacts should be explicitly addressed.	The NOx and Other Air Emissions Assessment will evaluate the potential for air quality emissions and reductions.	Environmental & Environmental Social Justice Analysis
61.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Estimate of jobs created with living wages should be provided along with an assessment of the available versus needed workforce capacity to support hydrogen production and transport with a pipeline.	High-level estimates will be created that address workforce capacity during both construction and operation of Angeles Link for temporary and permanent job creation as part of the Workforce Planning & Training Evaluation.	Workforce Planning & Training Evaluation

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62.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The technical approach for the demand study should clarify collaborative efforts with regulatory agencies such as the air districts and California Air Resources Board (CARB), as well as Original Equipment Manufacturers (OEMs) involved in the hydrogen production.	The Demand Study involves market participant interviews and peer review sessions with entities such as academic, regulatory or government agencies (state and federal) when possible, to provide objective feedback on approach, assumptions, and outputs. This will be noted in the study.	Demand Study
63.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Alignment with the DOE H2 roadmap and any national plans related to hydrogen pipelines should be part of the market validation.	The Demand Study is informed by the DOE H2 Roadmap as well as other reports and if available, will take into account projects that have been publicized and that may be part of hydrogen hub efforts.	Demand Study
64.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	It is imperative to assess the demand not only for prime power generation but also for clean backup power generation and the support of microgrids.	Please see response to Comment No. 56.	Demand Study
65.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The analysis of demand should consider the potential future demand created by federal/state hydrogen hub efforts to ensure the project's long-term viability.	SoCalGas is collaborating with ARCHES as a part of the statewide hydrogen hub efforts, and the Demand Study will be informed by the ongoing ARCHES efforts.	Demand Study
66.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Reference to South Coast AQMD's latest 2022 Air Quality Management Plan (AQMP), which outlines air quality goals and Zero Emission (ZE) technology adoption rates in the project region, should be an integral part of the project evaluation.	The NOx and Other Air Emissions Assessment will reference and consider the South Coast AQMD's 2022 Air Quality Management Plan.	Nitrogen Oxide and other Air Emissions Assessment
67.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The demand study should explore new sectors that were not previously served by Compressed Natural Gas (CNG), as hydrogen can serve both combustion and electricity generation purposes.	The Demand Study explores fuel switching which includes both diesel and natural gas in the mobility and power generation sectors and does not look at sectors with significant CNG use.	Demand Study
68.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The reliability of Renewable Energy and Clean Renewable Hydrogen Generation Technologies should be assessed in the overview.	Part of the pipeline sizing & design criteria study will include a literature review of electric reliability studies in California. The purpose of the report is to find and summarize the conclusions of relevant studies that assess the use of hydrogen as a clean generation fuel to enable bulk electric grid reliability in grids that are primarily supplied by intermittent renewables, imports, and intraday energy storage. The report will also identify and summarize any additional benefits or challenges mentioned by the subject studies.	Project Options and Alternatives
69.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Calculation approaches and methodologies should account for direct emissions as well as any potential air quality impact analysis.	The NOx and Other Air Emissions Assessment will evaluate the potential for emissions and reductions during Phase One. Modeling may be considered during future phases.	Nitrogen Oxide and other Air Emissions Assessment

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70.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The analysis of NOx emissions from combusting hydrogen in mobility applications should be considered.	The NOx and Other Air Emissions Assessment will evaluate the potential for emissions and reductions in the mobility sector based on the data from the Demand Study. It was assumed that the vehicles analyzed utilize hydrogen fuel cells.	Nitrogen Oxide and other Air Emissions Assessment
71.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The overview of the hydrogen leakage assessment should clarify whether it will primarily involve modeling or also include assessments of leakage detection methods.	The potential for leakage and mitigation of leakage will be evaluated during Phase One. This includes the assessment of existing leakage measurement and detection methods. Modeling may be considered for inclusion in future studies.	Hydrogen Leakage Assessment
72.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Different leakage rates for liquid and gaseous storage should be considered when assessing potential environmental impacts.	Research on both liquid and gaseous leakage assessments will be evaluated during Phase One based on best available science regarding hydrogen storage to inform the study's leak estimates.	Hydrogen Leakage Assessment
73.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The technical assessment of GHG emissions should specify whether it focuses on direct emissions or considers the entire life cycle analysis.	The GHG Evaluation assessment will focus on direct GHG emissions associated with combustion and indirect GHG associated with non-renewable electricity production to power production, storage, and transmission of clean renewable hydrogen associated with Angeles Link. Lifecycle assessments for hydrogen are not being evaluated under Phase One.	Greenhouse Gas Emissions Evaluation
74.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	GHG evaluation needs to consider the Carbon Intensity (CI) of hydrogen in this project and its alternatives, incorporating Life Cycle Assessment (LCA).	Lifecycle assessments for hydrogen are not being evaluated under Phase One.	Greenhouse Gas Emissions Evaluation
75.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Delivered pipeline hydrogen should have a carbon intensity associated with it based on production and transport scenarios.	Lifecycle assessments for hydrogen are not being evaluated under Phase One.	Greenhouse Gas Emissions Evaluation
76.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	It should be clarified if the tools used for GHG emissions evaluation or other tools developed during this project will be made accessible to the public.	Emissions calculations approaches were shared in the Technical Approach document for all Phase One studies on September 7th, 2023. The information used in calculating GHG emissions estimates will be part of the final report that will be available publicly.	General
77.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The overview should indicate what outreach to Disadvantaged Communities (DACs) is planned as part of the analysis.	As discussed in response to Comment No. 37, based on feedback received from the CBOSG, SoCalGas is adding a stakeholder engagement plan to the Environmental & Environmental Social Justice analysis. Expanded direct outreach with stakeholders including DACs will be included in subsequent phases of the project	Environmental & Environmental Social Justice Analysis

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					when preliminary project alignment and routing alternatives have been identified.	
78.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The analysis of NOx and GHG emissions, as well as leakage, should consider the specific locations and timings of emissions/leaks to assess their impact on Disadvantaged Communities (DAC) or other sensitive populations. Utilizing census tract-level data available from CARB EMFAC will enhance the precision of the assessment.	The parallel NOx Emissions Assessment and the GHG Emissions Evaluation will evaluate the potential for emission increases and reductions through mitigations. Geo-mapping will be incorporated to identify anticipated NOx impacts in DACs.	Environmental & Environmental Social Justice Analysis
79.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	Consideration should be given to potential work with refineries or ports regarding existing pipelines.	The Demand Study includes the potential clean renewable hydrogen use at the ports and refineries.	Project Options and Alternatives
80.	7/31/2023	South Coast AQMD (Aaron Katzenstein)	Email	The evaluation criteria should encompass material comparability studies for using existing pipelines and the assessment of relevant standards.	An initial materials evaluation assessment will be completed as part of Phase One.	Preliminary Routing/Configuration Analysis
81.	7/31/2023	Southern California Water Coalition (Charley Wilson)	Email	The question I had that did not appear to be asked was on the water access, capacity, and availability in the production of hydrogen. How are you planning to address the water needs for hydrogen production and how will that drive costs to your project?	Water needs for clean renewable hydrogen production are being addressed in SoCalGas's Water Resources Evaluation Study, which will identify potential water sources (e.g., recycled water, advanced treated water, surface water through water exchanges) that third-party producers may choose to draw upon for clean renewable hydrogen production. The identified potential recycled water sources will be summarized. More details on the potential water sources that feed specific clean renewable production projects, including the location of those sources and how those sources may be moved to production facilities as necessary, will be further evaluated and developed on a case-by-case basis as more details on specific production projects are developed by third-party producers. The Water Resources Evaluation Study will be used in the production study as part of the evaluation of the feasibility of clean renewable hydrogen production in Central and Southern California.	Water Resource Evaluation
82.	7/31/2023	Southern California Water Coalition (Charley Wilson)	Email	Since hydrogen production is energy intensive, how do hydrogen producers plan to access needed energy, particularly along the coast, for production needs? How does this impact line route, siting and easement need for your project?	The Production Planning & Assessment Study will evaluate renewable resources necessary for clean renewable hydrogen production, considering resource constraints (such as land). Production results will be incorporated into the Preliminary Routing/Configuration Analysis and considered in the formation of potential Angeles Link system configurations and routing.	Production Planning & Assessment

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83.	7/31/2023	Southside Coalition of Community Health Centers (Andrea Williams)	Email	In regard to providing feedback, I really did not see anything wrong with the Scope of Work Descriptions. I have a bachelor's degree in Biological Sciences and started my career in the sciences doing research at USC and City of Hope and I worked as a Scientific Writer for the Children's Oncology Group working on clinical trial protocols for children with cancer, so I am very familiar with the protocols and research studies. The information presented is the basics of how the study is going to be carried out. Since I am not an expert in this type of research, I can't assess whether the approach is sound or not, but they seem like they are all feasible studies to conduct. I think if there were something like potential adverse events that could occur from doing the studies or impacts to the community from the actual research that I could have expressed an opinion but since that was not included, I really didn't have anything to say. I think once the results are completed, and we can see potential impacts that will be able to provide feedback on whether the studies should move forward.	Comment is noted. We look forward to your continued engagement and insights.	General
84.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	SoCalGas's refusal to use transparent processes in Phase 1 violates the Commission's decision. In Q1 2023 feedback UCAN and other PAG members asked SoCalGas to share the scope of work for each of the studies. UCAN specifically asked for: • proposed study inputs and assumptions • the scope of work and work product that it plans to require of its contractors. • data collected by itself and its consultants as those data become available. At the June 28th meeting, SoCalGas stated that it would provide the scopes of work for the 16 proposed studies. The July 18th and July 20th meetings were scheduled to discuss scopes of work. Prior to the July PAG meetings, SoCalGas shared scope of work "descriptions" but did not distribute the scopes of work. During the July 20th meeting, PAG members again asked for the full scope of work rather than the summaries that SoCalGas provided to the PAG. SoCalGas claimed that it could not release the contracts because "there is confidential business information in our contracts with our vendors." SoCalGas also attempted to bar the CPUC's Public Advocates Office from viewing the contracts by stating that SoCalGas is completing Phase 1 outside a formal proceeding. SoCalGas's decision to sign secret contracts conflicts with its transparency claims. SoCalGas asked to track the costs of Phase 1 so that	Please see response to Comment No. 1.	General

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				it would have the opportunity to request cost recovery at some future point. The PAG and the public need to know what work SoCalGas has asked its contractors to complete in Phase 1. It is unreasonable for SoCalGas to ask future hydrogen ratepayers to pay for work with unknown conditions, scopes, and work products. SoCalGas should release the Phase 1 contracts to the PAG and the Commission. The Angeles Link decision, D.22-12-055, stated that "The PAG is a useful vehicle for providing transparency into the Angeles Link planning process and providing feedback to SoCalGas on Project options and alternatives." SoCalGas fails to meet.		
85.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	SoCalGas should stop using the PAG for promotional purposes if it intends to request cost recovery for Phase 1. D.22-12-055 does not allow SoCalGas to track expenses of promotional work. The decision stated that "SoCalGas may not record any costs for outreach and public relations activities in the Angeles Link Memo Account in Phase One." SoCalGas continues to spend time and money on promotional events, materials, staff, and contractors. A short list of some of SoCalGas's promotional efforts include: • Staffing Phase 1 with public relations employees and contractors. • Encouraging PAG members to attend a promotional tour of its hydrogen home during SoCalGas's July 18, 2023, PAG meeting. • Including promotional materials and language within documents distributed to the PAG and the CBOSG. For example, the Angeles Link Study Descriptions document included a long list of talking points promoting hydrogen. The list was labeled as "underlying purposes." • Including promotional materials for hydrogen on the Angeles Link page of the SoCalGas website. o Press releases o Promotional materials labeled as newsletters. o Promotional materials labeled as fact sheets. o A media interview of a SoCalGas executive o Multiple videos advertising hydrogen and SoCalGas projects.	SoCalGas acknowledges the distinction made in Decision D.22-12-055 between permissible stakeholder engagement activities and prohibited promotional work. We are aware of the decision's stipulation that costs associated with outreach and public relations activities are not to be recorded in the Angeles Link Memorandum Account. The efforts made to engage with the PAG and CBOSG members, including the provision of materials, the involvement of staff, and the engagement of contractors, are solely for the purpose of facilitating stakeholder engagement. These activities are essential for gathering feedback, addressing concerns, and providing information necessary for stakeholders to participate effectively in the Angeles Link planning process and are in compliance with Decision D.22.12-055.	General

No.	Comment Date	PAG/CBOSG Stakeholder Name and Organization	Email or Letter?	Comment	SoCalGas Response	Topic
86.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	All Phase 1 studies must rely on independent data sources. Over multiple years, SoCalGas stands to make billions of dollars in profit on hydrogen infrastructure. Under some scenarios that SoCalGas reviewed in its pre-feasibility studies where hundreds of miles of hydrogen pipeline would be built. This profit potential demonstrates that SoCalGas has a conflict of interest with regards to the outcome of the Angeles Link Phase 1 studies. For that reason, in its feedback provided for the SoCalGas's Q1 2023 report, UCAN proposed various options for minimizing the impact of the conflict of interest on the study's results. As of today, SoCalGas has not selected any of the recommendations that UCAN has proposed for minimizing SoCalGas's conflict of interest. Because SoCalGas has not taken actions to reduce the effect of its conflict of interest on the Phase 1 studies, it should commit to only using source data for its inputs and assumptions that come from independent sources. The Phase 1 studies should not use source materials that were funded by the fossil fuel industry including Sempra Energy companies such as SoCalGas.	SoCalGas is using credible non-biased third-party consultants in addition to independent third-party data sources to perform and inform the Phase One feasibility studies.	General
87.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	SoCalGas should evaluate hydrogen alternatives, pipeline alternatives, and provider alternatives. D.22-12-055 requires SoCalGas to complete "[e]valuation of the cost-effectiveness of the Project against alternatives, which should include a localized hydrogen hub or electrification option and determining the methodology to measure cost-effectiveness between the alternatives." The Alternatives study needs to evaluate three types of alternatives (1) hydrogen alternatives, (2) pipeline alternatives, and (3) provider alternatives. Some of the alternatives in each type are listed below. This list of alternatives is not exhaustive. • Hydrogen alternatives o Renewable energy delivered directly to the electricity grid. o Battery storage o Thermal storage o Renewable energy generation built with high curtailment assumptions. • Pipeline alternatives o Local hydrogen hub o Electricity delivery through existing electric transmission lines from distant hydrogen fired generators or distant hydrogen-fed fuel cells o Electricity delivery through new electric transmission lines o Hydrogen production on-site by end users o Industrial users moving production facilities to the site of hydrogen production to reduce hydrogen transportation costs. o Floating refueling hubs outside of the LA Basin for marine shipping • Provider alternatives o Regulated utility other than SoCalGas (e.g., Southern California Edison) o Municipal utilities (new or	Please see response to Comment No. 48. In addition, the Project Options & Alternatives and the High-Level Economic Analysis & Cost Effectiveness studies will compare the Project against a localized hub and other alternatives that include 1) non-hydrogen alternatives, such as electrification and in/near basin production and 2) hydrogen delivery alternatives, such as trucking, train and shipping. Please see the Scope of Work Descriptions for Phase One Studies, provided to PAG members on July 6, 2023, and the Technical Approach for Phase One Studies, provided to the PAG members on September 7th, 2023, for more information regarding those two studies.	Project Options and Alternatives

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				existing) o Unregulated hydrogen suppliers (non-utility) o Unregulated Sempra Energy companies.		
88.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	The Demand Study should include numerous inputs and outputs. Each alternative listed in the previous section should be analyzed as a component of the demand study. Hydrogen costs, alternatives to hydrogen, and hydrogen suppliers – other than regulated utilities – all impact customer demand for utility-supplied hydrogen. High hydrogen costs will reduce hydrogen demand. Hydrogen alternatives (e.g., electrification) will reduce hydrogen demand. Hydrogen suppliers other than SoCalGas will reduce hydrogen demand for SoCalGas-supplied hydrogen. Unless the Legislature bans fossil fuels, then some end users may continue to use polluting forms of energy including natural gas, grey hydrogen, and petroleum-based fuels. This possibility should be incorporated into D.22-12-055, p. 76. 5 in the demand study. One of the more interesting analyses will be utility-supplied hydrogen compared to customers producing their own hydrogen on site. All analyses should include the effect of the Inflation Reduction Act (IRA) on renewable energy pricing, battery pricing, hydrogen production pricing, and other effects the IRA may have. The IRA subsidy inclusion should be explicitly labeled and should show the effect on the hydrogen market both during the years of IRA subsidies and after the expiration of the IRA subsidies. Hydrogen demand forecasts by year should be provided. If Project built, hydrogen demand forecasts by year through 2050 will be a critical input for determining the optimal on-line date for the infrastructure. Hydrogen demand forecasts should include more than the total demand by year, it should also include demand by end use by year for at least 5 hydrogen cost levels. The hydrogen cost levels should be (1) current costs (2) the DOE's $1/kg cost goal (plus the cost of all delivery infrastructure required to get the hydrogen to the end customer, SoCalGas profits, financing costs, O&M costs, and other costs); (3) three cost points distributed green hydrogen & DOE goal costs.	Clean renewable hydrogen costs, production and supply, and overall alternatives will be covered in the High-Level Economic Analysis and Cost Effectiveness, Production Planning and Assessment, and Project Options and Alternatives studies, respectively. The Demand Study will consider clean renewable hydrogen alternatives at the end-user level across the three sectors modeled: mobility, power generation, and industrials. Regarding the cost of clean renewable hydrogen, please refer to response to Comment No. [129] The forecasted cost of clean renewable hydrogen is an important factor in projecting adoption and will need to be assessed in future phases of the Angeles Link project. The cost of clean renewable hydrogen was not considered in the Demand Study given its dependency on forecasts of to-be-determined system wide factors in Angeles Link Phase One and the need to simplify assumptions in order to arrive at an initial estimate of total potential clean renewable hydrogen demand volumes in SoCalGas territory. SoCalGas will utilize forecasts of clean renewable hydrogen costs to refine demand volumes in future phases.	Demand Study

No.	Comment Date	PAG/CBOSG Stakeholder Name and Organization	Email or Letter?	Comment	SoCalGas Response	Topic
89.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	SoCalGas should complete its hydrogen demand study, distribute the study, and receive PAG feedback on the study before determining if other studies should be completed. To some extent, SoCalGas continues to treat the 16 studies as independent and able to be completed by its consultants without the outcome of one study affecting another study. The 16 studies should be completed in a logical order with early studies determining the inputs and assumptions for later studies. The market assessment and alternatives (MAA) studies include the demand study (Demand), production planning and assessment study (Production), high level economic analysis and cost effectiveness study (Cost), and the project options and alternatives study (Alternatives). The MAA studies not only impact each other, they form the basis for inputs and assumptions for every other study. If SoCalGas finds a low demand for hydrogen, it would be reasonable to make significant changes to the scopes of each of the other studies or conceivably discontinue the rest of Phase 1. Before launching any of these 4 studies, SoCalGas should ask the PAG to provide feedback on the initial inputs and assumptions. Once SoCalGas has concluded the first round of MAA studies, it should ask the PAG for input on the results and whether additional rounds of MAA studies should occur. SoCalGas should also gather feedback from the PAG on whether the MAA studies indicate such low demand that SoCalGas should discontinue further Phase 1 work.	SoCalGas recognizes the role of the Demand Study in informing the other Phase One studies. To integrate the outcomes of the Demand Study appropriately into subsequent analyses, we have expedited its timeline. Accordingly, SoCalGas has facilitated discussions on the preliminary outputs of the Demand Study during meetings held with the CBOSG and PAG on August 28th and 29th. Following these initial discussions, SoCalGas provided a more in-depth presentation of the study's methodology, assumptions, and outputs on September 29th. SoCalGas agrees that the Demand Study analysis and outputs will continually inform and help guide other Angeles Link Phase One studies in their assessments.	Demand Study
90.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	The Commission did not authorize SoCalGas to complete a franchise analysis. SoCalGas proposed a franchise analysis as one of its 16 studies. D.22-12-055 did not approve a franchise analysis. Such an analysis only benefits SoCalGas shareholders and should not be part of Phase 1. If the Commission determines that some form of the Angeles Link should be built by some regulated entity, numerous companies may be interested in offering hydrogen under the Commission's regulatory structure. Because hydrogen can be produced and delivered by such diverse means, there is no reason that Californians should be forced to take hydrogen delivery from SoCalGas.	Consistent with the Decision, as part of Phase One, SoCalGas will identify and compare possible routes and configurations of a clean renewable hydrogen transportation pipeline (Ordering Paragraph P6(i)). In order to compare possible routes and configurations, SoCalGas will evaluate existing franchise agreements currently in place as well as the terms of those agreements and whether new/updated franchise agreements are warranted for a clean renewable hydrogen transportation pipeline. Gathering this information is necessary to make informed decisions when identifying and comparing preliminary routing alternatives and configurations.	Franchise Analysis

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				Moreover, the Commission itself does not make franchise agreement decisions. Each city or county in which a utility proposes regulated hydrogen service will determine its interest in signing a franchise agreement. Individual cities or counties may agree to a franchise agreement with utilities other than SoCalGas. It would also be reasonable for local jurisdictions to decide that regulated hydrogen service is not in the interest of its citizens if a local jurisdiction contains very few or no hydrogen customers. If SoCalGas does end up with future hydrogen ratepayers, those future hydrogen ratepayers should not pay for a franchise study benefiting SoCalGas in its competition with other utilities. Completing this type of study in Phase 1 reduces the likelihood that the Commission will grant cost recovery for Phase 1 spending.		
91.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	SoCalGas should remove Aliso Canyon closure from Angeles Link documents because Aliso Canyon will likely close before any Angeles Link option would be operational. SoCalGas's documents highlight the "ultimate retirement" of Aliso Canyon as a benefit of the Angeles Link. However, multiple studies note that Aliso Canyon can be closed soon without impacting gas or electric energy reliability. For example, the CPUC's Energy Division issued a staff proposal for the closure of Aliso Canyon by 2027. The current Angeles Link timelines appear to show hydrogen transportation will occur after the closure of Aliso Canyon. For that reason, Aliso Canyon should not be referenced in the Angeles Link planning. However, if SoCalGas continues to claim that Angeles Link will reduce the use of Aliso Canyon, it needs to include Aliso Canyon as a specific component of the Demand analysis and quantify the percentage reduction in natural gas storage for each demand forecast in the demand analysis.	SoCalGas has historically used Aliso Canyon to help balance energy supply and demand to meet seasonal and peak demand requirements and meet system reliability. SoCalGas believes that introducing a clean renewable hydrogen energy transport system into the Los Angeles Basin such as Angeles Link would serve multiple purposes and needs, including to provide clean alternative fuel that could help alleviate natural gas demand served by Aliso Canyon, supporting (along with other clean energy projects and reliability efforts, such as those being evaluated in the SB 380 Proceeding (I.17-02-002)) a path to its ultimate closure while maintaining energy system reliability. By way of example, analysis from Black & Veatch indicates that peak day in-basin natural gas-burn could be reduced by providing clean renewable hydrogen to electric generation facilities, such as the four Los Angeles Department of Water and Power (LADWP) facilities. (See CPUC, I.17-02-002, Sur-Rebuttal Testimony of Deepa Poduval (Feb.8, 2023), p. 2.) The Demand Study also notes that LADWP plans to eventually implement conversions in other gas plants like the Harbor and Haynes and Valley Generating Station. Using LADWP's plans to convert the 830 MW Scattergood plant to 100% clean renewable hydrogen as an example, it is expected that hydrogen will be highly prioritized as an alternative fuel in the power sector, which could reduce reliance on natural gas stored at Aliso Canyon.	General

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92.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	The regulatory, policy and environmental studies should be placed on hold until the market assessment and alternatives studies have been completed and reviewed by the PAG. Each of the regulatory, policy and environmental (RPE) studies depend on inputs from the MAA studies. Without the completed MAA studies, SoCalGas cannot accurately scope the work for the RPE studies. Any spending on the RPE studies prior to completion of the MAA studies could result in unrecoverable expenditures. PAG members are unable to provide comments on scope of the RPE studies at this time because the MAA studies have not been completed and the results have not been shared.	The Regulatory, Policy, and Environmental workstream studies are being executed concurrently with other studies in compliance with CPUC Decision 22-12-055. As identified in the Decision, "Given the confluence of current events, including recent federal statutes, regional initiatives, and local interests, public interest is served if SoCalGas begins conducting feasibility studies of the Angeles Link Project immediately." Phase One study data and preliminary information generated is being shared across workstreams and used as input when it is available in order to maintain efficiencies between and among the studies.	High-Level Feasibility Assessment & Permitting Analysis
93.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	The engineering design studies should be placed on hold until all other Phase One studies have been completed and reviewed by the PAG. The engineering design studies depend on all the other studies in Phase One. SoCalGas cannot study project engineering for all the distinct options for hydrogen supply and hydrogen alternatives without the results from all other Phase One studies. PAG members are unable to provide complete comments on the scope of the engineering design studies at this time because the market assessment and alternatives (MAA) studies and the regulatory, policy, and environmental (RPE) studies have not been completed and the results have not been shared.	Please see response to Comment No. 92. In addition, the engineering design studies are being executed concurrently with the other studies.	Preliminary Routing/Configuration Analysis
94.	7/31/2023	Utility Consumers Action Network (Tyson Siegele)	Email	SoCalGas needs to evaluate each alternative to the Angeles Link with the same rigor it evaluates the Angeles Link option. D.22-12-055 requires SoCalGas to evaluate "the cost-effectiveness of the Project against alternatives, which should include a localized hydrogen hub or electrification option and determining the methodology to measure cost-effectiveness between the alternatives." Before SoCalGas moves forward with the cost effectiveness evaluation, it should provide the evaluation methodology to the PAG for review. If SoCalGas does not request feedback on the methodology, it risks applying a flawed methodology in its cost-effectiveness study. These methodologies should incorporate study of each of the alternatives proposed by PAG members and use the same rigor for studying the alternatives as it does for evaluating the Angeles Link.	Please see response to Comment No. 87. The methodology for the Project Options and Alternatives and Cost-Effectiveness Studies were provided in the September PAG meeting.	Project Options and Alternatives
95.	7/31/2023	Society of Native Nations (Lydia Ponce)	Email	In May 2023, Alma Marquez and SoCalGas pledged to reach out to me offline to facilitate contact with local tribal leaders and elders. However, regrettably, this promise was never fulfilled, leaving me without any opportunity to liaise with these essential stakeholders.	Thank you for bringing your concerns to our attention. Please see response to Comment No. 39. More direct outreach with stakeholders including Tribes will be included in subsequent phases	General

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				Furthermore, I was repeatedly denied invitations to participate in the meetings until a third party finally provided me with the necessary information. This exclusionary approach is unacceptable and undermines the principles of inclusivity and genuine community engagement. Recently, I received a formal invitation to participate in the meetings, but to my dismay, it did not include any opportunity for me to act as a liaison with tribal leaders. This is especially concerning as to my knowledge, no tribal leaders, including but not limited to the Chumash, Gabrielino, Tonvga, and Ajachamen tribes, have been invited to participate in these discussions. I asked for an update at the last meeting, and they noted my question. No one from SoCal Gas or Lee Andrews Group could provide an answer. To assure equity and access, on my part for the local tribal people, to the meetings provided by SoCal Gas. I felt it legally necessary to communicate during the meeting and in the chat with everyone. It is imperative that my participation does not count for Indigenous consultation and Indigenous Consent. I wrote this message in the chat during our meeting and shared verbally during the recorded zoom meeting, serving as a public record.	of the project when final project alignment and routes have been identified.	
96.	7/31/2023	Society of Native Nations (Lydia Ponce)	Email	Of additional concern is the fact that SoCalGas and the Lee Andrews Group are allegedly considering the Oaxacan immigrant community as part of their tribal outreach efforts. Yes, they are, however, it is essential to recognize that the historic stewards of the land are the local tribes, and they must be accorded the utmost priority and respect in such consultations.	Please see response to Comment No. 39.	General
97.	7/31/2023	Society of Native Nations (Lydia Ponce)	Email	Equally troubling is the abrupt change in remuneration policy. Initially, it was communicated that individuals could be compensated for their time attending the meetings, considering that many community-based organizations (CBOs) are not registered as 501-c-3s. However, after a few meetings, we were informed that only organizations would be eligible for payment. This sudden change in policy reflects a lack of consistency and	Please see response to Comment No. 27.	General

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				transparency, which is deeply disconcerting. At this juncture, I am not concerned about any honorarium, nor am I interested. As a matter of fact, my participation is to support the local tribal people and a proper consultation and consent process to be fulfilled.		
98.	7/31/2023	Society of Native Nations (Lydia Ponce)	Email	Additionally, during the last meeting, we were promised a roster of all participants, recordings, and transcriptions of the discussions. However, to date, we have received none of these crucial resources, which only serves to further undermine the already questionable legitimacy of this outreach process. The entire outreach process undertaken by SoCalGas seems nothing more than a mere formality to 'check the box' that they have completed it, without any genuine community engagement or consideration for the concerns and rights of indigenous communities. It appears that the corporation is merely seeking to greenwash their image without taking concrete actions to address the real issues at hand.	Please see response to Comment No. 23.	General
99.	7/31/2023	Society of Native Nations (Lydia Ponce)	Email	Lastly, it is distressing to note that the commencement of these meetings is routinely wasted with trivial icebreakers and discussions of topics irrelevant to the core concerns at hand. Our time is invaluable, and SoCalGas's blatant disregard for this fact raises serious doubts about their commitment to meaningful dialogue.	Your comment is noted, and stakeholder feedback is welcome as SoCalGas strives to continually enhance its stakeholder and feedback activities.	General
100.	8/1/2023	Ballona Wetlands Institute (Marcia Hanscom)	Email	While I have been asked to provide feedback on the Phase 1 Study Topics for the Angeles Link, I'm not exactly clear on the purpose of this feedback. Is it to provide information on what should be included when an environmental review, as required by CEQA (California Environmental Quality Act) and NEPA (National Environmental Policy Act) are undertaken? I'm presuming there will still be a scoping session when these reviews are officially underway. So, I will provide whoever the reader is of some initial comments, but please realize these are not meant to be exhaustive nor complete.	As part of SoCalGas's effort to provide transparency to the PAG/CBOSG members and in compliance with Decision 22-12-055, SoCalGas has proposed a study milestone review and feedback process. PAG and CBOSG members have been provided the opportunity to review descriptions of work for each Phase One feasibility study (Milestone or Step 1), technical approaches (i.e., methodology or Step 2), data and preliminary findings (Step 3), and study draft reports (Step 4). We are still in Phase One of the Angeles Link Project, which consists of feasibility studies. The applicable California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) analysis will be conducted in future phases.	General
101.	8/1/2023	Ballona Wetlands	Email	Missing from the list of the "Scope of Work Descriptions for Phase One Studies" is an analysis of the impacts of this proposed project on the	A high-level desktop review of the project's potential impacts to natural resources, including habitat and sensitive species, are included	

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		Institute (Marcia Hanscom)		biodiversity of the State of California – which is part of the California Floristic Province and is one of the world's biodiversity hotspots. Governor Newsom has declared - as a matter of policy – that we must preserve 30% of the land and water in this state in order to contribute in any meaningful way toward relieving some of the worst impacts of climate change. Scientists who have researched this issue have calculated that it is more like 50% of the land and water that must be preserved to make this policy realistic. While it may not seem clear to the lay person why this is so important, to those who have taken a hard look at what our industrial society has contributed to our changing climate, the soils, the trees, the bushes, the grasslands, the wetlands – they all are storing and./or sequestering carbon – and the more these natural methods of storing and sequestering carbon can take on, the better.	as part of the Environmental & Environmental Social Justice Analysis scope. More in-depth environmental review will be conducting during future project phases as more details about the project are developed.	
102.	8/1/2023	Ballona Wetlands Institute (Marcia Hanscom)	Email	The second glaring omission in the list of the "Scope of Work Descriptions for Phase One Studies" is a serious comparison of the renewable energy resources we are using now (the ones we KNOW work and are contributing to the change in our energy grid NOW), vs. the highly experimental and many years-away ability to use Hydrogen WITHOUT mixing it with the highly dangerous greenhouse gas of methane that would need to be used in order to change over to Hydrogen. It has become clear to me and others through the meetings and workshops I've attended to date that the continued use of methane gas combined with Hydrogen will be necessary for years to come – and that – while there are those who are predicting that might change in the future, there is no research or verifiable data that supports such an unrealistic outcome. While I and others can be sympathetic to SoCalGas' desire to use it existing rights of way for another use besides transporting methane gas (i.e., Hydrogen) – the idea – and it appears to be merely an "idea" of replacing methane gas with hydrogen is not feasible. A third-party feasibility study should be undertaken related to this topic.	Project alternatives, including decarbonization options such as electrification are considered and evaluated in the Project Options and Alternatives Study and the Environmental and Social Justice Analysis. As noted in response to Comment No. 36, please note that SoCalGas is not alone in recognizing the important role that hydrogen can play in decarbonizing California. For example, in CARB's 2022 Scoping Plan, all scenarios that CARB identified as a pathway to carbon contemplated green hydrogen as a necessary component. (CARB, Final 2022 Scoping Plan, at 64, available at https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.) On August 8, 2023, Governor Newsom issued a directive to multiple state agencies to develop a hydrogen market development strategy that focuses on leveraging hydrogen to accelerate clean energy deployment and the decarbonization of transportation and industrial sectors. Hydrogen used in the mobility sector is also well-established. The California Energy Commission, which provides quarterly updates regarding the amount of hydrogen refueling stations in the state, indicates that there are 111 existing and planned stations, with the largest amount of stations concentrated in Los Angeles County. (See CEC, Hydrogen Refueling Stations in California, available at https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/hydrogen-	Production Planning & Assessment

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					refueling.) Please also see response to Comment No. 91 discussing the Demand Study.	
103.	8/1/2023	Ballona Wetlands Institute (Marcia Hanscom)	Email	The third thing that jumps out at me after attending these initial meetings in terms of something missing from the list of the "Scope of Work Descriptions for Phase One Studies" is a commitment to closing the Aliso Canyon methane gas storage facility and the Playa del Rey methane gas storage facility. Both facilities have been shown to be dangerous and are too close to surrounding communities to continue to operate. If indeed SoCalGas is convinced we eventually will need less and less methane gas in the conversion plans to Hydrogen, then these two facilities need to be studied for decommissioning as soon as possible -with a goal of closing them within the next 3 to 5 years.	Assessing current natural gas storage facilities for decommissioning is not within the scope of the Phase One activities. For further response related to Aliso Canyon, please see response to Comment No. 91.	Pipeline Sizing & Design
104.	8/1/2023	Ballona Wetlands Institute (Marcia Hanscom)	Email	When I was informed about the mandate from the CPUC to SoCalGas to form a group of Community Based Organizations to learn about and review plans for the Hydrogen Link, I was under the impression that participants would be receiving individual stipends directly for the time and effort we would be making. That was the understanding I brought to the leadership of Ballona Wetlands Institute. After I completed compensation forms, I was told differently, and have, thus, still been left not compensated as promised. I've been told that SoCalGas may be appealing to the CPUC to make allowances for this individual compensation, and I'd like to add my voice to get that change to happen quickly. Besides my own situation, there are others participating who I know are affiliated with community-based organizations that do not have bank accounts. After 9-11, banks do not easily open accounts – in fact, I'm not sure they do at all – if a group is not incorporated, which many community-based organizations are not.	Please see response to Comment No. 27.	General
105.	8/17/2023	Ballona Wetlands Institute	Email	Is there any word from the CPUC about payment options? It makes no sense that community based organizations that would rather have their representatives involved with this project could not receive individual stipends, as SoCalGas provides to other independent contractors. (Or	Please see response to Comment No. 27.	General

No.	Comment Date	PAG/CBOSG Stakeholder Name and Organization	Email or Letter?	Comment	SoCalGas Response	Topic
		(Marcia Hanscom)		some CBOs are even unable to otherwise receive such funds because they don't have bank accounts.) Without funding, it's challenging to justify the time commitment to these meetings, including meetings we were not originally envisioning or planning for. I believe that the reason the CPUC required the funding was because they were aware that it's a hardship for smaller CBOs to take time to attend and properly prepare for these meetings. 1. Could we please get an answer on this topic? (I was told you all were going to seek a change in the conditions from CPUC so you could pay stipends directly to those requesting that - what is the status?) 2. Is there a person at CPUC you could direct us to speak with? (would it help for us to support your request?)		
106.	9/25/2023	Food and Water Watch (Andrea Vega)	Email	Phase One of the SoCalGas Angeles Link Project once again failed to provide substantial answers to the concerns of the Community Based Organizations Stakeholder Group (CBOSG) during meetings and workshops. As a member of the CBOSG, Food & Water Watch remains doubtful of the feasibility, utility, reliability, and safety of the proposed Angeles Link Project. We are not confident that SoCalGas prepared for an energy infrastructure project of this scope. There has yet to be a strong argument for the necessity of this project and there is still a lack of transparency from SoCalGas to the Community Based Organization (CBO) members. We also want to reiterate our previous concern regarding the insufficient notice on upcoming workshops and quarterly meetings, as well as the insufficient time to present feedback on the materials presented. It is clear that this process is being rushed and SoCalGas has little interest in substantial feedback from the CBOSG.	See response to Comment No. 23. SoCalGas strives to provide thorough responses to questions during CBOSG stakeholder meetings. Responses to questions received in writing or not addressed during in-person meetings will also be captured in the response to comment tracker included in the quarterly report. The purpose of Phase One is to perform feasibility studies for the Angeles Link project, which will assess numerous topics, including those concerning demand, safety and reliability. In addition, the several underlying purposes that Angeles Link is intended to fulfill were provided in the Project Options & Alternatives Scope of Work.	General

No.	Comment Date	PAG/CBOSG Stakeholder Name and Organization	Email or Letter?	Comment	SoCalGas Response	Topic
107.	9/25/2023	Food and Water Watch (Andrea Vega)	Email	Market Assessment & Alternatives When looking at non-hydrogen alternatives, electrification should be at the forefront. SoCalGas must also consider any legislative or policy mandates that demand or accelerate a transition to electrification across any sectors related to the Project. Any evaluation of hydrogen delivery alternatives must also examine the health and safety risks associated with such alternatives. If SoCalGas is considering having hydrogen delivered by trucks, the members of the CBOSG should be provided with a list of potential truck models, along with any history of hydrogen leaks and/or explosions associated with those models. For in-basin hydrogen production, SoCalGas should examine what hazards frontline communities would face in such a scenario. Furthermore, given that in-basin hydrogen production is an alternative which contradicts what SoCalGas representatives have promised CBO members repeatedly during meetings (that such production would not be explored whatsoever given that the Project would solely be about the transportation of hydrogen), it is deeply concerning that this is being considered as an alternative.	The Project Options and Alternatives Study, the High-Level Economic Analysis and Cost Effectiveness Study, and the Environmental and Social Justice Analysis will identify and evaluate a range of alternatives to Angeles Link that may meet the project's purpose and objectives and will compare those alternatives to Angeles Link. Those alternatives will include non-hydrogen alternatives (e.g., electrification) and hydrogen delivery alternatives (e.g., trucking). Separate analyses will evaluate the cost effectiveness of Angeles Link as compared to the alternatives identified for further study and the environmental impacts of Angeles Link as compared to those alternatives. With respect to analyzing a specific alternative that considers in-basin hydrogen production, the Final Decision, Ordering Paragraphs 5(e) and 6(d) require an evaluation of a localized hydrogen hub alternative, with hydrogen production by third-party hydrogen producers and end users in close proximity. For further information related to the localized hydrogen hub, please see response to Comment No. 43. In addition, the Plan for Applicable Safety Requirements will evaluate the safety concerns related to Angeles Link and develop an assessment of appliable safety requirements for employee, contractor, system, and public safety. Pipeline transportation is generally regarded as one of the safest methods for transporting gases, benefiting from established safety protocols and advanced monitoring technologies. Although our current Phase One studies do not include a detailed safety assessment of each alternative, SoCalGas may consider information about the safety aspects of proposed alternatives in evaluating alternatives.	Project Options and Alternatives
108.	9/25/2023	Food and Water Watch (Andrea Vega)	Email	Regulatory, Policy, & Environmental Given California's finite water resources during this ongoing, historic drought, it is crucial that any water resources availability analysis also provide an estimate of how much water is needed annually for the project including the cooling, treatment, disposal, powering, and sourcing of hydrogen, as well as projected water usage for the first ten years of operation. An analysis of annual water usage for alternatives, such as solar and wind, should be included as well so that the CBOSG can	SoCalGas understands that water resources in California are finite and that drought conditions can limit the amount of water available for hydrogen production. Consistent with CPUC Decision 22-12-055, SoCalGas will identify potential sources of clean renewable hydrogen generation and water and estimate the costs of the clean renewable hydrogen (Ordering Paragraph 6.b.). SoCalGas's Angeles Link Phase One Water Resources Evaluation is currently evaluating the estimated water needed to meet the potential demand scenarios identified in the Demand Study and identifying the potential water sources that third-	Production Planning & Assessment

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				provide an informed response. When looking at the potential water sources for the Project, the analysis should also include how drought conditions are affecting the area where those sources are located, not just how it would affect the Project but how those conditions are and could continue to impact local communities.	party hydrogen producers may draw upon to produce clean renewable hydrogen. The Environmental and Social Justice Analysis will review potential environmental impacts at a high level related to the production of the clean renewable hydrogen that would be transported by Angeles Link, including potential impacts related to water use. The specific water resources that clean renewable hydrogen production projects may draw upon will be developed on a case-by-case basis as more details on specific production projects are developed. The Angeles Link Project will not be producing hydrogen, only transporting clean renewable hydrogen via pipelines from hydrogen producers to various demand centers. It would ultimately be up to the individual hydrogen producers to secure the necessary water for clean, renewable hydrogen production. More in-depth analysis of the potential environmental impacts and impacts to local communities related to that water usage can be further studied as those projects develop. For further response, please see response to Comment No. 13. Additionally, SoCalGas will include an environmental analysis as part of the overall evaluation of project alternatives. The Environmental & Social Justice Analysis will include environmental analysis of alternatives to enable a comprehensive consideration and evaluation of Project Alternatives, per the Final Decision Ordering Paragraph 5(e).	

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109.	9/25/2023	Food and Water Watch (Andrea Vega)	Email	The study done on NOx emissions and greenhouse gas (GHG) emissions should evaluate the climate and public health risks of those emissions, and whether those possible NOx and GHG emission levels resulting from the Project would contradict California's climate goals. The study must also examine the existing emission levels in the local communities where the Angeles Link Project pipelines would be going through, where the compressors would be located, as well as where the power generation units would be located.	Although Decision 22-12-055 requires SoCalGas to assess NOx emissions, including appropriate controls to mitigate NOx emissions, public health studies are not currently included in the Phase One NOx and GHG studies. This topic is currently being analyzed by a host of other stakeholders. As part of the HyBuild Los Angeles initiative, the Green Hydrogen Coalition worked with the University of California, Irvine, to analyze some of the quantifiable community impacts of a clean hydrogen ecosystem, demonstrating significant improvements in air quality and related public health impacts. (Green Hydrogen Coalition, HyBuild Los Angeles Phase 2 Report: Architecting the Green Hydrogen Ecosystem Vision For a Deeply Decarbonized LA, p. 24)[2]. The analysis shows that replacing fossil fuel combustion technology with clean hydrogen fuel cells in a variety of land-based mobility sectors reduces exposure from both ozone and $PM_{2.5}$ and would result in public health benefits throughout the South Coast Air Basin, including avoided hospitalizations, fewer lost workdays, fewer incidences of disease resulting in reduced mortality, and more. (*Id*. at p. 52.) Additionally, while our Phase One analysis will be examining the compression needs for a clean renewable hydrogen pipeline, we are not identifying the specific locations of compressor stations and their associated impacts in this phase in the project.	Nitrogen Oxide and other Air Emissions Assessment
110.	9/25/2023	Food and Water Watch (Andrea Vega)	Email	A comprehensive plan must be presented to the CBOSG regarding SoCalGas' emergency response in the event of a hydrogen leak, and the protocol for how SoCalGas would report and work with local and state government entities in the event of a leak.	As part of Angeles Link Phase One, a desktop and literature review will be conducted to incorporate the latest information on operational and safety programs and procedures for clean renewable hydrogen infrastructure. The studies will include review of existing processes, technology, reporting, compliance, and safety notifications with specific focus on emergency response protocols.	Workforce Planning & Training Evaluation
111.	9/25/2023	Food and Water Watch (Andrea Vega)	Email	Engineering Design When assessing repurposing existing gas pipelines for the Project, it is crucial for the CBOSG to be informed of leakage rates and risks for repurposed pipelines. When evaluating the storage of hydrogen, there	The potential for leakage and mitigation opportunities associated with storage and transmission of hydrogen is being evaluated in the Hydrogen Leakage Assessment. This includes underground storage, above ground storage, and pipelines.	Hydrogen Leakage Assessment

[2] The report is available at https://static1.squarespace.com/static/5e8961cdcbb9c05d73b3f9c4/t/641cc20e09d7604ba7839c4f/1679606290577/GHC-HyBuild-LA-Phase-2-Report.pdf.

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				must also be transparency on the risks associated with both underground and aboveground storage.	Repurposing of existing natural gas pipelines will be evaluated at a high level within the parallel study, Pipeline Sizing & Design Criteria Study.	
112.	9/25/2023	Food and Water Watch (Andrea Vega)	Email	SoCalGas needs to provide a list of potential pipeline routes, as well as a list of manufacturers and suppliers for the Angeles Link Project to the CBOSG.	Potential project alignment and routes will be shared once preliminary findings and data have been evaluated as part of Phase One of the Project. Detailed equipment and material lists would be developed in future phases of the Project and could include potential manufacturers and suppliers. SoCalGas has a strong commitment toward supplier diversity, demonstrated through a 30-year history of exceeding the spending goal with diverse business enterprises set by the CPUC.	Preliminary Routing/Configuration Analysis
113.	9/25/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	Email	Scope of Work We remain concerned about the lifecycle impacts of hydrogen and the wisdom of pursuing such a massive project, particularly knowing that many of the end uses that are currently being considered in the Los Angeles Basin do not fall under the “difficult to electrify” classification. We believe that a better use of time would be to figure out how to specifically support the sectors with no direct electrification alternatives, rather than creating a large supply of hydrogen for end uses where there might be better options.	In the Demand Study, within each sector there is an assessment of potential alternatives to clean renewable hydrogen. This assessment will consider whether there are other options to hydrogen for end-users for decarbonization purposes and how those could limit clean renewable hydrogen adoption. In addition, there will be a separate Angeles Link Phase One study that will specifically assess options and alternatives to Angeles Link.	Demand Study
114.	9/25/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	Email	We are also concerned about the many ways that the potential pathways laid out in this study will increase pollution in already overburdened communities, an example being the potential of using trucks to move hydrogen around our communities, which poses safety and environmental justice risks, and will contribute to traffic.	Environmental impacts of potential alternatives to the Angeles Link Project such as trucking will be described in the environmental analysis report. One of the purposes of the Angeles Link Project is to reduce the need for heavy trucking transport of hydrogen thereby reducing the pollution and traffic impacts to various communities in Central and Southern California.	Environmental & Environmental Social Justice Analysis
115.	9/25/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	Email	We also find some of the arguments laid out to be disingenuous, knowing that SoCalGas is actively working against them, an example being the supposed desire to reduce natural gas storage at Aliso Canyon. If this project is going to be held up as an energy solution, it needs to ensure that it is not supplanting better alternatives like direct electrification.	The Project Options and Alternatives Study will evaluate a range of alternatives to Angeles Link that may meet the project’s purpose and objective and will compare those alternatives to Angeles Link. Those alternatives will include non-hydrogen alternatives (e.g., electrification) and clean renewable hydrogen delivery alternatives (e.g., trucking). The project’s purpose that will inform development of the alternatives includes supporting the state’s decarbonization goals. Separate analyses will compare the cost-effectiveness and environmental impacts of Angeles Link against those of the identified alternatives.	Alternatives Analysis

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116.	9/25/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	Email	Our concerns for this document stem from some of the specific inclusions that we, and many in the space of environmental justice, find to be unacceptable. Major examples are the repurposing of existing methane pipelines to transport hydrogen, the potential of using steam methane reformation instead of electrolysis, and the inclusion of biomass and biogas in the definitions of "clean, renewable" hydrogen. We are concerned that even the conservative estimate assumes hydrogen will be used for baseload generation, as we know that the direct electrification of the grid is the most efficient pathway to 100% clean energy and are opposed to hydrogen combustion for electricity generation.	The comments that pertain to the Production Planning Assessment study relate to the definition of clean renewable hydrogen and whether non-electrolytic sources should be included in the definition. CPUC Decision 22-12-055, Ordering Paragraph 3(a) states, "feasibility studies for the Angeles Link Project shall be restricted to the service of clean renewable hydrogen that is produced with a carbon intensity equal to or less than four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram and does not use any fossil fuel in its production process." As a result, while clean renewable hydrogen produced via electrolysis is central to Angeles Link, the Production Study also includes other potential technology pathways (biomass/biogas) that could meet the Decision's definition of clean renewable hydrogen. Please see response to Comment No. 35 for a discussion of the potential role clean renewable hydrogen can play for on-demand power and, by extension, grid reliability and resiliency.	Production Planning & Assessment
117.	9/25/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	Email	We're also curious about the modeling used to predict risks associated with climate change, and what metrics SoCalGas is using to determine the indirect warming potential of leaked hydrogen.	The GHG study will include a table summarizing the range of GWP 20 and GWP 100 available in the literature. See response to comment 42 for additional discussion of hydrogen's GWP. Climate studies that predict risks associated with climate change are not a part of the Phase One GHG study. These study activities could be considered in a future phase when greater specifics are available to determine potential risk impacts.	Greenhouse Gas Emissions Evaluation
118.	9/25/2023	Physicians for Social Responsibility - Los Angeles (Alex Jasset)	Email	Also, when considering impacts, it's important to note that many communities are already disproportionately burdened by pollution, so it's important to include cumulative impacts studies, particularly for NOx, if for example hydrogen trucks were used in close proximity to methane-hydrogen blend combustion plants.	Decision 22-12-055 required SoCalGas to assess NOx emissions including appropriate controls to mitigate NOx emissions from Angeles Link. A cumulative impact study is not a part of the Phase One NOx study. This study activity could be considered in a future phase when greater specifics are available to determine potential cumulative impacts.	Nitrogen Oxide and other Air Emissions Assessment
119.	9/25/2023	Physicians for Social Responsibility -	Email	The process thus far has been challenging, largely because there has been way too much information being shared without appropriate formats for feedback (individual meetings with CBO member groups, plenty of time for discussion at meetings, etc.) I was only able to skim both documents,	Thank you for sharing your concerns about the current process, scheduling challenges, and volume of content. We understand that	General

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		Los Angeles (Alex Jasset)		and was not able to provide adequate feedback, and because there is no way to influence when meetings are happening, I won't be able to join for the whole meeting tomorrow due to an existing scheduling conflict. Going forward I would recommend reaching out to participants ahead of time to find a time that works for everyone, as most of us have standing meetings and often don't have several hours free on any given day. If the purpose of this group is to provide meaningful feedback about the proposed plans and project, we still have a long way to go.	there is a lot to accomplish in this initial phase. To help manage the amount of information provided to stakeholders, all materials are housed in a stakeholder "Living Library." When meeting times do not work with you, SoCalGas is open to providing dedicated 1x1 time with subject matter experts to walk through information with you and can extend feedback deadlines upon request.	
120.	9/25/2023	Protect Playa Now (Faith Myhra)	Email	Technical Approach and Data Analysis: The technical approach taken in the study needs further consideration. Instead of focusing on alternatives that genuinely reduce emissions throughout their lifecycle, it appears to prioritize hydrogen without adequately exploring cleaner alternatives. The study should place greater emphasis on electrification, which can minimize emissions and environmental impact. Concerns have been raised about the use of hydrogen-methane blends and the potential impact on local air quality. Transparency is needed regarding the blending of hydrogen with methane and its implications for reducing fossil fuel usage. The inclusion of both renewable natural gas (RNG) and natural gas with carbon management within the category of Non-Hydrogen Alternatives is highly objectionable. It is essential to recognize that this project's purpose is to align with the objective of achieving 100% renewable energy by 2035, not to provide a means for SoCalGas to continue profiting from methane gas while engaging in greenwashing practices associated with renewable energy. Furthermore, it is alarming that such a stance is being advocated when California Attorney General Rob Bonta recently announced a settlement against Southern California Gas Company (SoCalGas) due to numerous environmental marketing claims made in 2019 regarding natural gas being labeled as "renewable." Such claims are fundamentally misleading and warrant a critical reevaluation of the project's objectives and alignment with California's clean energy goals.	Please see response to Comment No. 115 and Comment No. 22.	Project Options and Alternatives
121.	9/25/2023	Protect Playa Now (Faith Myhra)	Email	Market Assessment & Alternatives: The analysis should give higher priority to electrification as an alternative to hydrogen, considering legislative and policy mandates that promote	Please see response to Comment No. 115. With respect to evaluating clean renewable hydrogen production within the Los Angeles Basin, the CPUC's Decision requires analysis of a localized hydrogen hub (Ordering Opinion 3(c)). The localized hydrogen hub would connect	Project Options and Alternatives

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				electrification across relevant sectors. Detailed information on potential truck models for hydrogen delivery, including safety records, should be provided. Transparency is crucial in assessing in-basin hydrogen production, as it appears to contradict prior assurances.	clean renewable hydrogen third-party producers to end users within the Los Angeles Basin.	
122.	9/25/2023	Protect Playa Now (Faith Myhra)	Email	Regulatory, Policy, & Environmental: The study must include a comprehensive assessment of water resources required for the project and compare water usage with alternative energy sources like solar and wind. Given California's ongoing drought, it is essential to consider how drought conditions may impact local communities and water sources.	Please see response to Comment No. 108. For Angeles Link Phase One studies, additional analysis comparing alternative energy sources and their specific water usage requirements is outside of the scope of the Angeles Link Phase One studies.	Production Planning & Assessment
123.	9/25/2023	Protect Playa Now (Faith Myhra)	Email	Regulatory, Policy, & Environmental: The analysis of NOx and GHG emissions should encompass an assessment of their climate and public health implications, with a steadfast commitment to aligning with California's climate objectives. It is imperative to conduct a comprehensive examination of emission levels within the communities impacted by the Angeles Link Project. Regrettably, the responses received from SoCalGas have often revolved around the notion that NOx levels have decreased and might continue to decrease in the future. However, this response falls short of addressing the genuine concerns at hand. Consequently, there is a pressing need for the development of a well-defined and all-encompassing emergency response strategy for hydrogen leaks. Such a plan should delineate reporting protocols and establish robust collaboration mechanisms with both local and state government entities to ensure effective handling of any potential emergencies.	Please see response to Comment No. 109. As part of the Phase One studies, an evaluation of applicable safety requirements is being conducted, which includes emergency response strategies to consider in operating a 100% hydrogen pipeline system. SoCalGas complies with emergency response requirements such as 49 CFR Part 192.615 and as applicable would incorporate hydrogen-specific details in the emergency response plans and develop the framework for emergency response protocols.	Nitrogen Oxide and other Air Emissions Assessment
124.	9/25/2023	Protect Playa Now (Faith Myhra)	Email	Engineering Design: The assessment of repurposing existing gas pipelines for the Project should include disclosure of leakage rates and risks associated with repurposed pipelines. Transparency regarding risks related to underground and aboveground hydrogen storage is crucial. Providing a	Underground and aboveground storage technologies will be evaluated at a high level in Phase One and may be further evaluated during subsequent phases of the Project. Repurposing of existing natural gas pipelines will be evaluated at a high-level within the Pipeline Sizing & Design Criteria Study. The Hydrogen Leakage Assessment will evaluate potential leakage and mitigation opportunities for the project.	Preliminary Routing/Configuration Analysis

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				list of potential pipeline routes, manufacturers, and suppliers will enhance transparency and stakeholder understanding.	Please also see response to Comment No. 112.	
125.	9/25/2023	Protect Playa Now (Faith Myhra)	Email	Communication and Process: There have been recurring concerns about the responsiveness of SoCalGas representatives to stakeholder questions. Simple and straightforward inquiries have often been met with vague or incomplete responses, hindering our ability to fully understand the project. This lack of clarity in communication has raised questions about the transparency and openness of the project. It is imperative that SoCalGas representatives provide clear and accurate information to stakeholders to ensure transparency and foster trust within the decision-making process. I have concerns about the transparency, notification of workshops and meetings, and opportunities for feedback. Addressing these concerns and providing a stronger argument for the necessity of the Angeles Link Project is vital to build trust with the Community Based Organizations Stakeholder Group (CBOSG) and other concerned stakeholders.	See response to Comment No. 23. SoCalGas understands the importance of clear and open communication, and your feedback is crucial in improving our processes. SoCalGas has committed to a transparent and robust stakeholder engagement process, and we strive to provide complete and clear responses to stakeholder questions.	General
126.	9/25/2023	Protect Playa Now (Faith Myhra)	Email	CBO Stakeholder Group: I have serious concerns about the necessity of the Angeles Link Project and its potential to reduce our climate impact. The process involving the CBOSG has raised serious questions about SoCalGas's understanding of Environmental Justice and its intentions related to this project. I have not received adequate compensation for my involvement as an individual in a volunteer grassroots CBO, as opposed to those who are employees of CBOs. The only solution offered to me was fiscal sponsorship, which, in practice, is not sufficient. To secure fiscal sponsorship, I would need to identify an organization that my fellow members trust, and one that is willing to accept funding from SoCalGas, a fossil fuel company that many organizations are actively working to hold accountable. Given that numerous CBOs operate as grassroots entities, the absence of a mechanism for compensating grassroots members during their involvement poses a significant barrier to their participation. This compensation limitation not only impacts the inclusivity of this process but also places an unwarranted burden on the very CBOs that SoCalGas and the CPUC have expressed a desire to collaborate with on this project.	SoCalGas appreciates hearing your concerns about the Angeles Link Project and its potential to reduce climate impact. The Phase One Feasibility process is specifically designed to address such concerns by thoroughly examining the necessity of the project and its potential contributions to reducing climate impact. Thank you for highlighting the importance of environmental justice. SoCalGas takes this matter seriously and is committed to learning from CBOSG members and adapting our practices throughout the stakeholder engagement process. See also response to Comment No. 27 for more information about the compensation process for CBOSG members. SoCalGas recognizes the large amount of material being provided to stakeholders and is committed to working with PAG/CBOSG members to assist in their review process. Thanks to feedback from stakeholders, SoCalGas has amended the outreach process to allow for:	General

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				Access to critical project documents has been challenging and has not been adequately addressed. Transparency is essential, and it is inappropriate for these documents to be behind a login, given the commitment to a transparent process. The quantity of information provided with limited review time and insufficient opportunities for meaningful dialogue during meetings and workshops is a significant concern. The process appears rushed, and SoCalGas seems to be pushing through this step without allowing adequate time for stakeholder engagement. Even for stakeholder members who are getting paid, the compensation is inadequate to cover the time required for meaningful engagement in such a short timeline. In conclusion, I urge the CPUC to carefully consider the concerns and observations raised in this feedback letter. It is crucial to prioritize transparency, thorough analysis, and inclusive stakeholder engagement in the decision-making process related to the Angeles Link Project Phase One. Your commitment to addressing these concerns will contribute to a more informed and balanced evaluation of this project.	- Delivery of meeting materials at least one week prior to meetings, with a goal of at least two weeks prior, - Additional time post-meeting to provide feedback and review materials (at least two weeks), - Per request, the possibility of dedicated 1x1 time with subject matter experts, and - Posting of all presentation decks, as well as transcripts and meeting recordings to a stakeholder "Living Library" that will host all meeting materials	
127.	9/25/2023	Utility Consumers Action Network (Tyson Siegele)	Email	Background: On August 29, 2023, SoCalGas hosted a Planning Advisory Group (PAG) meeting that included a presentation on the Demand Study Analysis Technical Approach and Preliminary Outputs ("Preliminary Outputs"). At that meeting, SoCalGas offered to provide additional time to brief the PAG members who were unable to ask all their questions during the PAG meeting. The Utility Consumers' Action Network ("UCAN") representative and a Public Utilities Commission's Public Advocates Office ("Cal Advocates") representative requested an additional meeting. SoCalGas met with UCAN and Cal Advocates on September 7, 2023, for one hour. SoCalGas committed to providing UCAN and Cal Advocates with the numerous data points requested during the meeting. On September 18, 2023, SoCalGas provide 10 slides by email. The data	In response to the information request, we have developed a PDF file named "Angeles Link Demand Study - Select PAG Responses 09292023," which outlines detailed information and inputs, such as step-by-step calculations, specific adoption criteria and what their evaluations were, explanations around assumptions, and specific page numbers of reports that were referenced in the Demand Study. This PDF file was provided to the PAG group on September 29, 2023.	Demand Study

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				on the slides were presented as “additional information” in response to UCAN and Cal Advocate’s requests during the September 7th meeting. Several of the slides were identical to slides in the slide deck that SoCalGas presented during the August 29, 2023, PAG meeting. The only new information in the slides was emissions-specific calculation methodologies used to calculate emissions per diesel vehicle. That data was not requested during the September 7, 2023, meeting. In response to receiving the additional slides, UCAN’s consultant requested specific information by email on September 19, 2023. In that email UCAN also requested that SoCalGas move back the deadline for PAG members to provide feedback on the Preliminary Outputs until SoCalGas could provide the information that UCAN had been attempting to obtain since the August 29, 2023, presentation. The information that UCAN has requested includes the: • Demand Study computer model. • Transcripts or recordings of the interviews referenced in the demand study slides: i. August 29, 2023, slides ii. September 18, 2023, slides • Page and quote from each report used as the basis for each assumption in the modeling calculations. • Calculation determining the “% of ZE vehicles that are FCEV (vs Alternatives).” Quote from: i. August 29, 2023, slides (page 14) ii. September 18, 2023, slides (page 10) • Primary factor or factors that resulted in such limited adoption of the BEV vehicles. • Data source used to assume that 32 natural gas-fired power plants would be converted to hydrogen-fired power plants.		

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				• Basis for the 10%, 20%, 30% capacity factors assumed for hydrogen-fired generators in the power generation sector. • Basis for the 10%, 20%, 30% capacity factors assumed for hydrogen-fired cogeneration units in the power generation sector. As of the due date of these comments, UCAN has not received the requested data, nor has UCAN received any response to its September 19, 2023, email. Until SoCalGas releases the data and information as required by D.22-12-055,[1] UCAN will be unable to provide comprehensive feedback. *FN 1: D.22-12-055, Decision Approving the Angeles Link Memorandum Account to Record Phase One Costs (December 15, 2022), Ordering Paragraph 7, p. 77, ("that "Southern California Gas Company (SoCalGas) shall make the data, findings, and results of its Phase One feasibility studies and quarterly reports to the Commission's Deputy Executive Director for Energy and Climate Policy available to the public and not redacted, unless SoCalGas is granted confidentiality of the data in accordance with General Order 66-D.") available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M500/K167/500167327.PDF.*		
128.	9/25/2023	Utility Consumers Action Network (Tyson Siegele)	Email	General Feedback on Preliminary Demand Modeling and Outputs: Area of demand evaluated: D.22-12-055 states that Phase 1 studies should identify "the demand and end uses for the Angeles Link Project."[2] According to SoCalGas's demand study presentation, "this analysis focuses on evaluating the potential hydrogen demand across select sectors in SoCalGas' service territory from 2025 – 2045."[3] Thus, SoCalGas's Preliminary Outputs report SoCalGas's assertions for a much larger geographic area than ordered in D.22-12-055. SoCalGas should revise its study parameters to align with the Commission's orders.	For Phase One, SoCalGas is conducting an initial assessment of potential clean renewable hydrogen demand within the SoCalGas service territory, including the Los Angeles Basin. In its Decision, the CPUC directed SoCalGas to identify "ratepayers who would be end-users, including current natural gas customers and future customers." SoCalGas's customers and future customers reside throughout SoCalGas territory.	Demand Study
129.	9/25/2023	Utility Consumers Action	Email	Cost of hydrogen: A key component of any demand study is the cost of the supplied product and the comparison between the cost of the product and the alternative to the product. The Preliminary Outputs do not qualify	SoCalGas is aware of concerns regarding the cost of hydrogen, though, as noted in response to Comment No. 2, there is a growing body of literature studying how sources of clean firm power, like	Demand Study

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		Network (Tyson Siegele)		the cost of the green hydrogen supplied by the Angeles Link or the cost of the alternative energy options available to the market. The demand study must include cost forecasts for each product at the point of sale (e.g., the meter, the behind the meter production, etc.). The cost forecasts should be specified by the years 2025-2045 just as the Preliminary Outputs showed stack graphs of claimed hydrogen demand by year.	hydrogen, are key to affordably and reliably transitioning California's energy system. SoCalGas is studying forecasts of the delivered levelized cost of hydrogen (LCOH) in the High-Level Economics and Cost Effectiveness Study. Indeed, one of the approaches in this study will be to calculate the levelized cost of delivering clean renewable hydrogen (including inputs from other studies as needed for production, transportation, compression, and storage) as a reasonable range in $/kg for each potential clean renewable hydrogen delivery configuration and alternative. In addition, the key drivers for hydrogen use in many cases in the Demand Study are policy mandates such as SB100, Advanced Clean Trucks (ACT), and ACF, as well as technical feasibility. As it relates to the Phase One Demand Study, the forecasted cost of clean renewable hydrogen is not factored into the potential demand analysis, which focuses on the total potential of hydrogen as a fuel in the Los Angeles Basin and SoCalGas territory. That being said, the forecasted cost of clean renewable hydrogen is an important factor in projecting adoption and will need to be assessed in future phases of the Angeles Link project. Although analysis and forecasts of delivered LCOH were outside the scope of the Demand Study, as noted above, the LCOH analysis will be evaluated in other Phase One studies and further refined in future Angeles Link phases. SoCalGas will also utilize forecasts of clean renewable hydrogen costs to refine demand volumes in future phases. Finally, we note that there is significant and ongoing support both federally and in the State of California to reduce the price of clean hydrogen today. For example, the DOE has set targets for achieving $1/kg clean hydrogen costs by 2030, the 45V Tax Credit (from the Inflation Reduction Act) awards up to $3 per kg of hydrogen produced to projects with a lifecycle greenhouse gas emissions intensity of less than 0.45 kilograms per kilogram of hydrogen, and	

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					California's Low Carbon Fuel Standard (LCFS) can provide several dollars per kilogram of hydrogen (pending on exactly how it is produced). These policies are all aimed at lowering the cost of hydrogen.	
130.	9/25/2023	Utility Consumers Action Network (Tyson Siegele)	Email	Hydrogen supplied by the Angeles Link: The Preliminary Outputs include hydrogen demand regardless of whether SoCalGas or other entities will provide the hydrogen. Again, because the Commission ordered that SoCalGas review just the demand served by the Angeles Link, the parameters of the outputs should be narrowed.	The aim of Angeles Link is to be an open-access pipeline system dedicated to public use that transports clean renewable hydrogen to off-takers who could use it. As a result, the request to narrow parameters will not be included in the study.	Demand Study
131.	9/25/2023	Utility Consumers Action Network (Tyson Siegele)	Email	Basis for assumptions: In each sector (i.e., mobility, power, industrials), key assumptions for SoCalGas's demand model appear to have no factual basis. Key assumptions have been selected that contradict the best available data and some of the reports referenced by SoCalGas in its Preliminary Outputs. Thus far, SoCalGas has refused to provide the basis for many of the assumptions used in the demand study. SoCalGas should release the basis for its assumptions so that PAG members are able to provide feedback.	The basis for assumptions for the demand analysis used CARB EMFAC data to establish fleet sizes and assign vehicle operational characteristics in the mobility sector. For the power sector, the study sourced current plan and fuel consumption data within SoCalGas territory from EIA datasets (EIA-923). For the industrial sector, the EIA MECS database was used to further break out off-take volumes by equipment. After receiving this comment, on September 7th ,2023 SoCalGas provided to the PAG detailed information on specific modeling calculations, hydrogen adoption rate criteria and values, further explanations behind model assumptions, and specific page numbers for reports that were referenced in the analysis.	Demand Study
132.	9/25/2023	Utility Consumers Action Network (Tyson Siegele)	Email	Mobility Sector: The preliminary demand modeling lacks bases for critical inputs: Fuel Costs: When UCAN met with SoCalGas on September 7, 2023, SoCalGas stated that the total cost of ownership ("TCO") in the demand study does not include fuel costs. Reliable demand studies must include fuel costs in TCO. The costs of the fuel sources must be included because fuel costs represent the largest percentage of costs for most trucking companies.[4] In 2021 fuel costs for trucking companies represented 22% of total costs and 39% of vehicle-based costs.[5] Failure to include the cost of fuel is an error that must be corrected. The U.S. Department of Energy publishes a quarterly report, Clean Cities Alternative Fuel Price Report, on the price of alternative fuels. The most recent publication reported that the average cost of hydrogen at fueling stations was $27.18/gallon of gasoline equivalent.[6] UCAN recommends that SoCalGas use the hydrogen price reported by the Clean Cities Alternative Fuel Price Report for hydrogen in the mobility sector. The	Please refer to response to Comment No. 129 for a discussion of the forecasted cost of clean renewable hydrogen. As stated, TCO was evaluated as a critical factor influencing the Commercial Availability factor of hydrogen adoption rates (both the timing and value). The TCO analysis for on-road vehicles leveraged the Argonne National Lab's BEAN model and included cost components such as vehicle costs, operation and maintenance costs, insurance costs, and more. Fuel costs were omitted from this analysis due to the fluctuation of current and potential future prices of clean renewable hydrogen fuel and electricity (for BEVs). In the Demand Study analysis, SoCalGas compares the TCO of hydrogen fuel cell vehicles to both internal combustion engine vehicles and battery electric vehicles to determine potential adoption rates of hydrogen fuel cell vehicles.	Demand Study

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				price of retail hydrogen at fueling stations should be held constant until a reliable, third-party, data source forecasting the cost of hydrogen becomes available. A 2022 UC Davis review of TCO studies comparing diesel, battery electric vehicles (BEV), and hydrogen fuel cell vehicles (HFCV) stated that "a direct comparison of overall TCO estimates between studies will show a wide range and should be considered cautiously."[7] Even though hydrogen is such a nascent technology that forecasts should be discounted, another 2022 UC Davis study found that, "The 15-year TCO ($/mi) of the fuel cell trucks is higher than those of the corresponding battery-electric vehicles primarily because the cost of hydrogen was assumed to be $7.5 /kg in the calculations."[8] Thus, even though the Davis study assumed a hydrogen cost that is 63% lower than today's hydrogen costs at fueling stations, hydrogen still could not compete with electric vehicles through 2030. Comparison vehicles: SoCalGas's Preliminary Outputs compare the cost effectiveness of diesel vehicles to hydrogen fuel cell vehicles according to SoCalGas's statements on Sept 7, 2023.[9] That is not the correct comparison because (1) SoCalGas assumes a 100% ZEV adoption rate by 2045[10] and, (2) battery electric vehicles are already less expensive than diesel vehicles in many cases and are forecast to be less expensive than all diesel vehicles between 2025 and 2040.[11] In all cases SoCalGas should compare the TCO for hydrogen vehicles to the TCO for battery electric vehicles. Adoption Rates vs Alternatives: SoCalGas appears to have qualitatively chosen adoption rates of hydrogen fuel cell vehicles. The image below is a reprint of part the Preliminary Outputs.[12] Despite the numerous on-road vehicle types, each with different usage patterns and requirements, most of the vehicle types are grouped into an adoption range that is identical to other vehicles' adoption ranges. This demonstrates that the adoption rates are qualitatively determined instead of quantitatively determined. In other words, SoCalGas chose adoption rates. It did not calculate adoption rates. More concerning than the groupings and determinations of adoption rates, is that SoCalGas noted that it has data that conflicts with the adoption	SoCalGas assessed over 100 different types of on-road vehicle classes. Groupings of classes were required in order to effectively and methodically carry out an analysis on hydrogen adoption rates for the Mobility sector in a timely and suitable manner for Angeles Link Phase 1. The Demand assessment consists of multiple adoption factors. In the Mobility analysis, the rate at which a vehicle class achieves or doesn't achieve cost parity with other alternatives is just one of the four factors that were considered to estimate adoption rates, and therefore does not drive an adoption rate by itself but in tandem with other factors such as policy & legislation and technical feasibility. SoCalGas has previously provided to the PAG the forecasted adoption rates for new vehicle sales of the various on- and off- road classes that were assessed in the Mobility sector of the demand study. SoCalGas has also provided to the PAG the methodology used for estimating these adoption rates.	

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				rates it chose. SoCalGas stated that the Class 8 Drayage truck costs "never achieves cost parity with alternatives."[13] Despite hydrogen fuel cell vehicles costing more than alternatives, SoCalGas states that its demand study assumes "31-38%" of new Class 8 Drayage vehicle sales will be hydrogen fuel cell in 2045.[14] There is no explanation for why at least 31% of those vehicles would be hydrogen fuel cell vehicles when those vehicles will be more expensive than alternatives. At the September 7, 2023, meeting, UCAN asked for SoCalGas's evaluations of each vehicle class that it provided in the Preliminary Outputs for Class 8 Drayage trucks and Class 8 Sleeper Cab Tractors. SoCalGas has not provided that information. The data SoCalGas has released calls into question all assumptions that SoCalGas made for the mobility sector. UCAN requests that SoCalGas release the data, assumptions, and basis for the assumptions that it made for the mobility sector. *FN 4: American Transportation Research Institute, An Analysis of the Operational Costs of Trucking: 2022 Update (August 2022), Table 10, page 20, https://truckingresearch.org/wp-content/uploads/2022/08/ATRI-Operational-Cost-of-Trucking-2022.pdf.* *FN 5: American Transportation Research Institute, An Analysis of the Operational Costs of Trucking: 2022 Update (August 2022), Table 10, page 20, https://truckingresearch.org/wp-content/uploads/2022/08/ATRI-Operational-Cost-of-Trucking-2022.pdf.* *FN 6: DOE, Clean Cities Alternative Fuel Price Report (July 2023), available at https://afdc.energy.gov/files/u/publication/alternative_fuel_price_report_july_2023.pdf?1aa8dba9c3.* *FN 7: National Center for Sustainable Transportation - UC Davis, The Current and Future Performance and Costs of Battery Electric Trucks: Review of Key Studies and A Detailed Comparison of Their Cost Modeling Scope and Coverage (June 2022), P. 41, available at https://escholarship.org/uc/item/8zj9462h.* *FN 8: UC Davis, Evaluation of the Economics of Battery-Electric and Fuel Cell Trucks and Buses: Methods, Issues, and Result (August 4, 2023), p. 55, available at https://escholarship.org/uc/item/1g89p8dn.* *FN 9: This remark was in response to the "commercial availability"*		

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				evaluation on page 15 of the Preliminary Outputs, which states that class 8 drayage vehicles would be "Close to parity 2025-2035 by scenario (never achieves cost parity with alternatives)." *FN 10: Preliminary Outputs, p. 16, ("Vehicles subject to ACF will buy 100% ZEVs starting 2024 (per regulation, assuming no exceptions). Other vehicles will buy 100% ZEV starting 2035 ramped linearly from ~0% today, to 25% by 2030, to 100% by 2035.").* *FN 11: UC Davis, Evaluation of the Economics of Battery-Electric and Fuel Cell Trucks and Buses: Methods, Issues, and Result (August 4, 2023), table 17-18, p. 48, available at https://escholarship.org/uc/item/1g89p8dn.* *FN 12: Preliminary Outputs, page 17, (partial graphic).* *FN 13: Preliminary Outputs, partial page 15.* *FN 14: Preliminary Outputs, partial page 15.*		
133.	9/25/2023	Utility Consumers Action Network (Tyson Siegele)	Email	Power Sector: The preliminary demand modeling lacks bases for critical inputs: The power sector modeling appears to assume that hydrogen will be used much like natural gas to power combustion turbines. Many of the current natural gas fleet of generators have already paid off their initial capital cost outlays. The ongoing costs will be operations and maintenance (O&M) and fuel costs. Meanwhile hydrogen-fired turbines will have cap ex costs, O&M costs, and the cost of a new pipeline infrastructure to deliver hydrogen to those turbines. UCAN has reviewed multiple reports that indicate a likelihood of low single digit capacity factors for hydrogen turbines – possibly for some of the reasons listed above. One of the reports listed in the Preliminary Outputs is the LADWP 2022 Strategic Long-Term Resource Plan (SLTRP), which states that "in-basin green hydrogen achieves a low-capacity factor, averaging less than 2%" unless LADWP decides to forego a new transmission expansion.[15] LADWP's analysis found that the transmission expansion would save LADWP "approximately $7 billion between 2028 and 2045 on a net present value basis."[16] The source material listed in the Preliminary Outputs (i.e., the LADWP SLTRP) contradicts the capacity factor assumptions made by SoCalGas. UCAN recommends that SoCalGas revise its capacity factors in the Power sector to 0% for its conservative scenario, 1.5% for its moderate	Capacity factors in the Power Sector of 0%, 1.5%, and 3% for the conservative, moderate, and ambitious scenarios were considered in response to this comment, and it was determined that the original parameters are appropriate for the Demand Study for the reasons described below. A range of "what-if" capacity factor scenarios were evaluated to determine the total power generation from clean renewable hydrogen in 2045. Capacity factors were not modelled and were instead input directly to understand what the potential demand could be across a range of different capacity factors. Interviews with OEMs suggest that hydrogen capacity factors could reach 8-10% by 2045, driving the conservative case. The 30% capacity factor in the ambitious case is based on historical EIA natural gas capacity factor data in California which has fluctuated between roughly 25% - 35% over the past 10 years. A 20% capacity factor scenario is used in the moderate case to reflect a midpoint between the conservative and ambitious cases. The probability of each capacity factor was not evaluated. Modeling the anticipated electric load increase and grid reliability requirements in future phases may help to determine which capacity factor is most likely, since capacity factors may be influenced by several factors	Demand Study

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				scenario, and 3% for its ambitious scenario. These revised capacity factors would more closely align with SoCalGas's source materials and other available data. *15 LADWP, 2022 SLTRP, p. 4-29, available at https://www.ladwp.com/cs/idcplg?IdcService=GET_FILE&dDocName=OPLADWPCCB794970&RevisionSelectionMethod=LatestReleased.* *16 LADWP, 2022 SLTRP, p. 4-28, available at https://www.ladwp.com/cs/idcplg?IdcService=GET_FILE&dDocName=OPLADWPCCB794970&RevisionSelectionMethod=LatestReleased.*	such as electric demand, electricity imports, costs of energy sources, reliability, and ramping needs, among others. In addition, the LADWP SLTRP does reference an 18% average capacity factor between 2028 and 2045 as a potential edge case scenario if transmission upgrade was not completed (pg. 4-29 of the LADWP 2022 SLTRP). We agree that hydrogen turbines will have additional CaPex costs, and this has been reflected in the model. Specific assumptions for different CaPex cost levels at varying turbine sizes and hydrogen capabilities have been included in the PAG/CBOSG presentation. Although CaPex costs will be higher for replacement or retrofits of natural gas turbines compared to business as usual, we project that policy and legislative incentives and mandates will drive this switch despite higher CaPex costs. Our study reflects California's net-zero target by 2045 and takes into account the various methods for power plants to decarbonize, including Carbon Capture, Utilization, and Storage with natural gas, clean renewable hydrogen, and batteries. SB 100 is a key legislative mandate driving the projected transition despite CaPex outlays, which requires renewable energy and zero-carbon resources to supply 100% of electric generation retail sales by 2045. CaPex costs for all these alternatives are included in the model and are assessed against each other, with assumptions stated in the PAG/CBOSG presentation and technical appendix.	
134.	9/25/2023	Utility Consumers Action Network (Tyson Siegele)	Email	Industrials Sector: The preliminary demand modeling lacks bases for critical inputs: UCAN was unable to find any support for SoCalGas's assumptions for the industrial sector related to fuel switching or co-generation. The capacity factors used in the power sector demand study appear to be copied into the industrial sector demand study for SoCalGas's co-generation assumptions. There does not appear to be any basis for SoCalGas's capacity factors in the co-gen demand, just as there was no basis for it in the power demand.[17]	In the Demand Study, SoCalGas has kept capacity factor projections constant across power and cogeneration. These capacity factors represent "what-if" scenarios and SoCalGas does not determine the likelihood of these different capacity factors occurring in the future. Cogeneration capacity factor assumptions have been made due to the lack of data and the fact that capacity factors may be influenced by several factors such as electric demand, electricity imports, costs of energy sources, reliability and ramping needs among others. Although it is possible that there is no cogeneration by the year 2045 given State reports showing cogeneration decreasing over time, if cogeneration does remain, it will likely continue at higher capacity factors compared to the 10-30% modeled given cogeneration is used	Demand Study

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				Until SoCalGas presents data that supports its assertions that industrial customers will use green hydrogen, SoCalGas should assume zero demand for green hydrogen from the industrial sector. *17 Preliminary Outputs, p. 32, 36. Page 32 claims that SoCalGas took the capacity factor from LADWP's 2022 SLTRP and made adjustments. It is not clear why SoCalGas assumes power assumptions and co-gen assumptions would be the same. However, on page 36 SoCalGas states that it used capacity factors of 10%, 20%, and 30% which is identical to the capacity factors SoCalGas assumed for the power sector.*	in industrial processes. The capacity factor range of 10-30% thus strikes a balance between these two potential futures for cogeneration. In terms of industrial customers using clean renewable hydrogen, the Demand Study highlights some of the uncertainties regarding industrial consumer conversion to hydrogen. These uncertainties are reflected in the wide spread of hydrogen adoption rates across scenarios. SoCalGas does not expect that demand in the industrial sector will be zero, as suggested by the comment. Despite uncertainties, the Demand model uses a rigorous approach to determine and quantify the potential future use of hydrogen in the industrial sector, ultimately showing that clean renewable hydrogen demand in this sector is expected to range between 0.2M and 1.5M tons per year by 2045. Hydrogen potential is evaluated by industry and end use to determine adoption rates for the different uses of hydrogen across sectors. Key factors used in this adoption analysis include the following: - Technical Feasibility: In each sub-sector, the shift in technology feasibility and commercial availability of hydrogen combustion technology (e.g., boilers and kilns) was assessed from 2025 to 2045. - Alternatives: For each heating end-use case, hydrogen technology and availability are compared to the costs and viability of alternatives, namely electrification and CCUS. - Business Readiness (Performance Impact & Capital Investment): Sensitivity of each sub-sector to the capital investments necessary to implement 100% hydrogen technology and short-term performance impacts from switching to hydrogen. - Asset Lifetimes: In the industrial sector, natural gas assets are expected to be potentially replaced with hydrogen technology near end of life. Depending on the equipment, asset turnover periods can range from 15 to 20 years.	

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					These key factors used in the adoption analysis were evaluated based on a variety of external sources and were supplemented by EPRI Subject Matter Expert (SME) expertise as well as market interviews. Fewer existing policy and legislative incentives in the industrial sector as compared to other sectors may drive lower adoption rates; however, an evaluation of technical feasibility, business readiness, and commercial availability shows that there is potential for adoption at the levels indicated by the Demand Study as incentives that reduce upfront capital costs and other adoption costs related to the transition to hydrogen are introduced. hydrogen equipment and costs improve.	
135.	9/25/2023	Utility Consumers Action Network (Tyson Siegele)	Email	UCAN's prior feedback remains relevant regarding data sources, Angeles Link alternatives, and the order of Phase 1 studies' completion. SoCalGas has not incorporated most of UCAN's recommendations from UCAN's July 31, 2023, written feedback. UCAN requests that SoCalGas review and incorporate recommendations that were supplied in UCAN's prior feedback. The following are headings from prior feedback that are particularly relevant. The sub-bullets highlight some of UCAN's concern regarding the Preliminary Outputs. • All Phase 1 studies must rely on independent data sources. o The Preliminary Outputs include multiple references to studies partially funded by SoCalGas or another Sempra Energy company. • SoCalGas should evaluate hydrogen alternatives, pipeline alternatives, and provider alternatives… o SoCalGas does not appear to have completed even the preliminary analysis of alternatives needed for a preliminary demand study. While there is a separate study to focus on "project options and alternatives" SoCalGas needs to complete a robust analysis of alternatives to hydrogen (including costs) that could serve customers' energy needs. Without that analysis, SoCalGas's demand study will remain incomplete and inaccurate. • The Demand Study should include numerous inputs and outputs. o A key component of the demand study is the cost of hydrogen. SoCalGas does not appear to have included hydrogen costs in the Preliminary outputs. Demand is highly dependent on cost. Preliminary	In response to UCAN's comment about independent data sources, the Demand Study leverages data from many sources and makes assumptions where data is unavailable. The Demand Study is informed by a combination of Federal and State data sources, such as the U.S. National Clean Hydrogen Strategy and Roadmap, CARB 2022 Scoping Plan for Achieving Carbon Neutrality, UC Davis California Hydrogen Analysis Project: The Future Role of Hydrogen in a Carbon-Neutral California, EIA's Manufacturing Energy Consumption Survey, ANL's BEAN tool, CARB's EMFAC database and more. In response to UCAN's comment about alternatives, the Demand Study considers clean renewable hydrogen alternatives for various Mobility, Power, and Industrials applications, and the Demand Study report discusses these alternatives. The model also considers the viability of clean renewable hydrogen versus these alternatives. Other Angeles Link Phase One studies will be analyzing pipeline alternatives as well as alternatives to clean renewable hydrogen at a system level. In response to UCAN's comment about Demand Study inputs and outputs, the Demand Study has been designed to include numerous inputs and outputs. In response to UCAN's comment about the cost of hydrogen, please see response to Comment No. 129. In response to UCAN's comment about the Angeles Link Process and	Demand Study

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				outputs for a demand study should have considered the cost of hydrogen compared to the cost of hydrogen alternatives. • SoCalGas should complete its hydrogen demand study, distribute the study, and receive PAG feedback on the study before determining if other studies should be completed. o SoCalGas should revise its demand study based on PAG members' input and release the revised demand study methodology for another round of input.	Feedback, SoCalGas recognizes the role of the Demand Study in informing the other Phase One studies. So that the outcomes of the Demand Study are appropriately integrated into subsequent analyses, SoCalGas expedited its timeline. SoCalGas is conducting the Phase One feasibility studies that were identified by the CPUC and is receiving and responding to feedback on those studies from PAG and CBOSG members.	
136.	9/25/2023	Utility Consumers Action Network (Tyson Siegele)	Email	SoCalGas's preliminary demand study results include numerous inaccuracies and should be corrected before SoCalGas proceeds with other Phase 1 work: SoCalGas presented three scenarios of possible future green hydrogen demand. The scenario with the lowest demand is the "conservative" scenario. Because of inaccurate inputs selected by SoCalGas, UCAN believes SoCalGas's "conservative" scenario over-estimates demand by at least a factor of ten. UCAN looks forward to an updated demand study that accurately represents likely future green hydrogen demand.	SoCalGas has considered UCAN's comment but found the recommendation to update the Conservative scenario to lower demand by at least a factor of ten to be inconsistent with both internal and external research done for the Demand Study as well as feedback from peer reviews, academia, federal and state agencies, and industry.	Demand Study

Follow-Up to Comments Received During a Meeting

	Stakeholder Meeting Date	PAG/CBOSG Stakeholder Name and Organization	Verbal or Chat?	Summary Comment	SoCalGas Response	Topic
1.	7/18/2023	Utility Consumers Action Network (Tyson Siegele)	Verbal (p. 111)	The price is very important with demand. As Yuri mentioned, there are a few ends uses that he has not seen alternatives to hydrogen, such as feedstock. He also sees long distance marine shipping and air travel as needing hydrogen or hydrogen-based fuel, which is currently not included. He noted that he believes the pricing for hydrogen is currently DOE $1/kilogram, but if the cost ends up being higher, the demand might not be the same. He would like SoCalGas to expand on how the demand analysis will approach this.	Please see response to written Comment No. 129, above. The forecasted cost of clean renewable hydrogen is an important factor in projecting adoption and will need to be assessed in future phases of the Angeles Link Project. Regarding long distance marine shipping, in the model ocean going vessels are included. However, the model only assesses demand related to replacing diesel fuel consumption (versus other types of fuels like bunker fuel), so further analysis may still be needed to better understand the demand in this sector as the current analysis may be understating the potential in the marine shipping subsector. Clean renewable hydrogen demand for fuel cells in the aviation sector is included in the ambitious scenario.	Demand Study
2.	7/19/2023	Defend Ballona Wetlands (Robert van de Hoek)	Verbal (p. 25)	Interested in having more signage around intersections in the city where pipelines are passing, to notify the public.	More information about SoCalGas' pipeline signage policy can be found at the following link: https://www.socalgas.com/stay-safe/pipeline-and-storage-safety/pipeline-safety-is-our-priority.	Plan for Applicable Safety Requirements
3.	7/19/2023	Defend Ballona Wetlands (Robert van de Hoek)	Verbal (p. 25)	He has a question because he did not realize that hydrogen pipelines are everywhere in the U.S. He is wondering what states have them, and if there are any patterns regarding the geography of the pipelines.	The National Pipeline Mapping System (NPMS) is a dataset containing locations of and information about gas transmission and hazardous liquid pipelines and Liquefied Natural Gas (LNG) plants which are under the jurisdiction of the Pipeline and Hazardous Materials Safety Administration (PHMSA). You may refer to this link for additional information: https://www.npms.phmsa.dot.gov/GeneralPublic.aspx.	Plan for Applicable Safety Requirements
4.	7/20/2023	Southern California Generation Coalition (Norm Peterson)	Verbal (p. 105)	Asked if there is information regarding what the expected depreciable life of a hydrogen pipeline might be.	Current natural gas infrastructure has a lifetime prediction of 50 years. The same lifetime can be expected for newly built hydrogen pipelines. (https://pubs.rsc.org/en/content/articlehtml/2023/se/d3se00281k) (mdpi.com)	Plan for Applicable Safety Requirements

5.	7/20/2023	Utility Reform Network (Marna Painstil Anning)	Verbal (pp. 170-171)	Expressed concern that she was unaware until today's meeting that the project was considering using in-basin water since she understood previously that the consultant team was evaluating such areas as the Delta, Mojave, and Blythe. Asked if the study will include a standard for where hydrogen is produced, that they will have to obtain water from recaptured sources or is the study going to primarily discuss the hubs option and ensure that the sources of the water used to produce the hydrogen will not exacerbate the current water shortage issues in the LA Basin.	Please see response to written Comment No. 81, above. SoCalGas will not produce the clean renewable hydrogen that may be transported by Angeles Link. More details on the water sources that feed specific clean renewable production projects, including the types and location of those sources, will be further evaluated, and developed on a case-by-case basis as more details on specific production projects are developed.	Water Resource Evaluation
6.	7/21/2023	Food and Water Watch (Andrea Vega)	Verbal (p.35)	Expressed frustration looking at the data, as communities are more than just data points. Requested SoCalGas to provide transparency on what would be essentially, "sacrifice zones." Requested a third-party academic to step in and do these presentations, so there is a dialogue rather than being talked at.	SoCalGas is willing to bring in subject matter experts to discuss environmental and social justice in the context of Angeles Link. SoCalGas appreciates additional input from PAG/CBOSG regarding other subject matter experts.	Environmental & Environmental Social Justice Analysis
7.	7/21/2023	Society of Native Nations (Lydia Ponce)	Chat/Verbal (p. 45)	Asked where indigenous populations are on the CalEnviroScreen map that was shared.	SoCalGas will include available geospatial data for federally recognized tribes available from the Bureau of Indian Affairs in the ESJ analysis maps. SoCalGas is not aware at this time of any accredited geospatial data for non-federally recognized tribes.	Environmental & Environmental Social Justice Analysis
8.	7/21/2023	Defend Ballona Wetlands (Robert van de Hoek)	Verbal – (p. 121)	Asked for details regarding the City's obligations to inform the public about the details and costs of repairing an emergency leak where easements and rights-of-ways are present.	This comment does not relate to the studies for the Angeles Link. However, SoCalGas will comply with all regulations related to public notice in the case of the need for emergency repairs. In addition, additional information about emergency response and public awareness plans will be presented in the Plan for Applicable Safety Requirements.	
9.	7/21/2023	Defend Ballona Wetlands (Robert van de Hoek)	Verbal (p. 133)	Asked where the water used in electrolysis would be sourced from (Downey, Colorado River Water, blended with LADWP water from the Sierra Nevada, etc.).	Please see response to written Comment No. 13, above.	Water Resource Evaluation
10.	8/29/2023 (PAG)	Utility Consumers Action Network (Tyson Siegele)	Verbal (p. 51)	Noted that interviews were included as a source of data for inputs, and he wants to know if these will be available to review before the comment period is over.	The insights and feedback from these interviews will be informing the demand analysis. However, transcripts and recordings of interviews were not created.	Demand Study
11.	8/29/2023 (PAG)	Public Advocates Office (Matthew Taul)	Chat (p. 61)	On Slide 19, The 'Ambitious' plot peaks at "5.0" million TPY visually but the callout reads "6.0." Which value is accurate?	We checked the numbers for Slide 19. 6.0 TPY is the correct value.	Demand Study

12.	8/29/2023 (PAG)	Public Advocates Office (Arthur Fisher)	Verbal (pp. 79-80)	For the three scenarios (conservative, moderate, and ambitious), do they change geographically, depending on which scenario is used? And if so, what is the driver? Arthur later responded that this makes sense for moderate and ambitious, but not for conservative, since he believes that the conservative geography can be more easily pinned down, given that the ports and decarbonization of vehicle fleets will be included.	The scenarios change geographically because some scenarios include or exclude certain sub-sectors. For instance, in the Mobility sector, potential demand from the Aviation sub-sector is only included in the Ambitious scenario. Therefore, the Ambitious scenario will be geographically different from the Conservative and Moderate scenarios because it includes locations that relate to the Aviation sub-sector.	Demand Study
13.	8/29/2023 (Workshop)	Food and Water Watch (Andrea Vega)	Verbal (p. 55)	Reiterated the desire for more inclusivity in this process, including the Native American community, in order to recognize and be more open to all organizations that want to be engaged.	Please see response to written Comment No. 39, above.	Environmental & Environmental Social Justice Analysis

APPENDIX 2 – ATTENDEE LIST OF LANNING ADVISORY GROUP AG AND COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP MEETINGS, INCLUDING THOSE INVITED

CBOSG July Workshop Attendees - July 19

CBOSG				
Organization	**First Name**	**Last Name**	**In person**	**Zoom**
Alma Family Services	Aida	Vega	X	
Ballona Wetlands Institute	Marcia	Hanscom	X	
Coalition for Responsible Community Development	Kenta	Estrada-Darley		X
Coalition for Responsible Community Development (CRCD)	Ricardo	Mendoza		X
Communities for a Better Environment	Roselyn	Tovar		X
Defend Ballona Wetlands	Robert	van de Heok		X
Food & Water Watch	Andrea	Vega	X	
Go Green Initiative	Jill	Buck		X
Little Tokyo Community Council	Kristin	Fukushima		X
Los Angeles Indigenous Peoples Alliance	Luis	R Pena	X	
Parents, Educators/Teachers, and Students in Action (PESA)	Sydney	Rogers	X	
Physicians for Social Responsibility LA	Alex	Jasset		X
Protect Playa Now	Faith	Myhra	X	
Reimagine LA Foundation	Rashad	Rucker-Trapp		X
Santa Monica College Eco Action Club	Jackson	Garland	X	
Society of Native Nations	Lydia	Ponce		X
Soledad Enrichment Action	Enrique	Aranda	X	
Southeast Rio Vista YMCA	Gerry	Salcedo	X	
Vote Solar	Andrea	Leon-Grossmann		X
Watts Labor Community Action Committee (WLCAC)	Thelmy	Alvarez		X
Non CBOSG				
Arellano Associates	Rachael	Potts		X
Arellano Associates	Sohrab	Mikanik	X	
Arellano Associates	Stephanie	Espinoza	X	
Arellano Associates	Chester	Britt	X	
California Public Utilities Commission	Christopher	Arroyo		X
Insignia Environmental	Anniken	Lydon		X
Insignia Environmental	Armen	Keochekian		X
Insignia Environmental	Julie	Roshala		X
Lee Andrews Group	Rick	Garcia		X
Lee Andrews Group	Alyssa	Martinez	X	
Lee Andrews Group	Alma	Marquez	X	
Lee Andrews Group	Antonia	Issaevitch	X	
SoCalGas	Andy	Carrasco		X
SoCalGas	Chanice	Allen		X
SoCalGas	Darell	Johnson		X
SoCalGas	Brian	Haas		X
SoCalGas	Megan	Lorenz		X
SoCalGas	Emily	Grant	X	
SoCalGas	Edith	Moreno	X	
SoCalGas	Sebastian	Garza	X	
SoCalGas	Neil	Navin	X	
SoCalGas	Amy	Kitson	X	
SoCalGas	Katrina	Reagan	X	
SoCalGas	Douglas	Chow	X	
SoCalGas	Jill	Tracy	X	
SoCalGas	Frank	Lopez	X	
SoCalGas	Yuri	Freedman	X	
SoCalGas	Larry	Andrews	X	

CBOSG July Workshop Attendees - July 21

CBOSG				
Organization	**First Name**	**Last Name**	**In person**	**Zoom**
Alma Family Services	Aida	Vega		X
Ballona Wetlands Institute	Marcia	Hanscom		X
California Greenworks	Jessy	Shelton		X
Defend Ballona Wetlands	Robert	van de Hoek		X
Food & Water Watch	Andrea	Vega	X	
Go Green Initiative	Jill	Buck		X
Little Tokyo Community Council	Kristin	Fukushima		X
Los Angeles Indigenous Peoples Alliance	Jamie	Patino		X
Parents, Educators/Teachers, and Students in Action (PESA)	Sydney	Rogers	X	
Physicians for Social Responsibility	Alex	Jasset		X
Protect Playa Now	Faith	Myhra		X
Reimagine LA Foundation	Rashad	Rucker-Trapp		X
Reimagine LA Foundation	Shawna	Andrews	X	
Reimagine LA Foundation	Raul	Claros	X	
Society of Native Nations	Lydia	Ponce		X
Society of Native Nations	Cheyenne	Rendon		X
Soledad Enrichment Action	Enrique	Aranda	X	
Southeast Rio Vista YMCA	Gerry	Salcedo		X
Southside Coalition of Community Health Centers	Andrea	Williams		X
Vote Solar	Andrea	Leon-Grossmann		X
Watts Labor Community Action Committee (WLCAC)	Thelmy	Alvarez	X	
Non CBOSG				
Arellano Associates	Sohrab	Mikanik		X
Arellano Associates	Stephanie	Espinoza	X	
Arellano Associates	Nancy	Verduzco	X	
California Public Utilities Commission	Christopher	Arroyo		X
Insignia Environmental	Anniken	Lydon		X
Insignia Environmental	Julie	Roshala		X
Insignia Environmental	Armen	Keochekian	X	
Insignia Environmental	Alisa	Lykens	X	
Lee Andrews Group	Rick	Garcia		X
Lee Andrews Group	Alyssa	Martinez	X	
Lee Andrews Group	Alma	Marquez	X	
Lee Andrews Group	Eden	Vitakis	X	
SoCalGas	Chanice	Allen		X
SoCalGas	Katrina	Reagan		X
SoCalGas	Darell	Johnson		X
SoCalGas	Kevin	O' Sullivan		X
SoCalGas	Glenn	La Fevers		X
SoCalGas	Clair	Schmidt		X
SoCalGas	Andy	Carrasco	X	
SoCalGas	Emily	Grant	X	
SoCalGas	Edith	Moreno	X	
SoCalGas	Sebastian	Garza	X	
SoCalGas	Douglas	Chow	X	
SoCalGas	Jill	Tracy	X	
SoCalGas	Frank	Lopez	X	
SoCalGas	Geoff	Danker	X	

CBOSG August Workshop Attendees - August 28

CBOSG		
Organization	**First Name**	**Last Name**
Ballona Wetlands Institute	Marcia	Hanscom
Breathe Southern California	Marc	Carrel
California Greenworks	Jessy	Shelton
Climate Action Campaign	Ayn	Craciun
Coalition for Responsible Community Development	Ricardo	Mendoza
Coalition for Responsible Community Deveplopment	Kenta	Estrada-Darley
Communities for a Better Environment	Roselyn	Tovar
Defend Ballona Wetlands	Robert Roy	van de Hoek
Food & Water Watch	Andrea	Vega
Go Green Initiative	Jill	Buck
Little Tokyo Community Council	Kristin	Fukushima
Nature for All	Belen	Bernal
Parents, Educators/Teachers, and Students in Action (PESA)	Ella	Cavlan
Physicians for Social Responsibility-LA	Alex	Jasset
Protect Playa Now	Faith	Myhra
Reimagine LA Foundation	Raul	Claros
Reimagine LA Foundation	Rashad	Rucker-Trapp
Soledad Enrichment Action	Enrique	Aranda
Southside Coalition of Community Health Centers	Andrea	Williams
Vote Solar	Andrea	Leon-Grossmann
Watts Labor Community Action Committee	Thelmy	Alvarez
Watts/Century Latino Organization	Autumn	Ybarra
Non CBOSG		
Arellano Associates	Rachael	Potts
Arellano Associates	Keven	Michel
Arellano Associates	Chester	Britt
Arellano Associates	Stevie	Espinoza
California Public Utilities Commission	Christopher	Arroyo
Insignia Environmental	Armen	Keochekian
Insignia Environmental	Julie	Roshala
Insignia Environmental	Alisa	Lykens
Lee Andrews Group	Rick	Garcia
Lee Andrews Group	Alma	Marquez
Lee Andrews Group	Alyssa	Martinez
SoCalGas	Marissa	Girolamo
SoCalGas	Douglas	Chow
SoCalGas	Emily	Grant
SoCalGas	Jill	Tracy
SoCalGas	Edith	Moreno
SoCalGas	Hector	Moreno
SoCalGas	Chris	Gilbride
SoCalGas	Yuri	Freedman
SoCalGas	Frank	Lopez

SoCalGas Liz Davis

CBOSG September Meeting Attendees - September 26

CBOSG				
Organization	**First Name**	**Last Name**	**In person**	**Zoom**
Alma Family Services	Lourdes	Caracoza		X
Ballona Wetlands Institute	Marcia	Hanscom		X
Breathe Southern California	Marc	Carrel		X
California Greenworks	Jessy	Shelton		X
Coalition for Responsible Community Development	Kenta	Estrada-Darley	X	
Coalition for Responsible Community Development	Ricardo	Mendoza	X	
Communities for a Better Environment	Roselyn	Tovar		X
Defend Ballona Wetlands	Robert	van de Hoek		X
Food and Water Watch	Andrea	Vega	X	
Go Green Initiative	Jill	Buck		X
Greater Zion Church Family	Michael	Fisher		X
Little Tokyo Community Council	Kristin	Fukushima		X
Los Angeles Indigenous People's Alliance	Luis	Pena	X	
Mexican American Opportunity Foundation	Ciriaco	Pinedo		X
Nature for All	Belen	Bernal		X
PESA (Parents,Educators/Teachers & Students in Action)	Ayasha	Johnson		X
Protect Playa Now	Kevin	Weir		X
PSR-LA	Alex	Jasset		X
Reimagine LA Foundation	Rashad	Rucker-Trapp	X	
Soledad Enrichment Action	Enrique	Aranda	X	
Soledad Enrichment Action	Luis	Melliz	X	
Southside Coalition of Community Health Centers	Andrea	Williams		X
Watts Labor Community Action Committee	Ava	Post		X
Non CBOSG				
Arellano Associates	Chester	Britt	X	
Arellano Associates	Stevie	Espinoza	X	
Arellano Associates	Nancy	Verduzco	X	
Arellano Associates	Sohrab	Mikanik	X	
California Public Utilities Commission	Christopher	Arroyo		X
DNV	Pedram	Fanailoo	X	
DNV	Cynthia	Spitzenberger	X	
Insignia Environmental	Armen	Keochekian	X	
Insignia Environmental	Julie	Roshala		X
Insignia Environmental	Alisa	Lykens	X	
Lee Andrews Group	Rick	Garcia		X
Lee Andrews Group	Alma	Marquez	X	
Lee Andrews Group	Alyssa	Martinez	X	
Lee Andrews Group	Alan	Rodriguez		X
Lee Andrews Group	Antonia	Issaevitch	X	
Lee Andrews Group	Edna	Degollado	X	
Mitsubishi Power Americas Inc.	Peter	Sawicki	X	
SoCalGas	Douglas	Chow	X	
SoCalGas	Emily	Grant	X	
SoCalGas	Jill	Tracy	X	
SoCalGas	Edith	Moreno	X	
SoCalGas	Hector	Moreno		X
SoCalGas	Frank	Lopez		X

SoCalGas	Andy	Carrasco	X
SoCalGas	Darrell	Johnson	X
SoCalGas	Theresa	Dao	X
SoCalGas	Amy	Kitson	X
SoCalGas	Katrina	Regan	X
SoCalGas	Chanice	Allen	X
SoCalGas	Glenn	La Fevers	X

PAG July Workshop Attendees - July 18

PAG				
Organization	**First name**	**Last name**	**In person**	**Zoom**
Agricultural Energy Consumers Assoc	Maddie	Munson		x
Air Products	Miles	Heller		x
California Energy Commission	Rizaldo	Aldas		x
California Hydrogen Business Council	Katrina	Fritz		x
California Manufacturers and Technology Association	Robert	Spiegel		x
California Public Utilities Commission	Christopher	Arroyo		x
California Public Utilities Commission	Arthur	Fisher		x
California Public Utilities Commission	Chris	Myers		x
California Public Utilities Commission	Matthew	Taul		x
Environmental Defense Fund	Joon Hun	Seong		x
Green Hydrogen Coalition	Nick	Connell	x	
Green Hydrogen Coalition	Hope	Fasching		x
SoCal Pipe Trades	Rodney	Cobos		x
South Coast AQMD	Maryam	Hajbabaei		x
South Coast AQMD	Sam	CaO		
Southern California Generation Coalition	Norman	Pedersen	x	
The Utility Reform Network	Marna	Paintsil Anning		x
Clean Energy Strategies representing the Utility Consumers' Action Network	Tyson	Siegele		x
Utility Workers Union of America 483*	Ernest	Shaw	x	
Non PAG				
Arellano Associates	Chester	Britt	x	
Arellano Associates	Stevie	Espinoza	x	
Arellano Associates	Nancy	Verduzco	x	
Insignia Environmental	Armen	Keochekian		x
Insignia Environmental	Anniken	Lydon		x
Insignia Environmental	Julie	Roshala		x
Lee Andrews Group	Rick	Garcia		x
Lee Andrews Group	Alma	Marquez	x	
SoCalGas	Chanice	Allen	x	
SoCalGas	Diana	Boyadjian		x
SoCalGas	Douglas	Chow	x	
SoCalGas	Sebastian	Garza	x	
SoCalGas	Chris	Gilbride		x
SoCalGas	Emily	Grant	x	
SoCalGas	Brian	Haas		x
SoCalGas	Eric	Hofmann		x
SoCalGas	Armando	Infanzon	x	
SoCalGas	Darell	Johnson	x	
SoCalGas	Amy	Kitson	x	
SoCalGas	Glenn	La Fevers	x	
SoCalGas	Megan	Lorenz		x
SoCalGas	Edith	Moreno	x	
SoCalGas	Neil	Navin	x	
SoCalGas	Katrina	Reagan	x	
SoCalGas	Jill	Tracy	x	

PAG July Workshop Attendees - July 20

PAG				
Organization	**First name**	**Last name**	**In person**	**Zoom**
Agricultural Energy Consumers Assoc	Maddie	Munson		x
Air Products	Miles	Heller	x	
California Energy Commission	Rizaldo	Aldas		x
California Hydrogen Business Council	Katrina	Fritz	x	
California Manufacturers and Technology Association	Robert	Spiegel		x
California Public Utilities Commission	Christopher	Arroyo		x
California Public Utilities Commission	Arthur	Fisher		x
California Public Utilities Commission	Kaj	Peterson		x
California Public Utilities Commission	Chris	Myers		x
California Public Utilities Commission	Matthew	Taul		x
Energy Independence Now	Brian	Goldstein	x	
Environmental Defense Fund	Joon Hun	Seong		x
Green Hydrogen Coalition	Nick	Connell		x
Green Hydrogen Coalition	Hope	Fasching		x
Harbor Trucking Association	Matt	Schrap		x
Local Union 250	Nathaniel	Williams	x	
Local Union 250	Hector	Carbajal	x	
SoCal Pipe Trades	Rodney	Cobos	x	
South Coast AQMD	Maryam	Hajbabaei		x
South Coast AQMD	Aaron	Katzenstein		x
South Coast AQMD	Sam	CaO		x
Southern California Generation Coalition	Norman	Pedersen	x	
The Utility Reform Network	Marna	Paintsil Anning		x
UC Irvine	Jack	Brouwer	x	
Clean Energy Strategies representing the Utility Consumers' Action Network	Tyson	Siegele		x
Utility Workers Union of America 483*	Ernest	Shaw	x	
Utility Workers Union of America 483*	Anthony	Flores	x	
Non PAG				
Arellano Associates	Chester	Britt	x	
Arellano Associates	Stevie	Espinoza	x	
Arellano Associates	Nancy	Verduzco	x	
Insignia Environmental	Armen	Keochekian	x	
Insignia Environmental	Anniken	Lydon	x	
Insignia Environmental	Julie	Roshala		x
Lee Andrews Group	Rick	Garcia		x
Lee Andrews Group	Alma	Marquez	x	
SoCalGas	Diana	Boyadjian		x
SoCalGas	Andy	Carrasco		x
SoCalGas	Douglas	Chow	x	
SoCalGas	Sebastian	Garza	x	
SoCalGas	Emily	Grant	x	
SoCalGas	Aila	Green	x	
SoCalGas	Brian	Haas	x	
SoCalGas	Stephanie	Henley	x	
SoCalGas	Eric	Hofmann		x
SoCalGas	Darell	Johnson	x	
SoCalGas	Amy	Kitson		x
SoCalGas	Glenn	La Fevers	x	
SoCalGas	Frank	Lopez		x
SoCalGas	Edith	Moreno	x	
SoCalGas	Neil	Navin	x	
SoCalGas	Jill	Tracy	x	
SoCalGas	Andrea	Warren		x

PAG August Workshop Attendees - August 29

PAG		
Organization	**First name**	**Last name**
Air Products	JP	Gunn
Bizfed	Sarah	Wiltfong
California Hydrogen Business Council	Katrina	Fritz
California Public Utilities Commission	Christopher	Arroyo
California Public Utilities Commission	Arthur	Fisher
California Public Utilities Commission	Chris	Myers
California Public Utilities Commission	Matthew	Taul
Communities for a Better Environment	Theo	Caretto
Communities for a Better Environment	Shara	Burwell
Earth Justice	Sara	Gersen
Energy Independence Now	Brian	Goldstein
Environmental Defense Fund	Joon Hun	Seong
Environmental Justice League	Russell	Lowery
Green Hydrogen Coalition	Nick	Connell
Harbor Trucking Association	Karla	Sanchez
Independent Energy Producer's Association	Jan	Smutny Jones
ILWU Local 13	Sal	DiCostanzo
Los Angeles Department of Water and Power	Aaron	Guthrey
Natural Resources Defense Council	Pete	Budden
South Coast AQMD	Maryam	Hajbabaei
South Coast AQMD	Sam	Cao
Southern California Water Coalition	Charles	Wilson
Southern California Generation Coalition	Norman	Pedersen
UC Riverside	Arun	Raju
The United Association	Aaron	Stockwell
Clean Energy Strategies representing Utility Consumer Action Network	Tyson	Seigel
Non PAG		
Arellano Associates	Chester	Britt
Arellano Associates	Stevie	Espinoza
Arellano Associates	Nancy	Verduzco
Arellano Associates	Rachael	Potts
Insignia Environmental	Alisa	Lykens
Insignia Environmental	Armen	Keochekian
Insignia Environmental	Julie	Roshala
Lee Andrews Group	Alma	Marquez
SoCalGas	Chris	Gillbride
SoCalGas	Douglas	Chow
SoCalGas	Emily	Grant
SoCalGas	Edith	Moreno
SoCalGas	Frank	Lopez
SoCalGas	Hector	Moreno
SoCalGas	Jill	Tracy
SoCalGas	Yuri	Freedman
California Strategies	Marybel	Batjer

PAG September Meeting Attendees - September 28

PAG				
Organization	**First name**	**Last name**	**In person**	**Zoom**
Air Products	Vince	Wiraatmadja	X	
Bizfed	Sarah	Wiltfong		X
California Energy Commission	Rizaldo	Aldas		X
California Hydrogen Business Council	Katrina	Fritz	X	
California Manufacturers and Technology Association	Robert	Spiegel		X
California Public Utilities Commission	Christopher	Arroyo		x
California Public Utilities Commission	Christopher	Myers		x
California Public Utilities Commission	Matthew	Taul		X
California Public Utilities Commission	Nathaniel	Skinner		X
Clean Energy Strategies representing the Utility Consumers' Action Network	Tyson	Siegele		X
Communities for a Better Environment	Theo	Caretto		X
Environmental Defense Fund	Joon Hun	Seong		X
Environmental Defense Fund	Michael	Colvin	X	
Green Hydrogen Coalition	Nick	Connell	x	
Harbor Trucking Association	Karla	Sanchez		X
Los Angeles Department of Water and Power	Nermina	Rucic		x
Los Angeles Department of Water and Power	Jesse	Vismonte		x
Natural Resources Defense Council	Pete	Budden		X
Port of Los Angeles	Mike	Galvin	X	
South Coast AQMD	Sam	Cao		X
Southern CA Water Coalition	Charley	Wilson		x
Utility Workers Union of America 483	Ernest	Shaw	X	
Utility Workers Union of America 483	Robin	Downs	x	
Non PAG				
Arellano Associates*	Chester	Britt	X	
Arellano Associates*	Stevie	Espinoza	X	
Arellano Associates*	Nancy	Verduzco	X	
California Strategies*	Marybel	Batjer	X	
Insignia Environmental	Armen	Keochekian		x
Insignia Environmental	Anniken	Lydon		x
Insignia Environmental	Julie	Roshala		x
Insignia Environmental	Armen	Keochekian		x
Lee Andrews Group*	Alma	Marquez	X	
SoCalGas	VJ	Atavane		x
SoCalGas	Kent	Kauss		x
SoCalGas	Andy	Carrasco		x
SoCalGas	Frank	Lopez		x
SoCalGas*	Douglas	Chow	X	
SoCalGas*	Edith	Moreno	x	
SoCalGas*	Maryam	Brown	X	
SoCalGas*	Yuri	Freedman	X	
SoCalGas*	Darrell	Johnson	X	
SoCalGas*	Jill	Tracy	X	

CBOSG July Workshops Invitee List

Org	First name	Last name
Alma Family Services	Lourdes	Caracoza
Alma Family Services	Diego	Rodriguez
Ballona Wetland Institute	Marcia	Hanscom
Breathe Southern California	Marc	Carrel
Breathe Southern California	Tigran	Agdaian
California Greenworks	Jessy	Shelton
California Greenworks	Michael	Berns
California Native Vote Project	Rene	Williams
Chinatown Service Center	Daisy	Ma
Chinatown Service Center	Kerry	Situ
Climate Action Campaign	Ayn	Craciun
Climate Action Campaign	Lexi	Hernandez
Coalition for Responsible Community Development	Ricardo	Mendoza
Coalition for Responsible Community Development	Kenta	Estrada-Darley
Communities for a Better Environment	Theo	Caretto
Communities for a Better Environment	Roberto	Cabrales
Communities for a Better Environment	Ambar	Rivera
Communities for a Better Environment	Roselyn	Tovar
Comunidades Indigenas en Liderazgo (CIELO)	Odilia	Romero
Defend Ballona Wetlands	Robert "Roy"	van de Hoek
Defend Ballona Wetlands	Jackson	Garland
Faith and Community Empowerment (FACE)	Hyepin	Im
Food and Water Watch	Andrea	Vega
Food and Water Watch	Chirag	Bhakta
Go Green Initiative	Jill	Buck
Greater Zion Church Family	Michael	Fisher
Greater Zion Church Family	Danny	Harrison
Greater Zion Church Family	Aquyla	Walker
Little Tokyo Community Council	Kristin	Fukushima
Little Tokyo Community Council	Chris	Fukushima
Los Angeles Indigenous People's Alliance	Luis R.	Pena
Mexican American Opportunity Foundation	Ciriaco "Cid"	Pinedo
Nature for All	Belen	Bernal
Nature for All	Steven	Ochoa
Parents, Educators/Teachers, and Students in Action (PESA)	Seymour	Amster
Parents, Educators/Teachers, and Students in Action (PESA)	Ella	Cavlan
Parents, Educators/Teachers, and Students in Action (PESA)	Araksya	Nordikyan
Physicians for Social Responsibility - Los Angeles	Alex	Jasset
Protect Playa Now	Faith	Myhra
Reimagine LA Foundation	Rashad	Trapp
Reimagine LA Foundation	Shawna	Andrews
Reimagine LA Foundation	Raul	Claros
Soledad Enrichment Action	Enrique	Aranda
Soledad Enrichment Action	Nathan	Aranda

Southside Coalition of Community Health Centers	Andrea	Williams
Southside Coalition of Community Health Centers	Lucy	Castro
Vote Solar	Andrea	Leon-Grossmann
Watts Labor Community Action Committee	Timothy	Watkins
Watts Labor Community Action Committee	Thelmy	Alvarez
Watts/Century Latino Organization	Autumn	Ybarra
Southeast Rio Vista YMCA	Gerry	Salcedo

CBOSG August Workshop Invitee List

Org	First name	Last name
Alma Family Services	Lourdes	Caracoza
Alma Family Services	Aida	Vega
Alma Family Services	Diego	Rodriguez
Ballona Wetland Institute	Marcia	Hanscom
Breathe Southern California	Marc	Carrel
Breathe Southern California	Tigran	Agdaian
California Greenworks	Jessy	Shelton
California Greenworks	Michael	Berns
California Native Vote Project	Rene	Williams
Chinatown Service Center	Daisy	Ma
Chinatown Service Center	Kerry	Situ
Climate Action Campaign	Ayn	Craciun
Climate Action Campaign	Lexi	Hernandez
Coalition for Responsible Community Development	Ricardo	Mendoza
Coalition for Responsible Community Development	Kenta	Estrada-Darley
Communities for a Better Environment	Theo	Caretto
Communities for a Better Environment	Roberto	Cabrales
Communities for a Better Environment	Ambar	Rivera
Communities for a Better Environment	Roselyn	Tovar
Comunidades Indigenas en Liderazgo (CIELO)	Odilia	Romero
Defend Ballona Wetlands	Robert "Roy"	van de Hoek
Defend Ballona Wetlands	Jackson	Garland
Faith and Community Empowerment (FACE)	Hyepin	Im
Food and Water Watch	Andrea	Vega
Food and Water Watch	Chirag	Bhakta
Go Green Initiative	Jill	Buck
Greater Zion Church Family	Michael	Fisher
Greater Zion Church Family	Danny	Harrison
Greater Zion Church Family	Aquyla	Walker
Little Tokyo Community Council	Kristin	Fukushima
Little Tokyo Community Council	Chris	Fukushima
Los Angeles Indigenous People's Alliance	Luis R.	Pena
Los Angeles Indigenous People's Alliance	Jamie	Patino
Mexican American Opportunity Foundation	Ciriaco "Cid"	Pinedo
Nature for All	Belen	Bernal
Nature for All	Steven	Ochoa
Parents, Educators/Teachers, and Students in Action (PESA)	Seymour	Amster
Parents, Educators/Teachers, and Students in Action (PESA)	Ella	Cavlan
Parents, Educators/Teachers, and Students in Action (PESA)	Sydney	Rogers
Parents, Educators/Teachers, and Students in Action (PESA)	Araksya	Nordikyan
Physicians for Social Responsibility - Los Angeles	Alex	Jasset
Protect Playa Now	Faith	Myhra
Reimagine LA Foundation	Rashad	Trapp
Reimagine LA Foundation	Shawna	Andrews

Reimagine LA Foundation	Raul	Claros
Soledad Enrichment Action	Enrique	Aranda
Soledad Enrichment Action	Nathan	Aranda
Southside Coalition of Community Health Centers	Andrea	Williams
Southside Coalition of Community Health Centers	Lucy	Castro
Vote Solar	Andrea	Leon-Grossmann
Watts Labor Community Action Committee	Timothy	Watkins
Watts Labor Community Action Committee	Thelmy	Alvarez
Watts Labor Community Action Committee	Ava	Post
Watts/Century Latino Organization	Autumn	Ybarra
Southeast Rio Vista YMCA	Gerry	Salcedo

CBOSG September Q3 Meeting Invitee List

Org	First name	Last name
Alma Family Services	Lourdes	Caracoza
Alma Family Services	Aida	Vega
Alma Family Services	Diego	Rodriguez
Ballona Wetland Institute	Marcia	Hanscom
Breathe Southern California	Marc	Carrel
Breathe Southern California	Tigran	Agdaian
California Greenworks	Jessy	Shelton
California Greenworks	Michael	Berns
California Native Vote Project	Rene	Williams
Chinatown Service Center	Daisy	Ma
Chinatown Service Center	Kerry	Situ
Climate Action Campaign	Ayn	Craciun
Climate Action Campaign	Lexi	Hernandez
Coalition for Responsible Community Development	Ricardo	Mendoza
Coalition for Responsible Community Development	Kenta	Estrada-Darley
Communities for a Better Environment	Theo	Caretto
Communities for a Better Environment	Roberto	Cabrales
Communities for a Better Environment	Ambar	Rivera
Communities for a Better Environment	Roselyn	Tovar
Comunidades Indigenas en Liderazgo (CIELO)	Odilia	Romero
Defend Ballona Wetlands	Robert "Roy"	van de Hoek
Defend Ballona Wetlands	Jackson	Garland
Faith and Community Empowerment (FACE)	Hyepin	Im
Food and Water Watch	Andrea	Vega
Food and Water Watch	Chirag	Bhakta
Go Green Initiative	Jill	Buck
Greater Zion Church Family	Michael	Fisher
Greater Zion Church Family	Danny	Harrison
Greater Zion Church Family	Aquyla	Walker
Little Tokyo Community Council	Kristin	Fukushima
Little Tokyo Community Council	Chris	Fukushima
Los Angeles Indigenous People's Alliance	Luis R.	Pena
Los Angeles Indigenous People's Alliance	Jamie	Patino
Mexican American Opportunity Foundation	Ciriaco "Cid"	Pinedo
Nature for All	Belen	Bernal
Nature for All	Steven	Ochoa
Parents, Educators/Teachers, and Students in Action (PESA)	Seymour	Amster
Parents, Educators/Teachers, and Students in Action (PESA)	Ella	Cavlan
Parents, Educators/Teachers, and Students in Action (PESA)	Sydney	Rogers
Parents, Educators/Teachers, and Students in Action (PESA)	Araksya	Nordikyan
Physicians for Social Responsibility - Los Angeles	Alex	Jasset
Protect Playa Now	Faith	Myhra
Reimagine LA Foundation	Rashad	Trapp
Reimagine LA Foundation	Shawna	Andrews

Reimagine LA Foundation	Raul	Claros
Soledad Enrichment Action	Enrique	Aranda
Soledad Enrichment Action	Nathan	Aranda
Southside Coalition of Community Health Centers	Andrea	Williams
Southside Coalition of Community Health Centers	Lucy	Castro
Vote Solar	Andrea	Leon-Grossmann
Watts Labor Community Action Committee	Timothy	Watkins
Watts Labor Community Action Committee	Thelmy	Alvarez
Watts Labor Community Action Committee	Ava	Post
Watts/Century Latino Organization	Autumn	Ybarra
Southeast Rio Vista YMCA	Gerry	Salcedo

PAG July Workshops Invitee List

Org	First name	Last name
Agricultural Energy Consumers Association	Michael	Boccadoro
Air Products	JP	Gunn
Air Products	Lorraine	Paskett
Air Products	Seth	Hilton
ARCHES	Angelina	Galiteva
Bizfed	Sarah	Wiltfong
Bloom Energy	Christina	Tan
California Energy Commission	Rizaldo	Aldas
California Hydrogen Business Council	Katrina	Fritz
California Manufacturers and Technology Association	Lance	Hastings
California Public Utilities Commission	Aruther	Fisher
California Public Utilities Commission	Christopher	Arroyo
California Public Utilities Commission	Chistopher	Myers
California Public Utilities Commission	Jack	Chang
California Public Utilities Commission	Nick	Zanjani
California Public Utilities Commission	Nathaniel	Skinner
CARB	Steve	Cliff
City of Long Beach*	Mario	Cordero
Clean Energy	Indicated Shippers Representative	
Clean Energy Strategies representing the Utility Consumers' Action Network	Tyson	Siegele
Communities for a Better Environment	Roberto	Cabrales
Communities for a Better Environment	Theo	Caretto
Earth Justice	Sara	Gersen
Environmental Defense Fund	Michael	Colvin
Environmental Justice League	Russell	Lowery
GoBiz	Deedee	Myers
Green Hydrogen Coaltion	Nick	Connell
Harbor Trucking Association	Matthew	Schrap
Independent Energy Producers Association*	Jan	Smutny Jones
International Longshore and Warehouse Union Local 13	Mark	Jurisic
LADWP	Marty	Adams
Metropolitan Water District	Deven	Upadhyay
Natural Resources Defense Council	Pete	Budden
Port of Los Angeles	Mike	Galvin
Protect our Communities Foundation**	Protect Our Communities Representative	
Reimagine LA	Rashad	Rucker-Trapp
Reimagine LA	Raul	Claros
Sierra Club	Monica	Embrey
Sierra Club	Katerine	Ramsey
Southern CA Water Coalition	Charley	Wilson

PAG July Workshops Invitee List

Southern California Association of Governments	Kome	Ajise
Southern California Generation Coalition	Norman	Pedersen
Southern California Leadership Council	Richard	Lambros
Southern California Pipe Trades	Rodney	Cobos
The United Association	Aaron	Stockwell
The Utility Reform Network*	Utility Reform Network Representative	
UC Davis Sustainable Transportation Energy Pathways	Lew	Fulton
UCI Advanced Power and Energy Program	Jack	Brouwer
University of CA Riverside	Arun	Raju
Utility Reform Network (TURN)	Marna	Paintsil Anning
Utility Workers Union of America 483*	Ernest	Shaw
Utility Workers Union of America Local 132	Joe	Moreno
UWUA 132	Mike	Cormode
West Coast Advisors	Maddie	Munson
Utility Workers Union of America 483*	Robin	Downs

PAG August Workshop Invitee List

Org	First name	Last name
Agricultural Energy Consumers Association	Maddie	Munson
Agricultural Energy Consumers Association	Michael	Boccadoro
Air Products	JP	Gunn
Air Products	Lorraine	Paskett
Air Products	Seth	Hilton
Air Products	Miles	Heller
ARCHES	Angelina	Galiteva
ARCHES	Tyson	Eckerle
Bizfed	Sarah	Wiltfong
Bloom Energy	Christina	Tan
California Energy Commission	Rizaldo	Aldas
California Hydrogen Business Council	Katrina	Fritz
California Manufacturers and Technology Association	Lance	Hastings
California Manufacturers and Technology Association	Robert	Spiegel
California Public Utilities Commission	Arthur	Fisher
California Public Utilities Commission	Christopher	Arroyo
California Public Utilities Commission	Christopher	Myers
California Public Utilities Commission	Jack	Chang
California Public Utilities Commission	Nick	Zanjani
California Public Utilities Commission	Nathaniel	Skinner
California Public Utilities Commission	Kaj	Peterson
California Public Utilities Commission	Matthew	Taul
CARB	Steve	Cliff
City of Long Beach*	Mario	Cordero
Clean Energy	Nora	Sheriff
California Water Data Consortium	Deven	Upadhay
Clean Energy Strategies representing the Utility Consumers' Act	Tyson	Siegele
Communities for a Better Environment	Roberto	Cabrales
Communities for a Better Environment	Theo	Caretto
Earth Justice	Sara	Gersen
Energy Independence Now	Brian	Goldstein
Environmental Defense Fund	Michael	Colvin
Environmental Defense Fund	Joon Hun	Seong
Environmental Justice League	Russell	Lowery
GoBiz	Deedee	Myers
Green Hydrogen Coalition	Nick	Connell
Green Hydrogen Coalition	Hope	Fasching
Harbor Trucking Association	Matthew	Schrap
Harbor Trucking Association	Karla	Sanchez
Independent Energy Producers Association*	Jan	Smutny Jones
International Longshore and Warehouse Union Local 13	Sal	DiConstanzo
International Longshore and Warehouse Union Local 13	Mark	Jurisic
International Longshore and Warehouse Union Local 13	Sophia	Dubrovich
LADWP	Marty	Adams
LADWP	Paul	Habib
LADWP	Nermina	Rucic

PAG August Workshop Invitee List

Local Union 250	Nathaniel	Williams
Local Union 250	Hector	Carbajal
Metropolitan Water District	Deven	Upadhyay
Natural Resources Defense Council	Pete	Budden
Port of Los Angeles	Mike	Galvin
Port of Los Angeles	Tim	DeMoss
	Protect Our Communities	
Protect our Communities Foundation	Representative	
Reimagine LA	Rashad	Rucker-Trapp
Reimagine LA	Raul	Claros
Sierra Club	Monica	Embrey
Sierra Club	Katerine	Ramsey
South Coast AQMD	Maryam	Hajbabaei
South Coast AQMD	Aaron	Katzenstein
South Coast AQMD	Sam	CaO
Southern CA Water Coalition	Charley	Wilson
Southern California Association of Governments	Kome	Ajise
Southern California Generation Coalition	Norman	Pedersen
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University of CA Riverside	Arun	Raju
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Utility Reform Network (TURN)	Marna	Paintsil Anning
Utility Workers Union of America 483	Ernest	Shaw
Utility Workers Union of America 483	Robin	Downs
Utility Workers Union of America 483	Anthony	Flores
Utility Workers Union of America Local 132	Joe	Moreno
Utility Workers Union of America Local 132	Mike	Cormode

PAG September Q3 Meeting Invitee List

Org	First name	Last name
Agricultural Energy Consumers Association	Maddie	Munson
Agricultural Energy Consumers Association	Michael	Boccadoro
Air Products	JP	Gunn
Air Products	Lorraine	Paskett
Air Products	Seth	Hilton
Air Products	Miles	Heller
ARCHES	Angelina	Galiteva
ARCHES	Tyson	Eckerle
Bizfed	Sarah	Wiltfong
Bloom Energy	Christina	Tan
California Air Resources Board	Steve	Cliff
California Energy Commission	Rizaldo	Aldas
California Hydrogen Business Council	Katrina	Fritz
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California Manufacturers and Technology Association	Robert	Spiegel
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California Public Utilities Commission	Christopher	Arroyo
California Public Utilities Commission	Christopher	Myers
California Public Utilities Commission	Matthew	Taul
California Public Utilities Commission	Jack	Chang
California Public Utilities Commission	Nick	Zanjani
California Public Utilities Commission	Nathaniel	Skinner
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Communities for a Better Environment	Theo	Caretto
Communities for a Better Environment	Shara	Burwell
Communities for a Better Environment	Roberto	Cabrales
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Energy Independence Now	Brian	Goldstein
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International Longshore and Warehouse Union Local 13	Mark	Jurisic
International Longshore and Warehouse Union Local 13	Sophia	Dubrovich
Local Union 250	Nathaniel	Williams
Local Union 250	Hector	Carbajal

PAG September Q3 Meeting Invitee List

Los Angeles Department of Water and Power	Aaron	Guthrey
Los Angeles Department of Water and Power	Marty	Adams
Los Angeles Department of Water and Power	Paul	Habib
Los Angeles Department of Water and Power	Nermina	Rucic
Los Angeles Department of Water and Power	Jesse	Vismonte
Metropolitan Water District	Deven	Upadhyay
Natural Resources Defense Council	Pete	Budden
Port of Los Angeles	Mike	Galvin
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Utility Workers Union of America 483	Anthony	Flores
Utility Workers Union of America Local 132	Joe	Moreno
Utility Workers Union of America Local 132	Mike	Cormode

APPENDIX 3 – CBOSG MEETING MATERIALS

July 19, 2023
9a.m. - 3:00 p.m.

ANGELES LINK

Community Based Organization Stakeholder Group (CBOSG)

Workshop #1

Warm welcome to our participants!
We will be starting shortly after 9:00 a.m. to make sure everyone is present in-person and online.

SoCalGas

HOUSEKEEPING:

This meeting will be recorded (video and audio), and a court reporter will be transcribing the meeting. Please announce yourself before you speak.

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Wireless microphones will be passed to those speakers attending in person.

WELCOME FROM OUR FACILITATORS

ANGELES LINK

CHESTER BRITT
Executive Vice President
Arellano Associates
PAG Lead

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

SoCalGas

AGENDA: PHASE ONE STUDY FEEDBACK

- Arrival and Continental Breakfast: 8:30-9:00am
- SoCalGas Safety Message, Welcome and Agenda Review: 9:00-9:15am
- Plan for Applicable Safety Requirements: 9:15-9:25am
  - Member Discussion: 9:25-10:00am
- Hydrogen 101 Presentation: 10-10:10 am
  - Member Discussion: 10:10-10:20
- Optional On-Site Tour - [H2] Innovation Experience/BREAK: 10:20-10:50am
- Workforce Planning & Training Evaluation: 10:50-11:00am
  - Member Discussion: 11:00-11:30am
- Preliminary Routing/Configuration Analysis: 11:30-11:40am
  - Member Discussion: 11:40-12:10pm
- Lunch: 12:10-12:40pm
- Demand Study: 12:40 –12:50pm
  - Member Discussion:12:50-1:20pm
- Production Planning & Assessment: 1:20-1:30pm
  - Member Discussion: 1:30-2:00pm
- Break: 2:00-2:15pm
- High-Level Economic Analysis & Cost Effectiveness: 2:15-2:25pm
  - Member Discussion: 2:25-2:55pm
- Debrief/Wrap-Up and Thank You: 2:55-3:00

SOCALGAS SAFETY MESSAGE

ANGELES LINK

LARRY ANDREWS
Emergency Strategy & Operations Manager

SoCalGas

SOCALGAS WELCOME AND OPENING REMARKS

ANGELES LINK

FRANK LOPEZ
Director – Regional Public Affairs

SoCalGas

PLAN FOR APPLICABLE SAFETY REQUIREMENTS SCOPE DISCUSSION

ANGELES LINK

AMY KITSON
Angeles Link Director
Engineering & Technology

KATRINA REGAN
Engineering & Technology
Development Manager

SoCalGas

PLAN FOR APPLICABLE SAFETY REQUIREMENTS SCOPE DISCUSSION

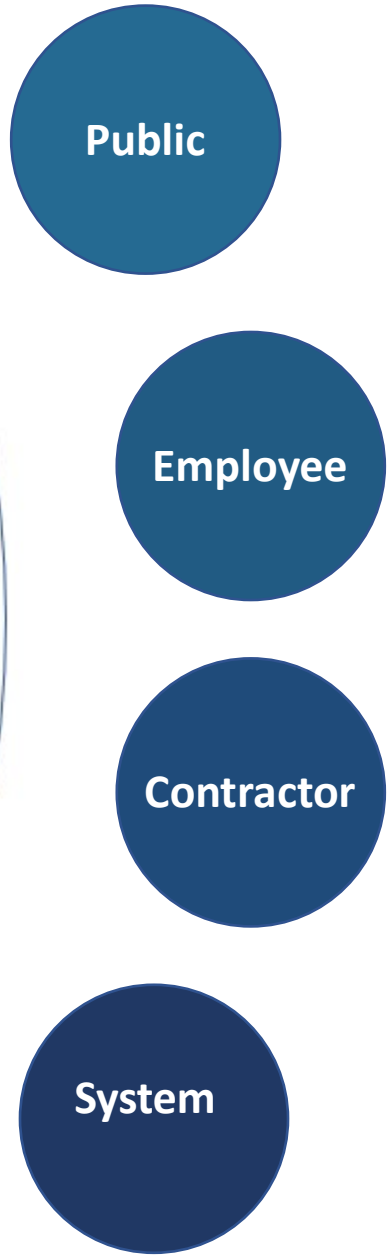
SoCalGas seeks to evaluate safety considerations and develop plans for applicable safety requirements for Angeles Link, which will consist of a safety assessment with the following features:

1. **Safety Considerations**
2. **Specifications, Standards, and Protocols**
3. **Employee, Contractor, System, and Public Safety**

PLAN FOR APPLICABLE SAFETY REQUIREMENTS SCOPE DISCUSSION

Description of Work

- Hydrogen Public Awareness Plans
- Hydrogen safety training and operator qualifications
- Key safety risks & potential mitigations
- Key safety codes
- Physical & chemical properties of hydrogen
- Leak Detection: specifications, standards & protocols
- Operations & maintenance considerations



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MEMBER DISCUSSION: PLAN FOR APPLICABLE SAFETY REQUIREMENTS

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

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Hydrogen 101

The following information is for educational purposes only

SoCalGas

HYDROGEN 101 OVERVIEW – WHAT IS HYDROGEN?

- Most abundant element in the universe and 3rd most abundant on the Earth's surface after Oxygen & Silicon
- Nontoxic and nonpoisonous
- Hydrogen is the lightest element on Earth: it is 14 times lighter than air and 57 times lighter than gasoline vapor
- Hydrogen has unique characteristics like any other fuel.

HYDROGEN 101 – HOW IS IT PRODUCED?

- Colors used as shorthand for different production methods
- Measuring **carbon intensity of hydrogen production** across a wide range of primary production pathways can provide markets with a clear understanding of the decarbonization potential which colors don't offer

Green Hydrogen

Hydrogen produced using electrolysis (water) powered by solar or wind power

Blue Hydrogen

Hydrogen produced using fossil fuels with CO_2 capture and/or renewable natural gas as feedstock

Pink Hydrogen

Hydrogen produced using electrolysis (water) with electricity produced with nuclear sources

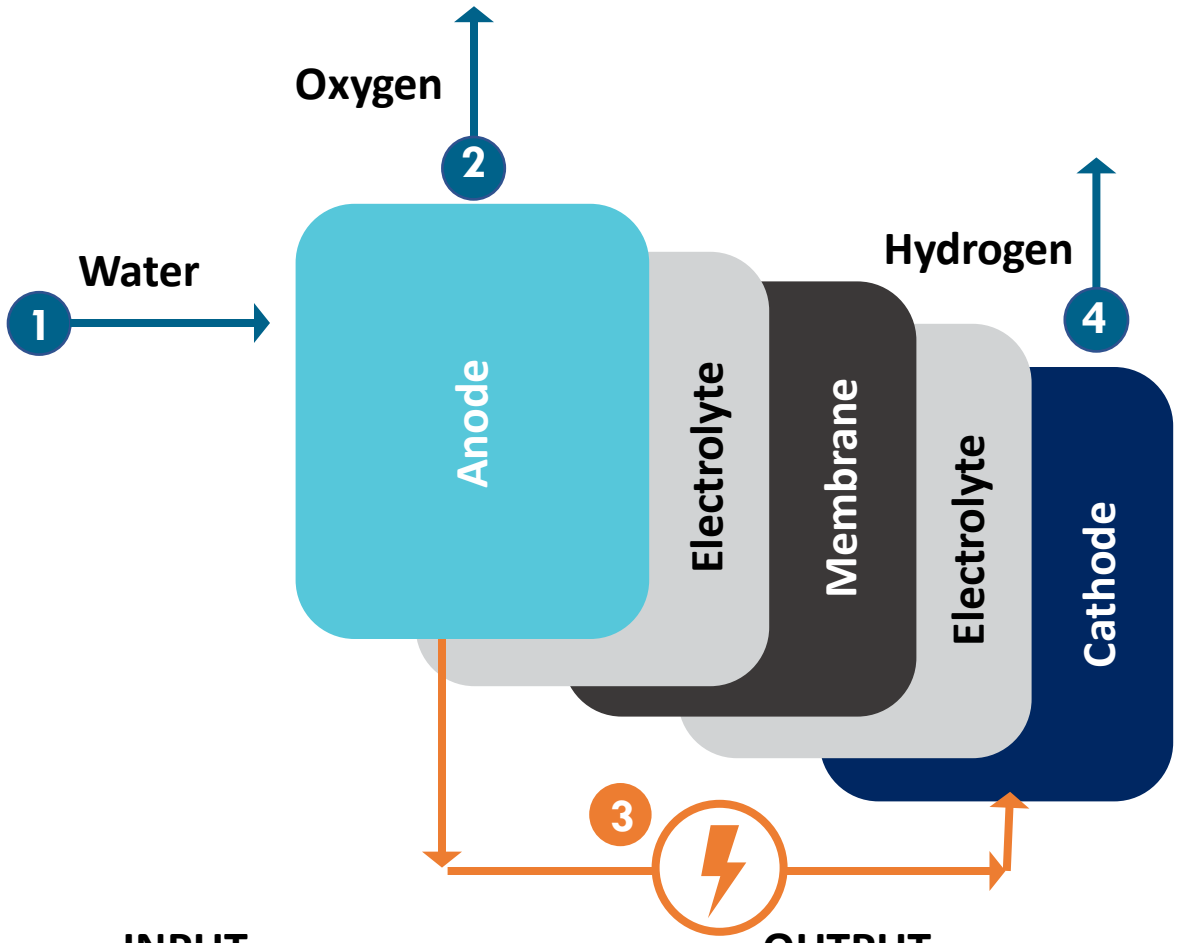
Turquoise Hydrogen

Methane pyrolysis with carbon removal and utilization

Grey Hydrogen

Hydrogen produced using fossil fuels without CO_2 capture

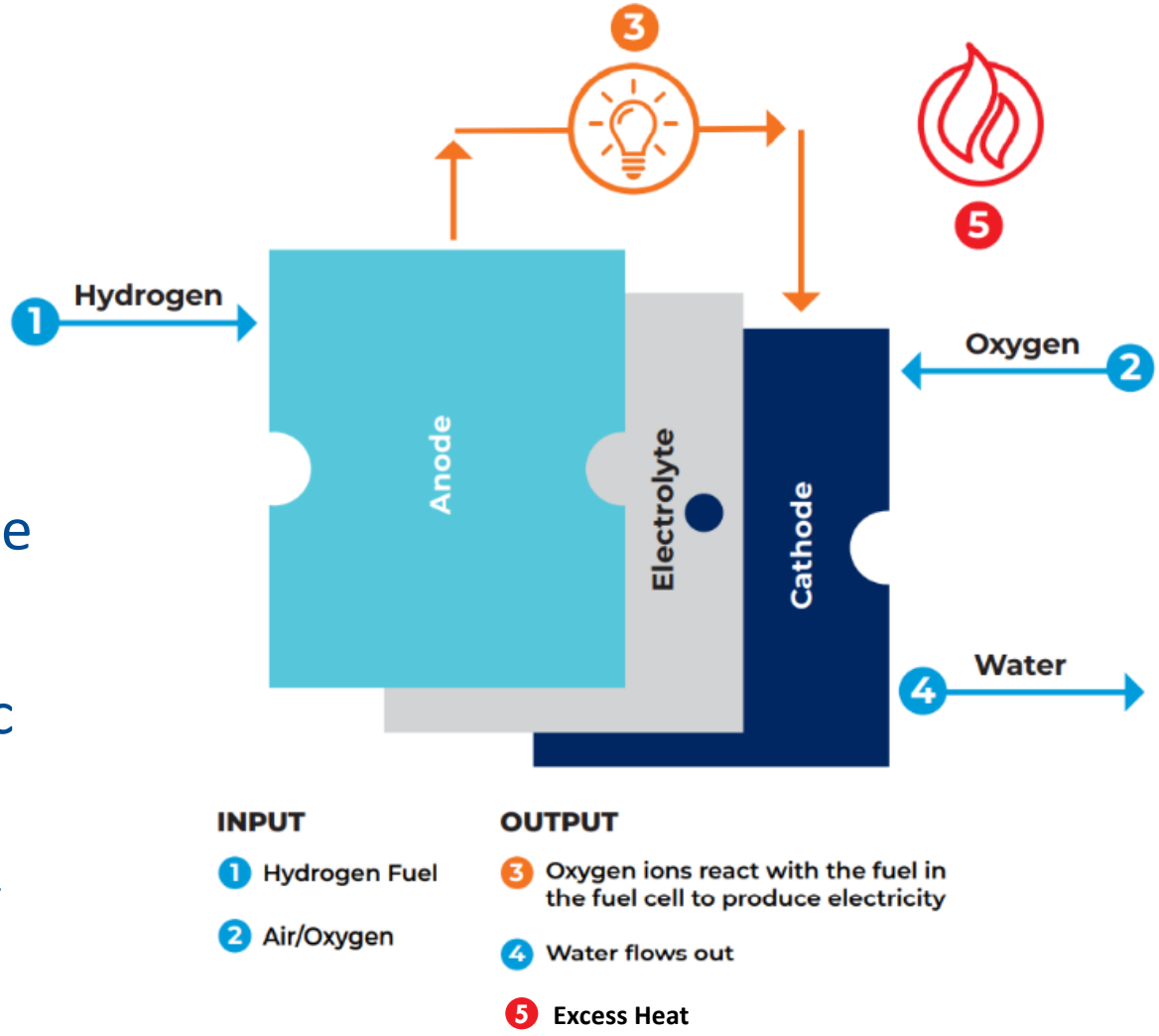
HYDROGEN 101 – HOW HYDROGEN IS FORMED VIA ELECTROLYSIS



- Water (H_2O) is put into the system
- Electric current applied to the H_2O causes it to break down into its components: Hydrogen (H_2) & Oxygen (O)
- Hydrogen moves across a membrane to be collected while Oxygen leaves the system

HYDROGEN 101 – FUEL CELL TECHNOLOGY

- Hydrogen & Oxygen go through a chemical reaction that only produces water as a byproduct
- Hydrogen fuel cells are adaptable and can be used in cars, in houses/communities, for portable power and many more applications
- Electricity and heat are generated which can be used
- A fuel cell often looks like a large basic metallic box & on the inside are a series of “cells”
- A fuel cell functions similar to a typical battery with hydrogen as a fuel input



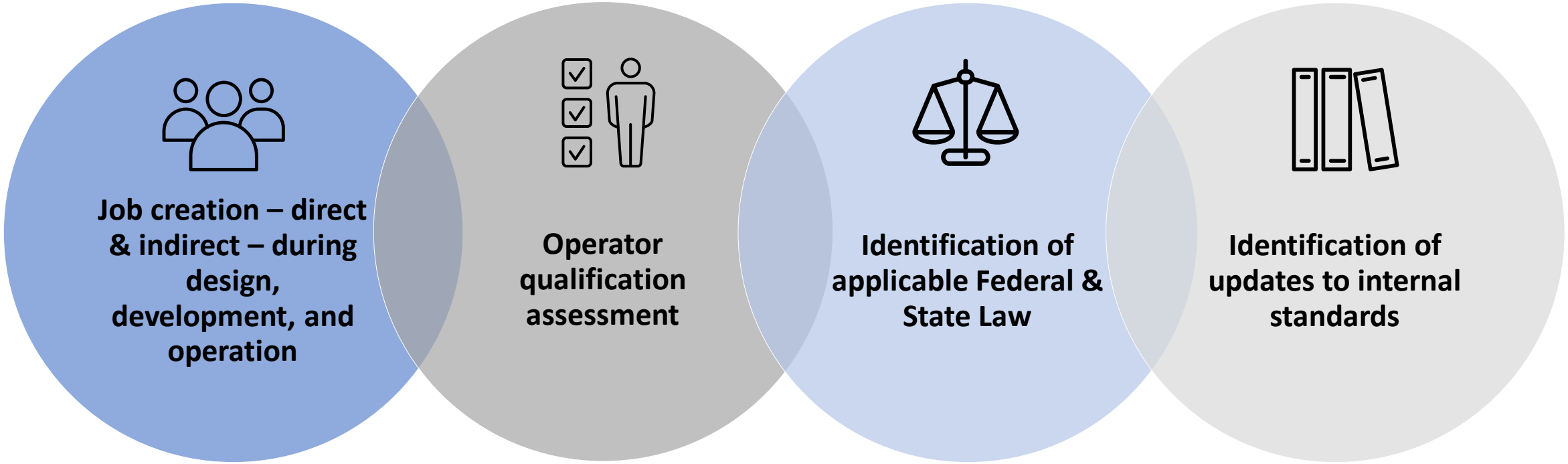
HYDROGEN 101 – HYDROGEN PIPELINES

- Approximately 1,600 miles of Hydrogen pipelines currently operating in the US today
- Angeles Link is proposed to be the first open-access common carrier hydrogen pipeline system
- Traditional pipeline components are the same as natural gas components: pipe, valves, compressor stations, regulators
- Hydrogen is unique in that it enhances renewable electricity and the reliability, resiliency, and flexibility toward decarbonizing the electric grid

Optional On-Site Tour - [H2] Innovation Experience/BREAK

WORKFORCE PLANNING & TRAINING EVALUATION SCOPE DISCUSSION

Assessment & strategic evaluation of current workforce & internal training standards compared to future workforce classification & training needed to build, transfer, and transition workforce to maintain & operate the proposed Angeles Link clean renewable hydrogen transportation infrastructure.



WORKFORCE PLANNING & TRAINING EVALUATION INTRODUCTION

Description of Work

- Operations & Maintenance Protocols
- DOT and Other Construction Qualifications/Protocols
- Changes to Existing Processes
- Changes to Technology & Implementation
- Workforce Staging Timeline
- Comparison to Existing Company Facilities
- DOT & Other Construction Qualifications
- Risk / Mitigation Assessment

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MEMBER DISCUSSION: WORKFORCE PLANNING & TRAINING

- Please announce your name and speak directly into the microphone
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PRELIMINARY ROUTING/CONFIGURATION ANALYSIS INTRODUCTION

High-level construction staging for implementation, initial evaluation of localized hydrogen hub and an initial evaluation of hydrogen storage technology both above and underground for Angeles Link will all factor into this study. The following areas will be considered in this study:

Pipeline routing & constructability factors

Potential production & storage locations

Potential locations of demand

PRELIMINARY ROUTING/CONFIGURATION ANALYSIS DESCRIPTION

Description of Work

Constructability

- Workspace
- Crossing Methods
- Open-Cut Trench
- Trenchless Installation
- Construction Methods
- Valves

Evaluation Criteria

- Engineering
- Social
- Environmental

Route Selection

- Weighted Value
- Scoring
- Ranking

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MEMBER DISCUSSION: PRELIMINARY ROUTING/CONFIGURATION ANALYSIS

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ANGELES LINK

LUNCH

SoCalGas™

DEMAND STUDY SCOPE DISCUSSION

ANGELES LINK

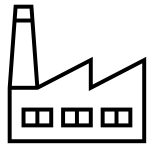
YURI FREEDMAN
Senior Director
Business Development

SoCalGas

DEMAND STUDY OVERVIEW AND INTRODUCTION

SoCalGas to identify:

Hydrogen demand, end uses, and end-users by 2045 (including current natural gas customers and future customers) of the Project.



This study is evaluating potential clean renewable hydrogen demand and assess adoption with a priority on the Mobility, Power Generation, and Industrial sectors.

DEMAND STUDY DESCRIPTION

Technical Approach

1. Identify top sub-sectors using historical data (e.g., vehicle inventories, natural gas consumption)

2. Demand Model Development
   - A. Model the Total Potential Market
   - B. Forecast the % of the market will be zero emission
   - C. Assess the viability of clean renewable hydrogen
   - D. Develop demand scenarios

3. Validate and refine model results

DEMAND STUDY DESCRIPTION

Market Validation

The demand assumptions will be validated through interviews with potential end users and key industry and subject matter advisors.

Industry

Various sector participants coming from Mobility, Power Generation, and Industrial Companies

Research & Academia

Potential subject matter advisors:

University of California

National Laboratories

Public Agencies & Consortiums

Potential advisors/references:

PAG/CBOSG (including CPUC) feedback, California Air Resources Board, California Energy Commission, South Coast Air Quality Management District, CA Hydrogen Fuel Cell Partnership (H2FCP)

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MEMBER DISCUSSION: DEMAND STUDY

- Please announce your name and speak directly into the microphone
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PRODUCTION PLANNING & ASSESSMENT SCOPE DISCUSSION

Overview

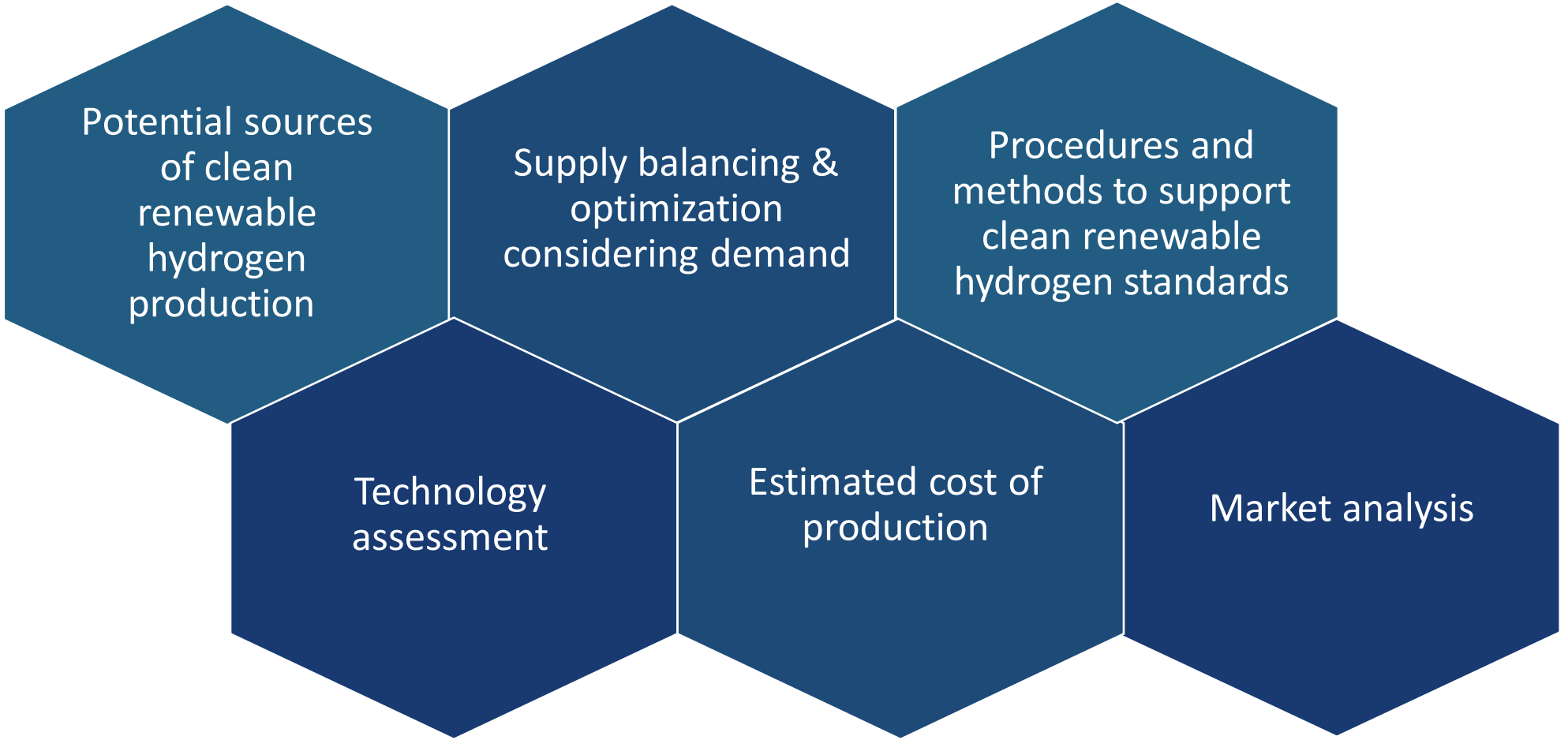
- SoCalGas to identify:

The potential sources of hydrogen generation for the Project

Plans to ensure the quality of the hydrogen gas meets the clean renewable hydrogen standards set in the Decision

PRODUCTION PLANNING & ASSESSMENT INTRODUCTION

This Production Planning & Assessment will cover various topics, including:



PRODUCTION PLANNING & ASSESSMENT DESCRIPTION

- Identify eligible renewable resources and hydrogen generation technologies

- Assess how much hydrogen can be produced, focusing on SoCalGas's service territory

- Perform a market analysis to understand what businesses are doing or may do in the future

- Discuss ways hydrogen production will meet the Final Decision's hydrogen production standard

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MEMBER DISCUSSION: PRODUCTION PLANNING & ASSESSMENT DESCRIPTION

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ANGELES LINK

BREAK

SoCalGas

HIGH-LEVEL ECONOMIC ANALYSIS & COST EFFECTIVENESS DESCRIPTION

Analysis output: A levelized delivered cost comparison of hydrogen pipeline systems compared to decarbonization alternatives and other methods of delivery

Levelized Cost of Hydrogen (LCOH)

Use CAPEX and OPEX to calculate pipeline system LCOH

Determine a cost-effectiveness methodology

Decarbonization Alternatives

Potential examples:

Electrification

Energy Efficiency

Renewable Natural Gas (RNG)

Carbon Management

Non-pipeline Hydrogen Delivery

Potential examples:

Trucking

Train

Marine

Hybrid (trucking/train)

In-basin hydrogen production

ANGELES LINK

MEMBER DISCUSSION: HIGH LEVEL ECONOMIC ANALYSIS & COST EFFECTIVENESS

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ANGELES LINK

DEBRIEF/WRAP-UP

SoCalGas

Thank you for your participation!

Please drive safely.

SoCalGas

July 21, 2023
9a.m. - 2:35 p.m.

ANGELES LINK

Community Based Organization Stakeholder Group (CBOSG)

Workshop #2

Warm welcome to our participants!
We will be starting shortly after 9:00 a.m. to make sure everyone is present in-person and online.

SoCalGas

WELCOME FROM OUR FACILITATORS

ANGELES LINK

CHESTER BRITT
Executive Vice President
Arellano Associates
PAG Lead

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

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AGENDA: PHASE ONE STUDY FEEDBACK

- Arrival and Continental Breakfast: 8:30-9:00am
- SoCalGas Safety Message, Welcome and Agenda Review: 9:00-9:15am
- Environmental & Social Justice Analysis: 9:15 - 9:25am
  - Member Discussion: 9:25-9:55am
- Hydrogen Leakage Assessment: 09:55-10:05am
  - Member Discussion: 10:05-10:35am
- On-Site Tour - [H2] Innovation Experience 10:35-11:05
- Greenhouse Gas Emissions Evaluation: 11:05-11:15am
  - Member Discussion: 11:15-11:45am
- Lunch: 11:45-12:15pm
- Nitrogen Oxides (NO_x) Emission Assessment: 12:15-12:25pm
  - Member Discussion: 12:25-12:55pm
- Stakeholder Feedback Tracking System: 12:55 –1:05pm
  - Member Discussion: 1:05-1:35pm
- Break: 1:35-1:50pm
- Right-of-Way & Franchise Analysis: 1:50-2:00pm
  - Member Discussion: 2:00-2:30pm
- Debrief/Wrap-Up and Thank You: 2:30-2:35pm

SOCALGAS SAFETY MESSAGE

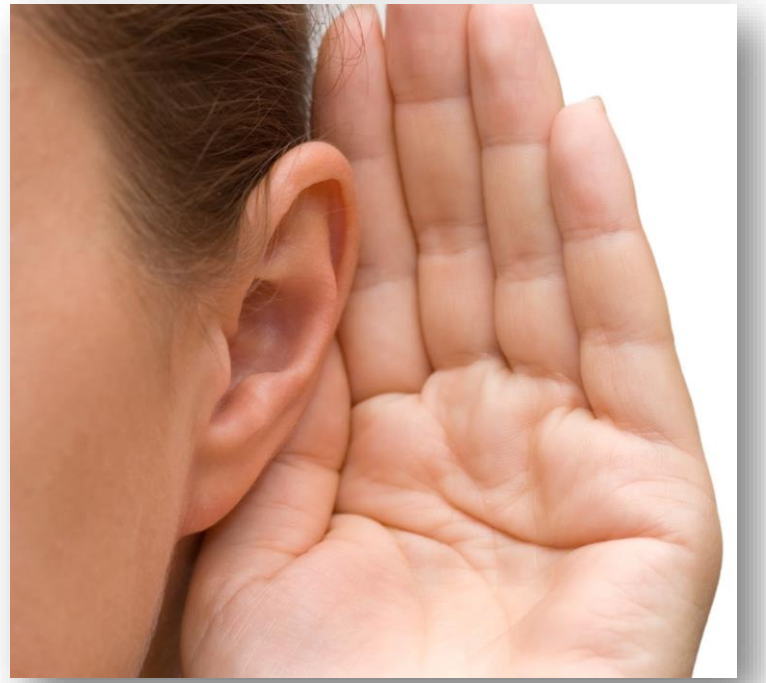
ANGELES LINK

SONIA RODRIGUEZ
SoCalGas
Safety & Health Manager

SoCalGas

LISTEN TO YOUR BODY

- Listening to your body is a crucial step in identifying and treating illnesses.
- <u>3 Steps:</u>
    1. Pay attention and don't ignore symptoms:
        - Losing or gaining weight too quickly
        - Excessively tired
        - Excessively hungry or excessively thirsty or using the restroom frequently at night
        - Hands, feet, ankles or arms swell, experiencing headaches
        - Your face feels a little different and your smile is slightly crooked
        - Swelling of ankles, coughing, wheezing, shortness of breath
        - Other signs
    2. STOP, don’t brush it off
    3. Don’t wait, get checked



LISTEN TO YOUR BODY

- Stress
  - Good vs. Bad
  - Recognizing the symptoms
  - How your body deals with stress
  - Ways to cope
    - Exercising
    - Spending time with loved ones
    - Talking to someone
    - Taking your vacation time

SOCALGAS WELCOME AND OPENING REMARKS

ANGELES LINK

ANDY CARRASCO
SoCalGas
Vice President Communication,
Local Government &
Community Affairs

SoCalGas

ENVIRONMENTAL & SOCIAL JUSTICE ANALYSIS: SCOPE DISCUSSION

ANGELES LINK

SEBASTIAN GARZA
SoCalGas Angeles Link
Project Manager

ALISA LYKENS
Insignia
Director

SoCalGas

ENVIRONMENTAL & SOCIAL JUSTICE ANALYSIS: SCOPE

Identify Disadvantaged Communities

- **CalEnviroScreen Tool (State)**
- **Climate Economic Justice Screening Tool (Federal)**
- *Justice40 Initiative*

Identify "Hot Spots"

- **"Hot Spot" communities, or disadvantaged communities of concern based on threshold comparisons in data collected will be identified**

Conduct EJ Assessment

- **High-level analysis of Project's potential impact on communities of concern**
- **Evaluate mitigation measures to eliminate or reduce impacts**
- **Solicit feedback from CBO/PAG stakeholders**

Objective: Identify Potential Impacts to Disadvantaged Communities and Other Environmental Justice Concerns

ENVIRONMENTAL ANALYSIS: SCOPE

Objective: Demonstrate compliance with environmental law and public policies and baseline existing environmental conditions

Desktop Environmental Analysis will address:

- ❑ Potential pipeline routes and associated facilities
- ❑ Third-party production facilities
- ❑ Potential third-party storage facilities

ENVIRONMENTAL ANALYSIS: SCOPE

Objective: Demonstrate compliance with environmental law and public policies and baseline existing environmental conditions

Desktop Environmental Analysis involves:

- ❑ Collection of publicly available and confidential datasets
- ❑ Use of GIS and aerial photography to determine where potential project components intersect sensitive resources
- ❑ Making an initial determination of whether impacts can be avoided or mitigated

ENVIRONMENTAL ANALYSIS: CRITERIA

- ❑ Aesthetics
- ❑ Agriculture and forestry resources
- ❑ Biological resources
- ❑ Cultural and tribal resources
- ❑ Energy
- ❑ Geology and soils
- ❑ Hazardous materials
- ❑ Hydrology and water quality
- ❑ Land use and planning
- ❑ Noise
- ❑ Transportation

ANGELES LINK

MEMBER DISCUSSION: ENVIRONMENTAL & SOCIAL JUSTICE ANALYSIS

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

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BREAK (15 MINUTES)

SoCalGas

HYDROGEN LEAKAGE, GREENHOUSE GAS AND NO_X ASSESSMENTS: SCOPE AND TECHNICAL APPROACH DISCUSSION

ANGELES LINK

DARRELL JOHNSON
SoCalGas Manager
Environmental Services

SoCalGas

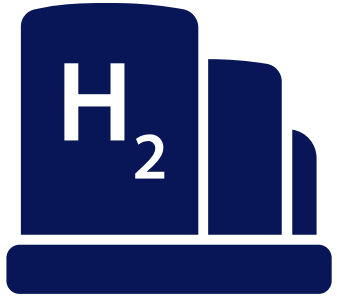
HYDROGEN LEAKAGE ASSESSMENT: SCOPE

Objectives:

- Assess the potential for **hydrogen leakage associated with production, storage, and transportation of clean renewable hydrogen**
- Identification and evaluation of **potential mitigation measures**

Study Approach:

- **Estimate potential for leakage** associated with the anticipated sources
- Identify potential **leakage mitigation measures**
- **Compile available technical information** including from parallel Phase One studies
- **Develop estimates** making assumptions, as needed, based on availability of related and documented data



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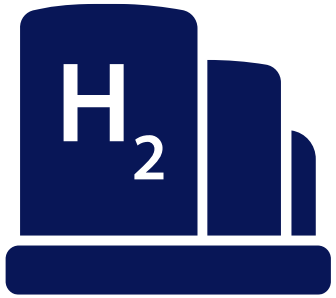
GREENHOUSE GAS EMISSIONS (GHG) EVALUATION: SCOPE

Objective:

- Assess the potential for both **GHG emissions increases and reductions** resulting from the Project, and
- Identify potential **GHG emissions mitigation measures to reduce potential GHG emissions**

Study Approach:

- **Estimate GHG emissions** associated with the anticipated emission sources
- Identify potential **GHG emissions mitigation measures**
- **Compile available technical information** including from parallel Phase One studies, regulatory and transportation agencies, etc.
- **Develop estimates** making assumptions, as needed, based on availability of related and documented data



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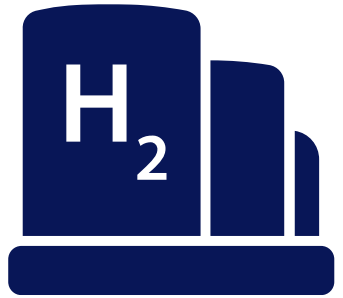
NO_x EMISSIONS ASSESSMENT: SCOPE

Objective:

- Assess the potential for both **NO_x emissions increases and reductions** resulting from the Project and identify potential **NO_x mitigation measures to reduce potential NO_x emissions**
- NO_x will be the **primary focus** and the study will also include a **high-level review of other potential emissions**

Study Approach:

- **Estimate NO_x emissions** associated with the anticipated emission sources
- Identify potential **NO_x mitigation measures**
- **Compile available technical information** including from parallel Phase One studies, regulatory and transportation agencies, etc.
- **Develop estimates** making assumptions, as needed, based on availability of related and documented data



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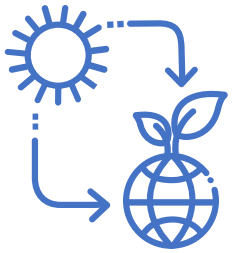
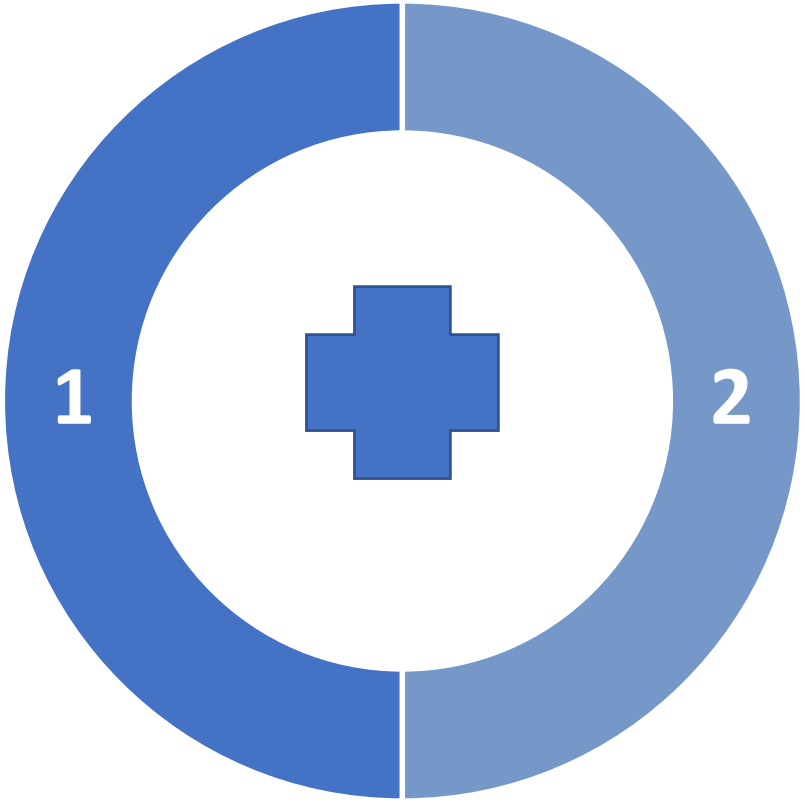
AIR AND EMISSIONS ASSESSMENTS: TECHNICAL APPROACH



Identify Source Types



Identify Mitigation Measures

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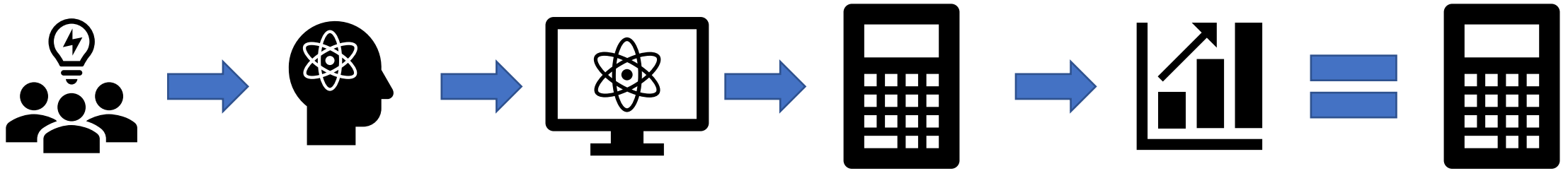
AIR AND EMISSIONS ASSESSMENTS: TECHNICAL APPROACH (CONT.)

For each source type and mitigation measure:



Identify Potential Calculation Approaches

Determine Best Calculation Approach

Determine Calculation Method for Selected Approach

Prepare Calculations at Unit Level

Apply Scaling Factor

Calculate Estimated Impacts

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MEMBER DISCUSSION: HYDROGEN LEAKAGE, GHG AND NO_X EMISSIONS ASSESSMENT

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LUNCH

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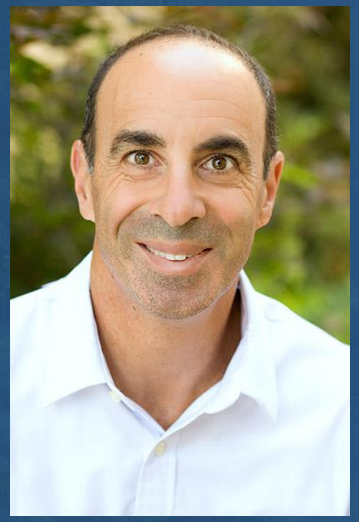
INSIGNIA ENVIRONMENTAL: STAKEHOLDER FEEDBACK TRACKING SYSTEM

ANGELES LINK



ARMEN KEOCHEKIAN
Director
Insignia

SoCalGas

STAKEHOLDER FEEDBACK TRACKING SYSTEM

Phase One Feasibility Studies Milestones

- Study Descriptions of Work
- Study Methodology/ Technical Approach
- Preliminary Data and Findings
- Draft Reports

Comment Periods

- One comment period for each milestone
- Comment periods are approximately 4 weeks
- If some studies advance more quickly, we may combine milestones

Feedback Mechanisms

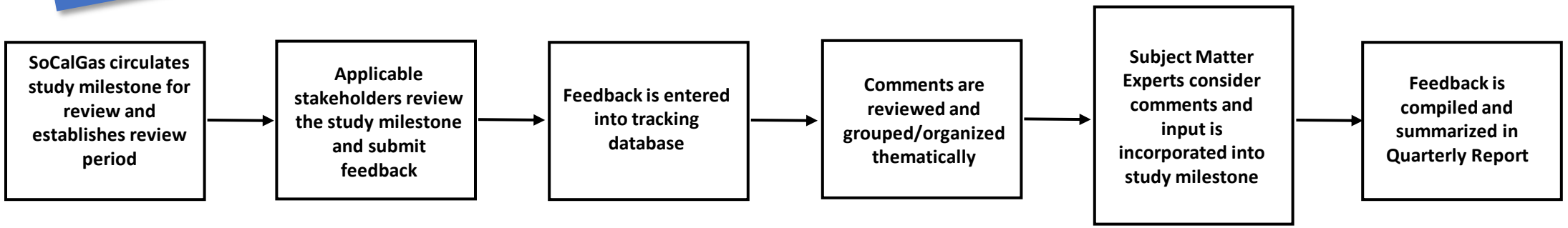
- Designated email address
- Mail
- Interim and quarterly meetings
- Online form

STAKEHOLDER FEEDBACK TRACKING SYSTEM

A Feedback Tracking System database has been created to track comments

Comments will be entered into the database, grouped thematically, and disseminated to SoCalGas Subject Matter Experts

Feedback is considered for current studies and process summarized in Quarterly Report



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MEMBER DISCUSSION: STAKEHOLDER FEEDBACK TRACKING SYSTEM

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BREAK (15 MINUTES)

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RIGHT-OF-WAY AND FRANCHISE ANALYSIS: SCOPE DISCUSSION

ANGELES LINK

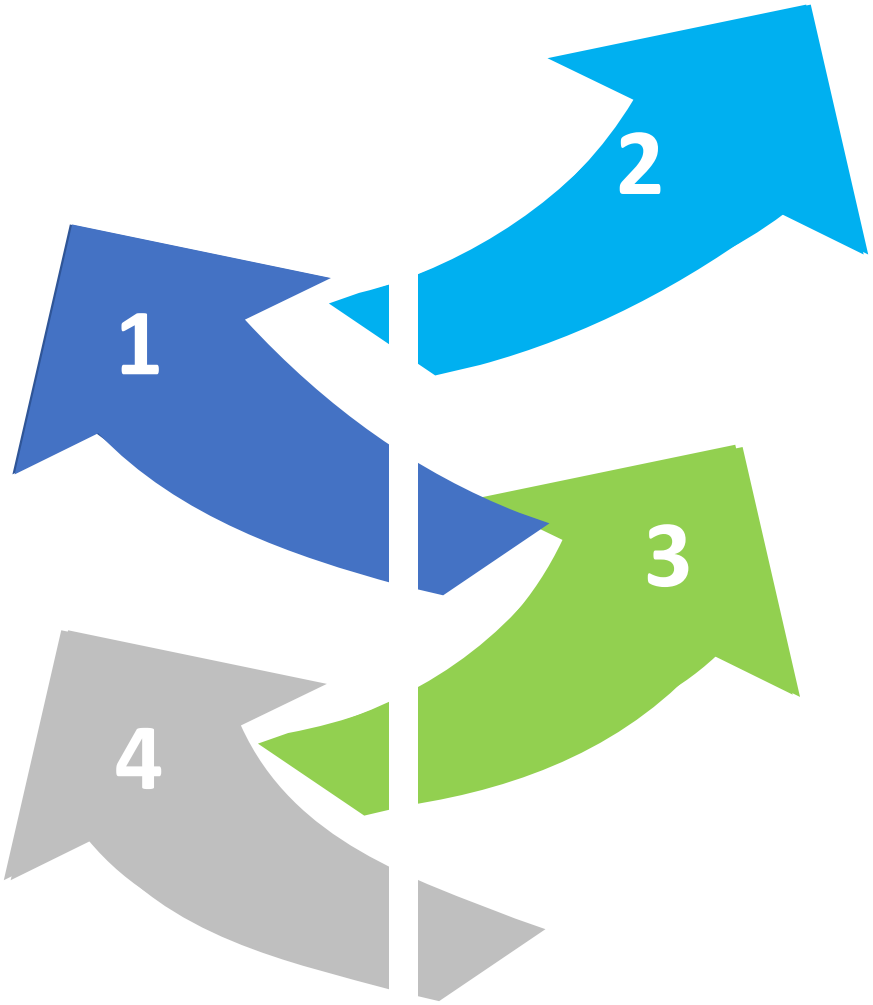
GEOFF DANKER
Franchise, Fees & Policy Manager

SoCalGas

Franchise Overview

Existing SoCalGas Pipelines

Preliminary Review Stage



Public Rights-of-Way and Franchise Agreements

Terms of Franchise Agreements

FRANCHISE ANALYSIS: SCOPE

Introduction and Description of Work

- Identifying existing franchises to accommodate the potential routes and future franchises that could help facilitate the proposed routes

- Initial review and analysis of:
  - the number and types of SoCalGas projects in applicable municipalities
  - an assessment of SoCalGas's rights in its existing franchised ROWs
  - potential terms or conditions, as developed, for new franchises

RIGHT-OF-WAY ANALYSIS: SCOPE

Land and Right-of-Way Analysis Overview

- Private easements or rights-of-way (ROWs) grant SoCalGas the right to construct, operate and maintain pipeline facilities within private properties owned by others.

- SoCalGas owns tens of thousands of private easements/ROWs, allowing the safe operation of existing pipeline systems within its service territory.

- As part of the Phase One land rights analysis, SoCalGas will conduct a high-level evaluation to review the availability of its existing easements/ROWs to accommodate the potential routes, as well as future land rights that may be needed.

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MEMBER DISCUSSION: RIGHT-OF-WAY AND FRANCHISE ANALYSIS

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DEBRIEF/WRAP-UP

SoCalGas

Thank you for your participation!

Please drive safely.

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DEMAND STUDY ANALYSIS

Technical Approach and Preliminary Outputs

August 2023

SoCalGas™

Document Contents

SoCalGas™

Recap of CPUC Decision and Presentation Objectives

CPUC Decision and Context

- In December 2022, the CPUC approved SoCalGas's request to establish the Angeles Link Memo Account to record the costs of performing Phase One feasibility studies for the Angeles Link Project.
- The CPUC's Decision requires, as part of the Phase One feasibility studies, SoCalGas to identify demand and end uses for Angeles Link and make the data, findings, and results available to the public unless SoCalGas is granted confidentiality of the data in accordance with General Order 66-D.
- Based on these guidelines, this analysis focuses on evaluating the potential hydrogen demand across select sectors in SoCalGas' service territory from 2025 – 2045.

Presentation Objectives

Approach and Methodology

Provide a high-level overview of the model development process

Modeling Assumptions

Share important inputs, assumptions and inputs across modeled sectors

Analysis Outputs

Present a summary view of preliminary model outputs

Key Considerations on Scope and Areas for Further Analysis

- This analysis focuses on a bottom-up assessment of demand potential for clean renewable hydrogen across the Mobility, Power Generation, and Industrial sectors
- To be conservative, the model does *not* account for certain variables that would be expected to increase future demand for hydrogen, such as:
  - Use of hydrogen to facilitate energy system reliability and maintain Loss of Load Expectations against an increasing share of intermittent renewable resources on the grid
  - Potential additions to generation capacity to meet demand growth in 2045, as seen in the projected new resources identified in CARB's Scoping Plan (including approximately 9 GW of hydrogen turbine capacity)
  - Carbon pricing (e.g., LCFS and cap-and-trade) impacts on demand which may be influenced by pending regulatory proceedings
- These variables may be further assessed in future studies

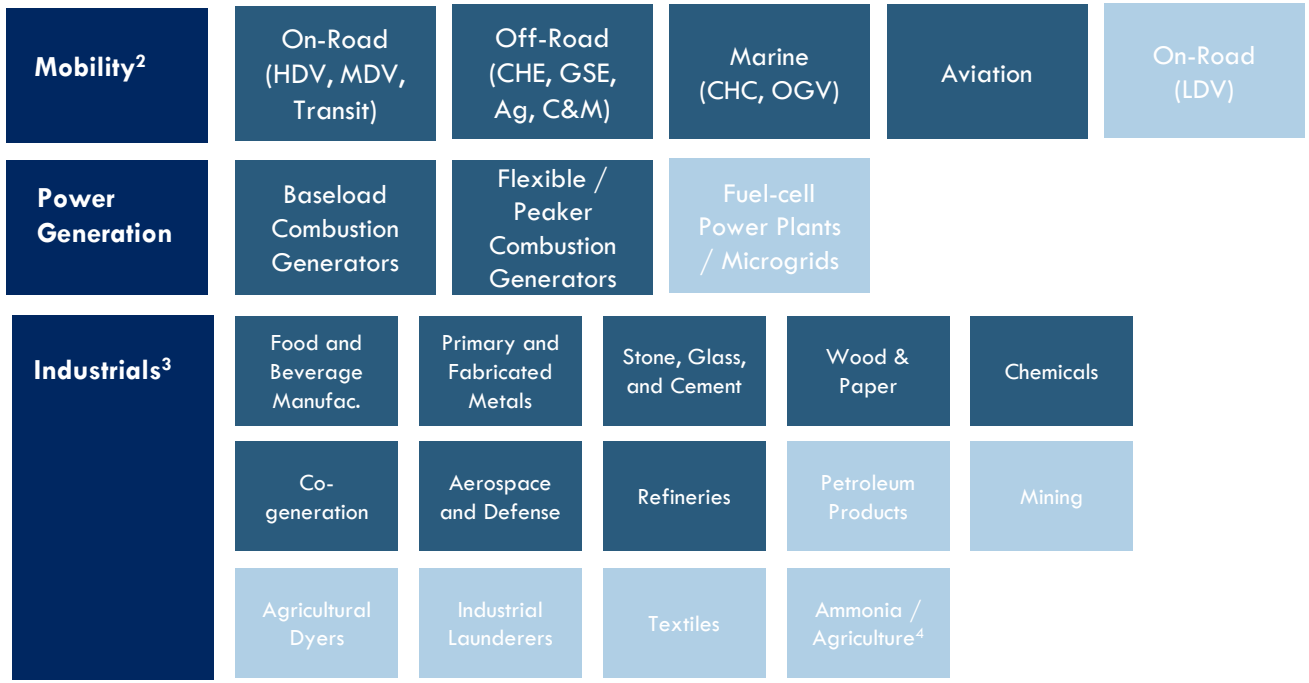
Demand Analysis Scope

The demand analysis focuses on three priority sectors: Mobility, Power Generation & Industrials, with multiple subsectors assessed based on their emissions footprint, current fuel consumption, and hard-to-electrify use cases

Demand Analysis Scope

	Mobility	Power Generation	Industrials
Adoption Drivers	Understand market adoption drivers including legislation and regulations, technical feasibility, commercial availability, and business readiness[1]		
Demand Volume	Create a model quantifying potential future demand by sector		
Decarbonization Alternatives	Understand how hydrogen compares to other decarbonization alternatives across costs, markets, and technical feasibility and how this impacts adoption		
Market Validation	Confirm outcomes and assumptions with market segment experts		

Sectors and Sub-Sectors Assessed for Demand Analysis



1. Additional analysis factors considered: Planned hydrogen projects and announcements; CARB's Scoping Plan

2. HDV (Heavy Duty Vehicles), MDV (Medium Duty Vehicles), CHE, (Cargo Handling Equipment), GSE (Ground Support Equipment), Ag (Agricultural Equipment), C&M (Construction & Mining Vehicles), CHC (Commercial Harbor Craft), OGV (Ocean Going Vessels)

3. Potential hydrogen demand from methanol production is not quantified in the current model but will be evaluated in a future phase.

4. Ammonia production for fertilizer manufacturing will also be assessed in a future phase.

Demand Analysis Approach

An initial model was developed and revised through input from potential end-users and market participants

Model Definition

- Establish a clear set of objectives, scope, and approach for the demand analysis
- Assess academic and market analysis to identify priority sub-sectors and applications for clean hydrogen demand

Model Buildout

- Develop detailed model methodology; identify relevant datasets and inputs
- Quantify total addressable market for clean hydrogen and estimate adoption rates for each sub-sector and application by evaluating alternatives

Model Refinement (In Progress)

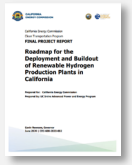
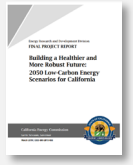
- Share preliminary outputs with PAG / CBO members and gather feedback
- Incorporate feedback (where possible) into the model and integrate findings with other Angeles Link Phase One studies

Sector Interviews & Peer Reviews (In Progress)

- Conduct targeted interviews with subject matter experts across industry, academia and government agencies to test model approach, inputs, assumptions and outputs

Research Overview

Several recent reports that evaluate the potential for hydrogen, both at the state and federal level, have been leveraged as inputs and references

Reference	Analysis Overview	Key Insights
 **DOE Clean Hydrogen Commercial Liftoff Report & U.S. National Clean Hydrogen Strategy and Roadmap** (Source 1, Source 2)	DOE overview of pathways to widespread clean hydrogen adoption throughout the U.S. analyzing various challenges, opportunities, and incentive programs	• 4-8 MMT per year of hydrogen demand expected nationwide in 2050 to supply energy storage and power generation • 5-8 MMT per year of hydrogen demand nationwide in 2050 for the medium and heavy-duty trucking sector • Open access hydrogen transport infrastructure will be key in ensuring long-term, self-sustaining demand growth
 **CARB 2022 Scoping Plan for Achieving Carbon Neutrality** (Source)	Discussions of expected future energy use in CA broken down by source and application. Includes an overview of CA state actions, regulations, and incentives	• The Scoping Plan Scenario models carbon neutrality by 2045 using a broad portfolio of fossil fuel alternatives and clean technologies while aligning with policy direction • 1.4 MMT per year of hydrogen non-LDV mobility energy demand in CA in 2045 under the Scoping Plan Scenario
 **UC Davis California Hydrogen Analysis Project: The Future Role of Hydrogen in a Carbon-Neutral California** (Source)	UC Davis analysis of potential future hydrogen transportation systems, demand across sectors, and sources of supply	• 3.2 MMT per year of hydrogen non-LDV mobility energy demand in CA in 2045 under the High case scenario • 30,654 FCEV long-haul trucks in service in CA in 2045
 **CEC and UC Irvine Roadmap for the Deployment and Buildout of Renewable Hydrogen Production Plants in California** (Source)	CEC and UC Irvine report on roadmaps for statewide clean hydrogen deployment in CA including potential hydrogen demand by sector	• 0.4 MMT per year of hydrogen demand in CA in 2050 for electricity generation • 1.1 MMT per year of hydrogen non-LDV mobility energy demand in CA in 2050 under the High case scenario
 **CEC Building a Healthier and More Robust Future: 2050 Low-Carbon Energy Scenarios for California** (Source)	CEC report with an overview of different future California specific energy mix projections with insight into potential capacity and generation numbers	• 320-490 TWh of electricity demand per year in CA in 2050 • FCEV fuel efficiencies are expected to improve by ~25% from 2020 to 2050

METHODOLOGY

Demand Model Methodology

The model methodology projects transition of current fuel to hydrogen for priority sub-sectors, with validation through end user interviews and peer reviews

Key Activities:

1. Identify top sub-sectors using **historical natural gas, diesel, and gasoline consumption** data
2. Align on key data sets and assess **modeling approach**
3. Test **technical feasibility** (gathering inputs from interviews when possible) to help fill information gaps

2a. **Model Total Addressable Market (TAM) using current fuel usage**

- Determine industry growth rates
- Define industry-specific characteristics (type of equipment used, efficiency rates and fuel consumption)

2b. **Apply Zero-Emission (ZE) and H2 adoption rates to TAM**

- Forecast transition to net-zero broadly and hydrogen specifically using key adoption factors:
  - Legislation and regulations, technical feasibility, commercial availability and business readiness

2d. **Develop demand scenarios**

- Define adoption scenarios through qualitative assessment of decarbonization alternatives, technology commercialization, and cost to adopt hydrogen

- Conduct **interviews with end-users to inform** model assumptions and overall outputs
- **Conduct peer-reviews** to validate approach, assumptions and outputs
- **Incorporate feedback** from interviews with end users and peer-reviews into the model and document appropriately
- **Incorporate feedback from PAG/CGO** as appropriate

Demand Model Methodology

The model considers current energy use assumptions, market growth, zero emission adoption, and hydrogen adoption to develop a quantitative demand projection

2A

Model the total addressable market (TAM)

Energy consumed (P)

Example inputs

- Equipment efficiency rates
- Fuel consumption rates

X

Market size/growth (Q)

Example inputs

- Utilization (ex: fleet size & VMT)
- Industry growth rates

=

2B

Apply ZE adoption rates

X

ZE adoption

Example inputs

- Legislation (State/Fed.)
- Interviews

=

2C

Apply H2 adoption rates

X

Hydrogen adoption

Example inputs

- Market research
- Interviews
- Efficiency gains

=

2D

Develop +/- demand scenarios

X

Demand scenarios

Example factors

- Alternatives
- Tech Availability

=

Total Energy Requirements (ex: MMBtus) → **Base Hydrogen Demand (ex: TPY/TPD)** → **Demand Range**

Note: ZE stands for Zero Emissions. For many sub-sectors, zero emissions legislation exists, such as for 100% of all drayage trucks to be ZE by 2035.

Scenario and Adoption Rate Overview

Three scenarios have been developed reflect a continuum of potential clean hydrogen adoption rates

Description of Scenarios

Conservative

Scenario assumes lower adoption rates for hydrogen across a limited set of use-cases within prioritized sectors and sub-sectors, primarily driven by existing legislation.

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Moderate

Scenario assumes increased hydrogen adoption across an expanded set of use-cases within prioritized sectors and sub-sectors, driven by existing legislation.

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload, Cogen

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Ambitious

Scenario assumes more ambitious policies are put in place and businesses are incentivized to support widespread hydrogen adoption within prioritized sectors and sub-sectors.

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV,* Aviation

Power: Peaker, Baseload, Cogen

Industrials: Refineries, Cogen, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

*HDV (Heavy Duty Vehicles), MDV (Medium Duty Vehicles), CHE, (Cargo Handling Equipment), GSE (Ground Support Equipment), Ag (Agricultural Equipment), C&M (Construction & Mining Vehicles), CHC (Commercial Harbor Craft), OGV (Ocean Going Vessels; *Diesel consumption only, not main engine heavy fuel)*

Cogeneration in Conservative and Moderate scenarios excludes cogeneration plants at refineries

Base market growth rate approach and assumptions vary per sector and per scenario

Primary Factors Driving Adoption Rates

Policy & Legislation

Is there a legislative or policy mandate that accelerates the transition to hydrogen? Are there incentives in place?

Technology Feasibility

Is hydrogen technically and/or operationally feasible? How does this compare against alternatives?

Commercial Availability

Is hydrogen commercially available? How does this compare against alternatives?

Business Readiness

Is the industry or sub-sector ready to adopt the technology?

MOBILITY

SoCalGas

Mobility: Scope of Applications Modelled

175+ vehicle classes have been modelled across the various mobility sub-sectors within the SoCalGas territory

On-Road Vehicles

Vehicle Class Type	# Vehicles in SCG territory (2024)
Class 8 Sleeper Cab Tractor	39,300
Class 7-8 Day Cab Tractor	76,300
Class 8 Vocational	36,600
Class 8 Drayage	18,100
Transit Bus / Motor Coach	8,300
Other Buses[1]	25,800
Class 8 - Other	11,200
Class 7 - Other	30,500
Class 6 - Other	85,400
Class 5 - Other	11,100
Class 4 - Other	54,200
Class 2b-3	565,800
Motor Home	63,400

1,026,000+ on-road vehicles across 50+ on-road applications are modelled[2]

Off-Road Vehicles, Marine Vessels, and Aircraft[3]

Vehicle Application Type	# Vehicles in SCG territory (2024)
Cargo Handling Equipment	4,100
Ground Support Equipment	5,400
Other Off-Road (Agricultural, Construction & Mining)	169,700
Marine Vessels (Ocean Going Vessels, Commercial Harbor Craft)	~149M gallons/yr diesel consumption
Aircraft	~1.6B gallons/yr jet fuel consumption[4]

180,000+ off-road vehicles across 100+ applications are modelled

25+ Marine vessel types are modelled*. Ocean going vessels includes auto carrier, bulk ,container, cruise, general cargo, reefer, RoRo, tanker, and vessel

Aviation is modelled as a single category**

# of vehicles based on data from CARB EMFAC Database; OGV diesel consumption from EMFAC; Aviation jet fuel consumption from EIA

1. Other buses includes a wide variety of vehicles that carry many passengers including school buses, shuttle buses, double decker buses
2. Model accounts for adjustments in vehicle counts for future years when determining hydrogen volumes
3. Rail applications may be considered in future analysis
4. Includes international travel

*Marine vessels have main engines and auxiliary engines. the model only accounts for replacing current diesel consumption by OGVs. Bunker fuel replacement (e.g. the main engine's typical fuel) is not considered

**Aircraft are modelled as a single category rather than by type or application of aircraft

Mobility: Methodology

H_2 demand for the mobility sector in SoCalGas service territory is modelled by multiplying the following factors

of Total vehicles & Fuel Consumption, 2025-2045

# of vehicles by class/application, fuel type, by county

On-Road	50+ vehicle applications (HDV, MDV, Bus: GVWR Class 2b-8 and buses)
Off-Road	15+ Port Cargo Handling Equipment (CHE) 30+ Airport Ground Support Equipment (GSE) 50+ Other Off-Road (agricultural, construction & mining equipment)
Marine	15+ Commercial Harbor Craft (CHC) 10+ Ocean Going Vessels (OGV)
Aviation	Aircraft

H2 consumption is determined by calculating the H2 equivalent of current fuel consumption using the ratios of:

- Ratio of energy density (btu per kg of H2, per gallon of diesel, etc)
- Ratio of engine efficiency

Data is taken straight from the CARB EMFAC Database which includes vehicle fleet size forecasts through 2050, as well as fuel consumption forecasts for all on-road and off-road vehicles and marine vessels.

Aviation is included in the ambitious scenario only, reflecting ambition in the 2022 CARB Scoping Plan, and fuel consumption data from EIA.

% of vehicles converted to ZE

Zero Emission adoption rates are applied to reflect current legislation or policies

The plans reflected in the model are:

- **Advanced Clean Fleets (ACF):** Conversion of 'priority fleets' by 2024 and all fleets by 2035
- **Innovative Clean Transit (ICT):** transit agency defined targets, generally 2030
- **Clean Shipping Act of 2023:** requires 100% clean shipping fuels by 2040
- **Clean Air Action Plan (CAAP):** POLA and POLB set targets for 100% ZEV CHE by 2030
- **Executive Order N-79-20:** sets targets for 100% ZEV by 2045 or earlier by application

Regulations support initiatives to achieve California Net Zero targets by 2045. New regulation is regularly coming out. Regulations modelled reflect those above, announced before July 1st, 2023.

ZE adoption rates

% of ZE vehicles that are FCEV (vs Alternatives)

Within ZE, the % of new vehicle or vessel purchases that are FCEV vs alternatives is based on assessment of 4 factors:

1. **Policy & Legislation:** held constant in Conservative and Moderate scenarios
2. **Technology Feasibility:** assessed across a serios of factors specific to application type. This is held constant across scenarios.
3. **Commercial Availability:** assessed by evaluating non-fuel costs to determine when price parity of FCEV vs alternatives is achieved (if ever). Price parity is used in initial phase of analysis, and will be integrated and updated depending on outputs of supply and engineering studies
4. **Business Readiness:** assessed to reflect company net zero targets in moderate and ambitious scenarios

The adoption factors were determined using third party research and interviews where possible, including assessments by the DOE (H2 Roadmap and Liftoff Report), as well as TCO analysis leveraging ANL's BEAN model, and more.

H_2 adoption rates

Mobility: Methodology (Example)

Sleeper cabs and drayage trucks are shown as examples for how hydrogen demand is calculated by vehicle class

# of Total vehicles & Fuel Consumption, 2025-2045 × **% of vehicles converted to ZE** × **% of ZE vehicles that are FCEV (vs Alternatives)**

Class 8 Sleeper Cab Tractor

2024 Total # of Vehicles[1]	Avg. Miles Travelled /day[1]	Avg. kg H2/Day
39,300	204.0	30.2

% of Vehicles ACF Applies To[2]	ZEV Adoption Rate (2045)[3]
67%	100%

The Advanced Clean Fleets (ACF) regulation requires 100% of sleeper cab sales to be ZE starting 2035, attempting for all to be 100% ZEV by 2042.

% 2045 H2 Adopt. Rate (new sales)	2045 # H2 Vehicles (conservative)	2045 H2 Demand (conservative, '000 TPY)
81-98%	34,542	380

- **Technical feasibility:** High to Very High likelihood of H2 adoption across technical requirements
- **Commercial availability:** At cost parity 2035-2045 by scenario
- **Business Readiness:** Market driven to fast follower by scenario
- **Legislation:** Considers existing ACF legislation only in Conservative and Moderate scenarios

Class 8 Drayage

2024 Total # of Vehicles[1]	Avg. Miles Travelled /day[1]	Avg. kg H2/Day
18,100	107.8	16.9

% of Vehicles ACF Applies To[2]	ZEV Adoption Rate (2045)[3]
100%	100%

The Advanced Clean Fleets (ACF) regulation requires 100% of drayage truck sales to be ZE starting 2024 and 100% of drayage trucks to be ZE by 2035 (in order to be allowed into enter seaports or intermodal railyards).

% 2045 H2 Adopt. Rate (new sales)	2045 # H2 Vehicles (conservative)	2045 H2 Demand (conservative, '000 TPY)
31-38%	4,074	25

- **Technical feasibility:** Medium-high across technical requirements
- **Commercial availability:** Close to parity 2025-2035 by scenario (never achieves cost parity with alternatives)
- **Business Readiness:** Market driven to fast follower by scenario
- **Legislation:** Considers existing ACF legislation only in Conservative and Moderate scenarios

1. Based on CARB EMFAC Database for SoCalGas service territory
2. Based on CARB assessment (see ACF)
3. Based on ACF regulation

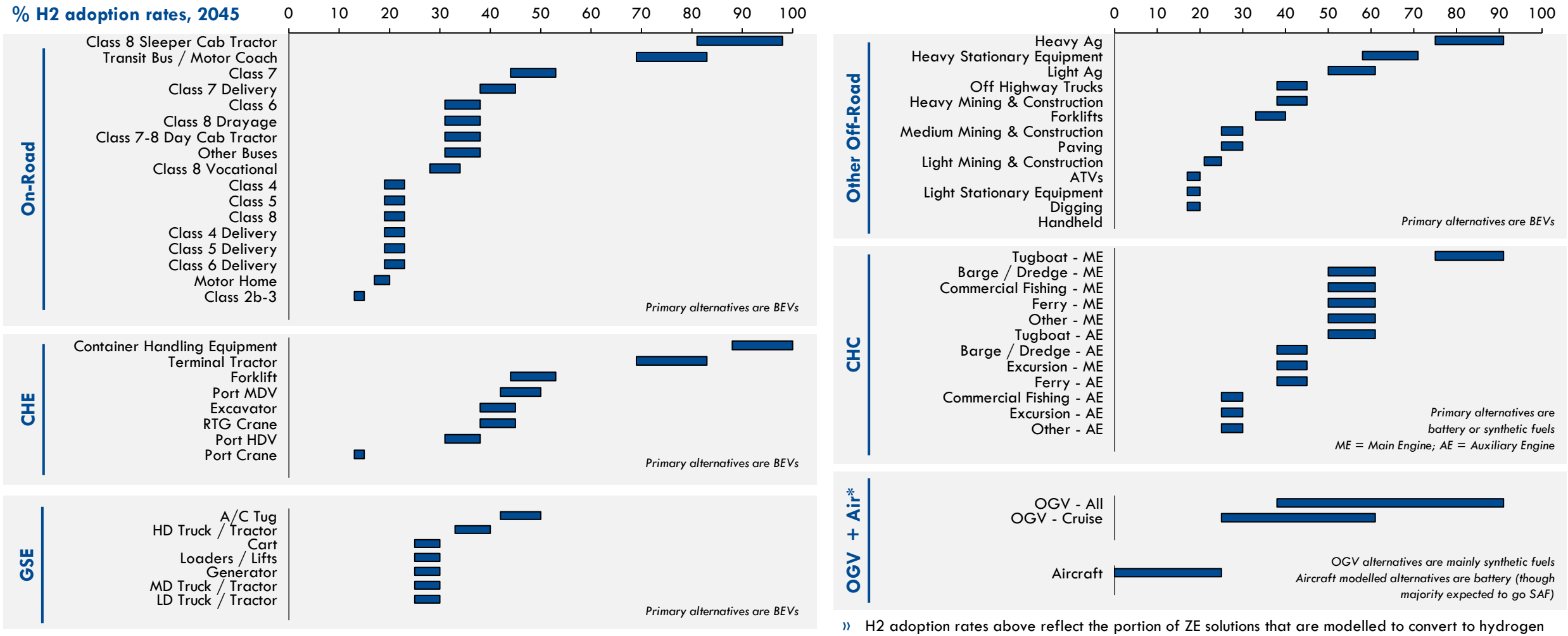
Mobility: Key Assumptions and Data Sources

Modelling assumptions across adoption rate factors were developed and validated through research & interviews

Adoption Factor	Assumptions / Inputs	Data Source
Vehicle / Vessel Operational Characteristics	**Fleet Sizes and Growth Rates** • Vary by application but are taken to exactly match the CARB EMFAC Database forecasts for SoCalGas service territory **Vehicle Lifespans and Retirement Rates** • On-Road: 17 years for MDV, 16 years for HDV, 12 years for Buses • Off-Road: Varies based on equipment type and associated research, generally 10-20 years for CHE, 10-20 years for GSE, 5-15 years for Agricultural, Construction & Mining equipment • Marine: 15-years for Commercial Harbor Craft **Fuel Consumption Rates** • Fuel consumption rate is calculated based on current diesel or gasoline consumption today (from CARB EMFAC Database), using energy density ratios and fuel cell vs combustion engine efficiency ratios • 0.5% increase in fuel cell efficiency and diesel engine efficiency per year	CARB EMFAC Database 2022 CARB Scoping Plan SCAQMD CAAP GSE Industry research Agriculture, Construction & Mining Industry Research DOE: H_2, diesel, and gasoline efficiency rates
Legislation and ZEV Adoption	**Advanced Clean Fleets Regulation** • Vehicle will retire using the Model Year Schedule, not the ZEV Milestones Option defined by ACF • % of vehicles estimated to be subject to ACF: 67% of Class 7-8 Tractors, 52% of Class 4-8 Vocational, 12% of Class 2b-3 • Vehicles subject to ACF will buy 100% ZEVs starting 2024 (per regulation, assuming no exceptions). Other vehicles will buy 100% ZEV starting 2035 ramped linearly from ~0% today, to 25% by 2030, to 100% by 2035. **Clean Air Action Plan (CAAP)** • 100% ZEV CHE by 2030 **Executive Order N-79-20** • Reflects 100% ZEV sales for GSE by 2035; by 2045 for other off-road equipment (where specific regulation doesn't otherwise exist) **Marine & Aircraft** • CHC sales 100% ZEV by 2035; OGV stocks 25% ZE by 2045; Aircraft fuel 20% battery or fuel cell by 2045	Advanced Clean Fleets CAAP EO-N-79-20 ZEAT 2022 ARB Scoping Plan
Commercial Readiness	• Assessed by modelling TCO assuming cost parity with incumbent fuel for on-road using ANL's BEAN model, and market research for non-on-road applications	ANL BEAN model

Mobility: H_2 Adoption Rates vs ZE Alternatives

H_2 fuel cell adoption rates in 2045 vary by application and scenario



Note: Left of bar is the 2045 Conservative scenario adoption rate; right of bar is the Ambitious scenario adoption rate.

- H2 adoption rates above reflect the portion of ZE solutions that are modelled to convert to hydrogen fuel cell technology (generally new sales). The inverse of the H_2 adoption rates shown reflects the modelled adoption rate of alternative ZE solutions
- Adoption rates are low in early years generally due to the assessed impact of commercial availability.

**H2 adoption rates reflect those for new sales only (not stocks), except for OGV and Aircraft which reflect stocks (of ZE). *Marine vessels have main engines and auxiliary engines. The model only accounts for replacing current diesel consumption by OGVs. Bunker fuel replacement (e.g. the main engine's typical fuel) is not considered*

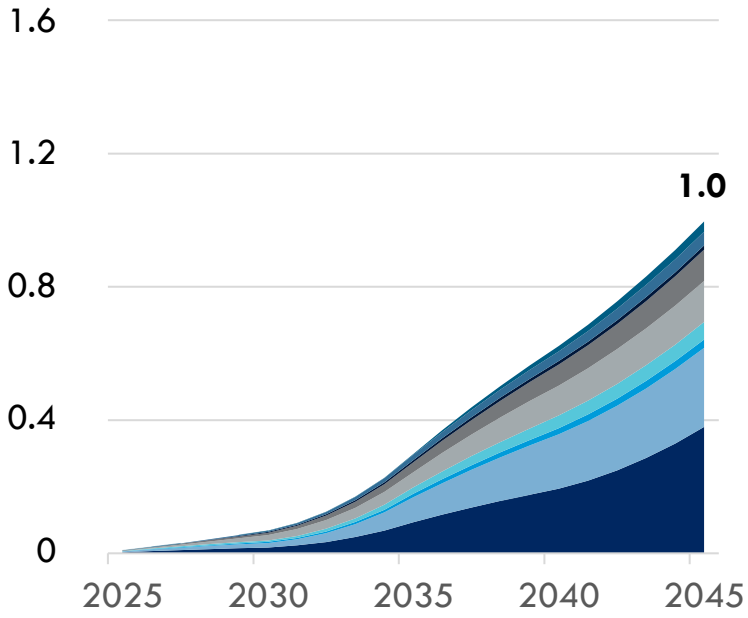
Mobility: Demand Outputs

Potential mobility sector H_2 demand in SoCalGas service territory is projected to be between 1.0-1.7M TPY by 2045

Total Expected Clean Renewable Hydrogen Demand

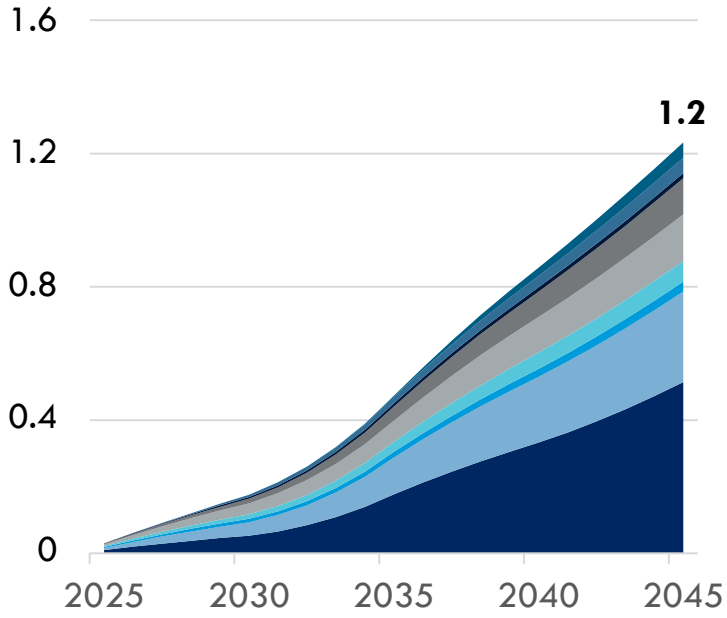
Values in Million TPY | Reflects SoCalGas service territory

Conservative



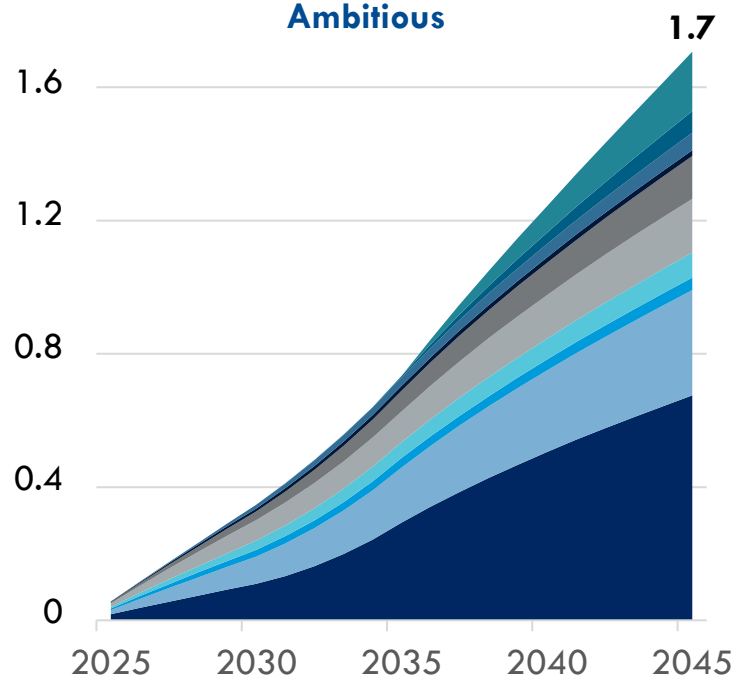
The conservative scenario reflects current legislation and relatively conservative estimates for hydrogen adoption.

Moderate



The moderate scenario reflects current legislation, assumes moderate estimates for hydrogen adoption.

Ambitious



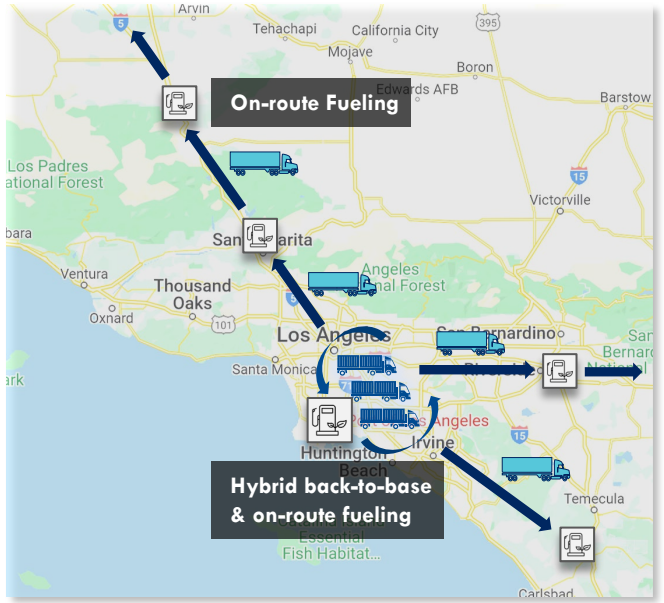
The ambitious scenario builds on the moderate scenario with potential additional ZE legislation and more ambitious estimates for hydrogen adoption.

Class 8 Sleeper Cab Tractor
Class 7-8 Day Cab Tractor
Class 8 Drayage
Class 8 Vocational
Transit Bus / Motor Coach
MDV
Other Buses
Off-Road
Marine
Aviation

Note: MDV is Medium Duty Vehicles, Marine includes Commercial Harbor Craft (CHC) and Ocean Going Vessels (OGV), where OGV values reflect diesel consumption only (does not include main engine heavy fuel).

Sample Use Cases | Drayage Trucks & Sleeper Cabs

Vehicle Fueling Characteristics



Drayage Truck

H2 Demand Forecast

25 - 38k

TPY by 2045

Statistics[1]

Vehicles Today: 18,000
Avg. VMT: 108 miles/day
Avg. Fuel: 16.9 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	6%	6%	31%	31%	31%
Moderate	19%	19%	34%	34%	34%
Ambitious	34%	41%	38%	38%	38%

Adoption rates for new vehicle purchases. Inverse values reflect battery vehicle adoption rate.

Policy Considerations

The Advanced Clean Fleets (ACF) regulation requires that starting 2024 new trucks registering with CARB to conduct drayage activities in California must be 100% ZEV. All drayage trucks entering ports and intermodal railyards must be ZEV by 2035.[3]

Sleeper Cab

H2 Demand Forecast

380 - 675k

TPY by 2045

Statistics[1]

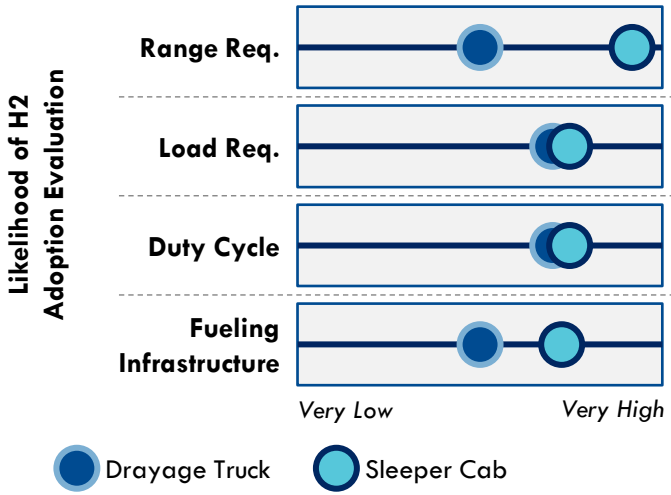
Vehicles Today: 39,300
Avg. VMT: 204 miles/day
Avg. Fuel: 30.2 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	8%	8%	41%	41%	81%
Moderate	24%	24%	67%	67%	89%
Ambitious	45%	54%	98%	98%	98%

Policy Considerations

The Advanced Clean Fleets (ACF) regulation aims to have 100% ZEV sleeper cab tractors in California by 2042.[2]

Technical Feasibility Assessment[1]

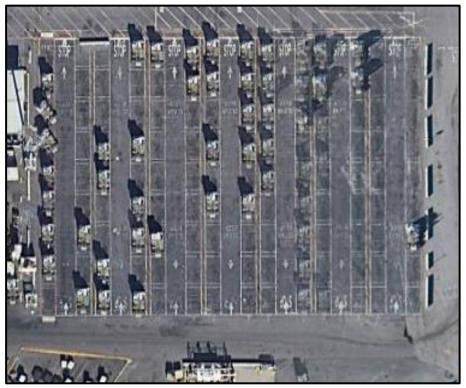


	Drayage Truck	Sleeper Cab
Range Req.	Average 108 miles per day, though range can vary significantly (up to several hundred miles) pending cargo destination.	Currently averages 204 miles per day, though range is often much higher, especially if vehicles have 2+ driver shifts per day.
Load Req.	Class 7-8 requirements due to varied weight of cargo. Battery weight impacts towing capacity, influencing H2 adoption.	Trucks must accommodate a wide range of cargo. Battery weight impacts towing capacity, influencing H2 adoption.
Duty Cycle	Sometimes operate in 2-3 eight-hour shifts. May require fast refueling or multiple refueling cycles per day.	Sleeper cab tractors may operate with a team of drivers working in 8-hour shifts as drivers are generally paid per mile.
Fueling Infrastructure	May fuel at base if back-to-base operations or may fuel at distributed fueling locations, depending on operations.	Highly distributed fueling operations across transit corridors. Typically fuel at truck stops where drivers can also sleep.

References: (1) # Vehicles and Avg. VMT (vehicle miles travelled) reflect 2024 figures from CARB's EMFAC Emissions Inventory database for vehicles in SoCalGas service territory; Avg. Fuel consumption calculated based on equivalence from diesel consumption, (2) ACF

Sample Use Cases | Container Handling Equipment & Terminal Tractors

Vehicle Fueling Characteristics[4]



Terminal Tractor Fueling Lanes at POLA

Container Handling Equip. Fueling at POLA

Container Handling Equipment

H2 Demand Forecast

15 - 18k

TPY by 2045

Statistics[1]

Vehicles Today: 550
Avg. Fuel: 56.3 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	9%	44%	88%	88%	88%
Moderate	26%	66%	96%	96%	96%
Ambitious	48%	100%	100%	100%	100%

Adoption rates for new vehicle purchases. Inverse values reflect battery vehicle adoption rate.

Policy & Strategy Considerations

CAAP sets targets for 100% ZEV CHE by 2030 and POLA/POLB are working closely with terminal operators to achieve this.

Terminal Tractor

H2 Demand Forecast

6 - 8k

TPY by 2045

Statistics[1]

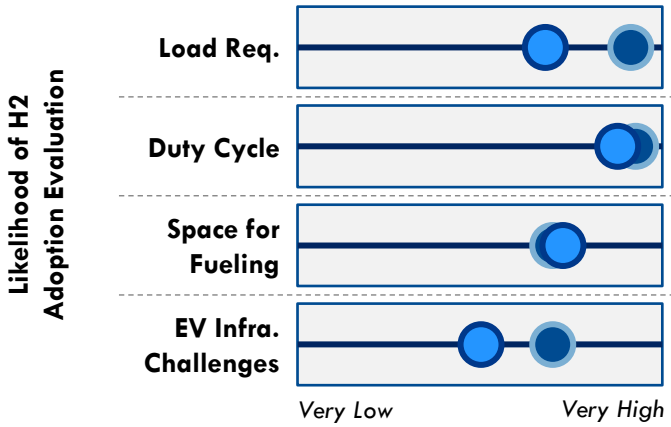
Vehicles Today: 2,150
Avg. Fuel: 8.1 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	7%	34%	34%	69%	69%
Moderate	21%	34%	57%	76%	76%
Ambitious	38%	45%	83%	83%	83%

Policy & Strategy Considerations

"Yard tractors… offer ZE and/or NZE fuel-technology platforms that simultaneously achieve the basic parameters and criteria to be deemed (or approaching) commercially available and technically viable.[2]

Technical Feasibility Assessment



	Container Handling Equipment	Terminal Tractor
Load Req.	Container handling equipment must be capable of lifting containers regardless of contents. CARB assessed load factors of 0.59.[4]	Must be capable, but do not require long duration load carrying requirements. CARB assessed load factors of 0.39.[4]
Duty Cycle	Some are operated for 4,600 annual hours (equivalent to two daily shifts, five-to-six days per week"[2]	Vehicles typically operate in-line with port operations: x2 eight-hour shifts per day on average.
Space for Fueling	Fuel at central depot via mobile fueling trucks before being put back into service. Little room for long-duration EV charging.	Fuel at central depot via mobile fueling trucks before being put back into service. Little room for long-duration EV charging.
EV Infra. Challenges	Installation of power lines (buried or otherwise) at ports to support charging would prove challenging compared to transportable fuel.	Installation of power lines (buried or otherwise) at ports to support charging would prove challenging compared to transportable fuel.

References: (1) # Vehicles and 2024 figures from CARB's EMFAC Emissions Inventory database; Avg. Fuel consumption calculated based on equivalence from diesel consumption, (2) CAAP 2021 Cargo Handling Equipment Feasibility Assessment Report, (3) CARB 2022 Cargo Handling Equipment Emissions Inventory (4) Google Maps

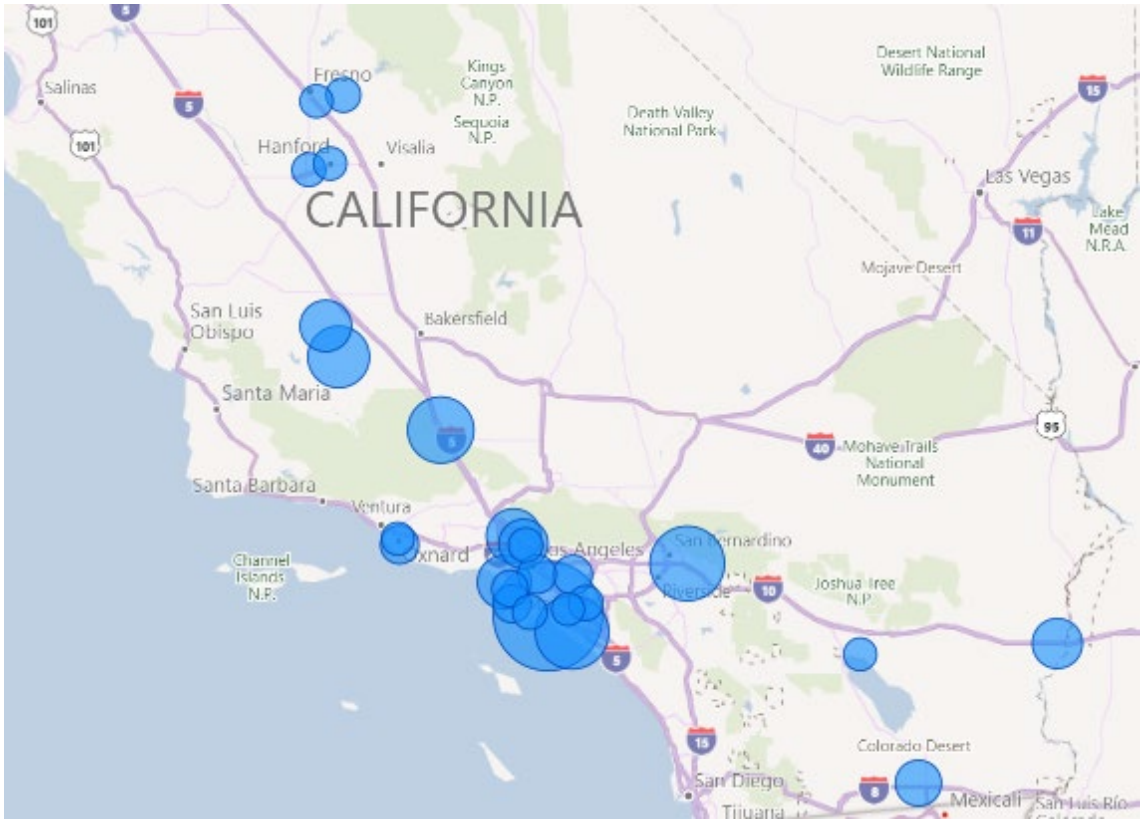
POWER

SoCalGas

Power Generation: Overview

Current natural gas consumption within the power sector is 256 BCF/yr in the SoCalGas service territory, with an opportunity for hydrogen fuel switching across peaker and baseload plants

Current Natural Gas Consumption by Zip Code



Size of Bubble: Natural Gas Consumption for Electricity (MMBTU)
Does not include power generation in SDG&E
Sources: EIA 923 – Generator Data[1]

Power Industry Overview

- The sector currently accounts for 256 BCF of natural gas in SoCalGas territory
- There are 32 power plants in the SoCalGas territory that have been included in the model with a capacity of >1MW. Current baseload and peaker plants are included, with the assumption that the majority of plants will transition to peaker in the future
- Existing natural gas peaker & baseload plants represent ~15GW of total capacity, with peaker and baseload generation of 32.6M MWh annually. [1,2,5]
- We anticipate that the importance of dispatchable generation on the grid will continue due to an increase in intermittent renewables such as wind and solar on the grid, providing a role for hydrogen
- Current power plant data has been used as the base to model fuel switching to hydrogen in SoCalGas territory. The full power market was not modelled
- The baseline for the model is facility-level natural gas consumption data from the EIA and CEC[1, 4]

References: (1) EIA, (2) CEC, (3) CARB, (4) CEC (5) GW capacity represents all power generation in 2021 excluding cogeneration. MWh generation represents generation from peaker and baseload plants

Power Generation: Methodology

H_2 demand for the power sector in SoCalGas service territory is modelled by multiplying the following factors

Facility-Level Fuel Consumption, 2025-2045

Current Plant Data from EIA 923 and EIA 860

Operator, nameplate capacity, historical generation & fuel consumption on an MMBTU basis, turbine type, summer and winter nameplate capacity, and heat rates.

Combined cycle combustion turbine	Combustion turbine
Steam turbine	Combine cycle steam turbine part
Combined cycle single shaft	Internal combustion turbine

H2 consumption is determined by calculating the H2 equivalent of current fuel consumption using the ratios of:

- Heat content of hydrogen on an MMBTU basis
- Hydrogen turbine efficiency

Data is taken from the EIA 923 and EIA 860 databases, which includes current natural gas consumption at the plant and turbine level on an MMBTU basis

Facility data was filtered to include only facilities in SoCalGas territory

NG to H2 Transition Rate

H2 Upgrade Probability X **System-Wide Capacity Factor** = **NG to H2 Transition Rate in 2045**

Probability to switch to H2 in 2045 based on predicted revenues of electricity produced from hydrogen in combustion turbines, as well as those from natural gas compared to CCUS and battery, with all three compared against the cost of purchased power.

2045 "what if" capacity factor range assumptions based on external studies and interviews with market participants (Conservative), external reports that project future system-wide natural gas capacity factors[1] (Moderate), and historical natural gas capacity factors (Ambitious).

Adoption Curve from 2025-2045

Adoption curve from current consumption to 2045 consumption is determined based on **key milestones and associated adoption factors**

Legislation	Technical Feasibility	Business Readiness
*SB100**	*Timeline to 100% H2 turbines*	

References: (1) Glendale, CEC, CARB, (2) EIA

Demand will need to be further mapped to locational areas to assist with other Angeles Link studies

**Although SB100 framework does allow for an emission budget, the analysis conservatively assumed zero emission by 2045 under SB100*

***Capacity factors were not modelled and were instead inputted directly to understand what hydrogen demand could be across a range of different capacity factors.*

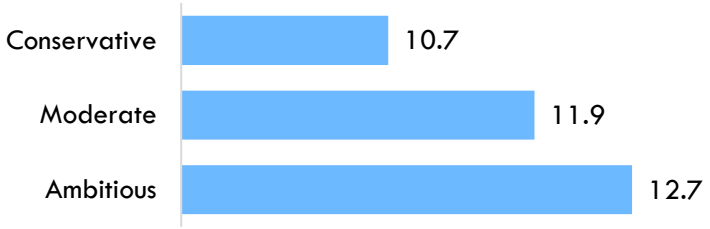
Power Generation: Adoption Rates

Hydrogen demand is driven by cost and commercial availability, regulations and legislation, technical feasibility, business readiness, and projected capacity factors

H2 Upgrade Probability X **System-Wide Capacity Factor** = **NG to H2 Transition Rate in 2045**

Hydrogen upgrade probability : Cost inputs are used to determine the likelihood of turbine-level capacity to choose H2 in 2045 compared to other alternatives (CCUS, battery). This percentage is applied to current capacity to determine 2045 H2 capacity

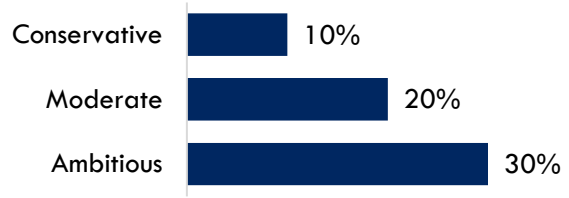
Projected Hydrogen Capacity by 2045, GW



Capacity Factor: A range of "what-if" capacity factor scenarios were evaluated to determine the total power generation from hydrogen in 2045. Capacity factors were not modelled and were instead inputted directly from external sources and reports to understand what the potential demand could be across a range of different capacity factors. The probability of each capacity factor was not evaluated.

Modeling the anticipated electric load increase and grid reliability requirements in future phases may help to determine which capacity factor is most likely

Hydrogen Capacity Factors and Associated MWh



Scenario	"What If" Analysis of Capacity Factors	Source
Conservative (C.F. of 10%)	Decline in future capacity factors due to a large shift from natural gas to other renewables with renewables serving future load growth	Number is based on external studies and feedback from market participants who expect hydrogen capacity factors to be in the range of 5% - 15%
Moderate (C.F. of 20%)	Decline in capacity factor from today, however the capacity factor is larger than in the conservative scenario reflecting increased dispatchability needs.	Number is based on future natural gas capacity factors projected by the CARB scoping plan and CEC reports, which range from 15-25%
Ambitious (C.F. of 30%)	Reflects a potential future where hydrogen capacity factors remain the same as current system-wide natural gas capacity factors	Number is based on historical EIA natural gas capacity factor data

References: Interviews held with power plant owners, OEMs, academia, and governmental and regulatory organizations

Power Generation: Key Assumptions and Data Sources

Modelling assumptions across adoption rate factors were developed and validated through research & interviews

Adoption Factor	Assumptions / Inputs	Data Source
Legislation	Senate Bill 100 (2018) • Requires renewable energy and zero-carbon resources to supply 100% of electric generation by 2045. Model assumes 100% emission reduction by 2045, although SB100 framework allows an emission budget • Provides interim milestone of 60% of electric retail sales to be met by eligible renewable resources by 2030 Senate Bill 1020 (2022) • Requires eligible renewable energy resources and zero-carbon resources supply 90% of all retail sales of electricity by 2035, 95% by 2040, and 100% by 2045	SB100 SB1020 100% carbon free assumption for SB100 adherence based on LADWP SLTRP
Technical Availability	• Current blending percentage is taken at the plant level, with current turbines in SoCalGas territory capable of 5-75% blending with a majority of plants at 30% • Projected 2030 milestone for 100% H2 turbine technical capability	EPRI Analysis, Interviews with OEMs

Commercial Availability	• Hydrogen is at price parity with incumbent fuels
	• Hydrogen upgrade costs are developed at a plant level across various upgrade ranges:
	  • 300MW: $18M-$20M for 30% upgrades, $24M-$31M for 100% upgrades
	  • 100MW: $3.8M for 30% upgrades, $14M-$17M for 100% upgrades
	  • 40MW: $3.2M for 30% upgrades, $14M-$16M for 100% upgrades
	  • >300MW: Up to $570M with increasing costs based on size
	• Hydrogen is compared to alternatives on a cost and profit basis to determine hydrogen upgrade probability using the following inputs:
	  • Battery Install cost: $2M/MWh, CCUS Capital Cost: $1,727/KW, CCUS T&D cost: $3.7/MWh
	  • Peak Demand Power Cost: $0.50/KW, Revenue Power Charge: $0.12/KW
		EPRI analysis, OSTI, Interviews with OEMs

Other:
Capacity Factors
	• Capacity factor is projected across a variety of what-if scenarios:
	  • Conservative (10%): Developed based on interview inputs, with common projections from OEMs and power plant operators ranging from 8-10%
	  • Moderate (20%): Developed based on external reports projecting future natural gas capacity factor around 20%
	  • Ambitious (30%): Developed based on current natural gas capacity factors
	• LADWP stated hydrogen capacity buildout has been maintained for LADWP plants
		LADWP SLTRP, Interviews with OEMs and plant operators

Business Readiness	• Projected that business readiness will take 5-8 years due to business decision making, permitting, construction for new turbines, and retirement rates of current turbines	Interviews with plant operators
Sector Growth	• Model conservatively assumes no new hydrogen power generation capacity	Not applicable

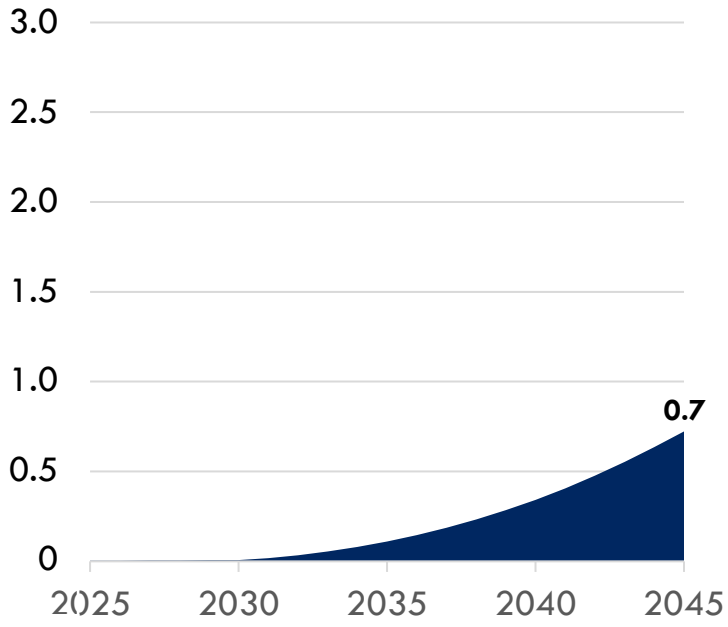
Power: Demand Outputs

Preliminary demand projections range from 0.7M – 2.7M tons of hydrogen/year in 2045, with increasing ramp up over time

Total Expected Clean Renewable Hydrogen Demand

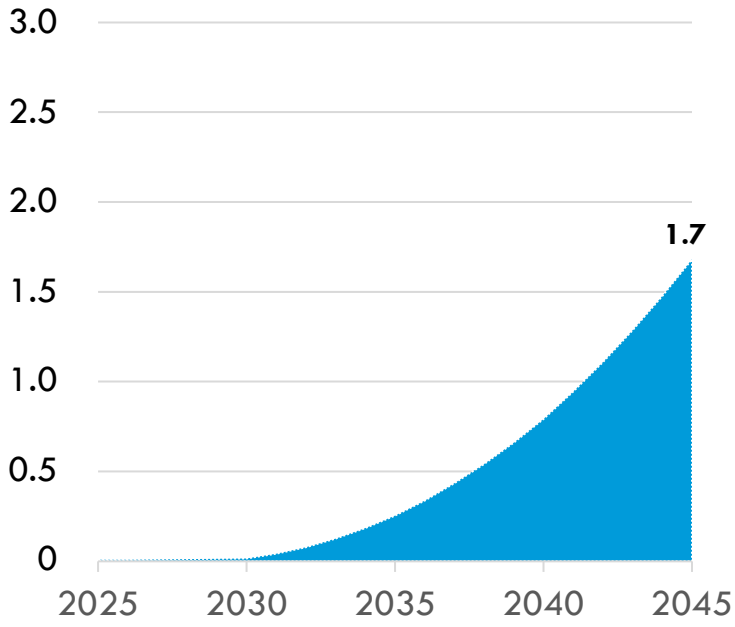
Values in million TPY | Reflects SoCalGas service territory

Conservative



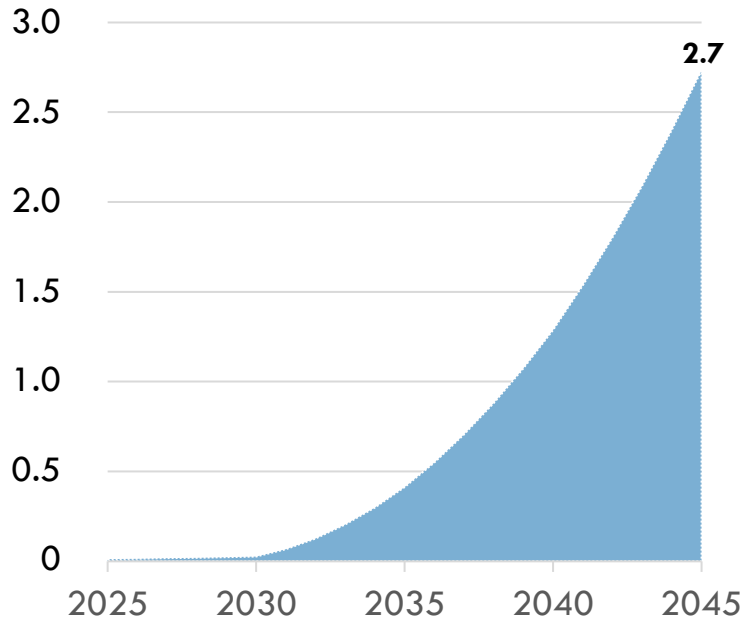
The conservative scenario reflects hydrogen demand under a low capacity factor scenario of 10%, assuming a decline in thermal combustion as other renewables increase and supply future load growth, based on external studies[1,2] and feedback from market participants[6]

Moderate



The moderate scenario reflects hydrogen demand under a capacity factor scenario of 20%, representing continued need for dispatchable generation, although at lower levels than we see today. Capacity factor assumption based on future natural gas capacity factors projected by the CARB scoping plan[3] and CEC reports[4]

Ambitious

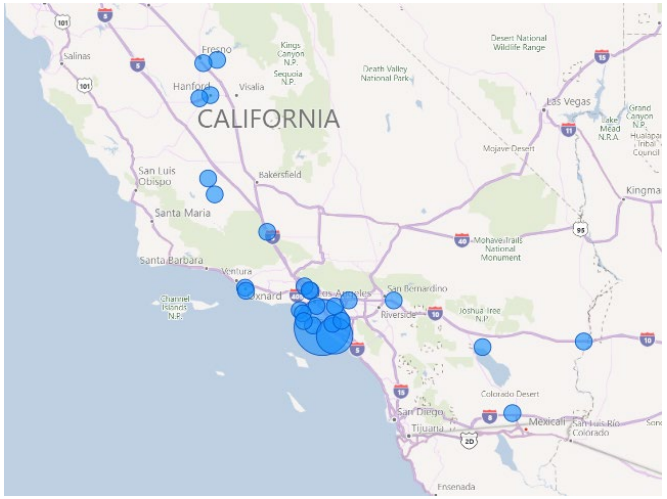


The ambitious scenario determines future hydrogen demand under the assumption that capacity factors continue to follow historical trends (~30%)[5]

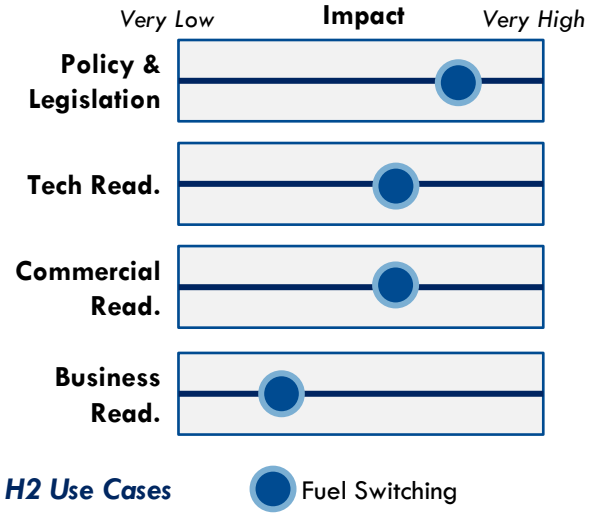
References: (1) LA100 (2) LADWP (3) CARB (4) CEC (5) EIA (6) Interviews held with power plant owners, OEMs, academia, and governmental and regulatory organizations

Sample Use Cases | Baseload & Peaker Plants

Major Southern California Facilities



Size of bubble: Number of facilities in zip code



Baseload & Peaker Plants

H2 Demand Forecast

0.7M – 2.7M

TPY by 2045

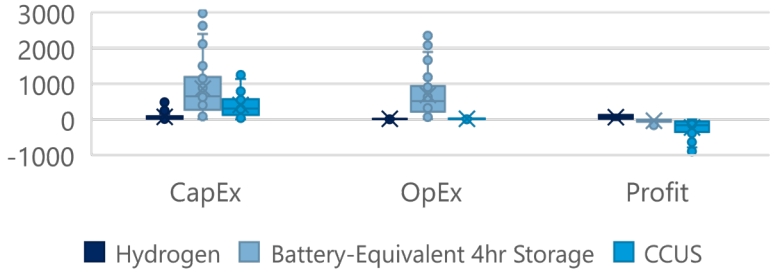
Statistics

Estimated Annual NG Usage: 256M MMBTU

Policy & Regulation Considerations

SB100 mandates 60% renewables for electricity by 2040 and 100% by 2045, which will drive sector decarbonization in the long term

Cost Comparison of Decarbonization Alternatives



CapEx and OpEx costs, revenue, and profit are calculated at the plant level depending on turbine type, current combustion and 2045 scenario capacity factor of given option

Given price parity, hydrogen consistently shows lower costs and higher revenue than modeled alternatives

CA Case Study: Scattergood Hydrogen Transition

LADWP is moving forward with plans to convert its largest baseload-fired power plant, the 830MW Scattergood Generating station, to run on green hydrogen. This transition will start with combustion of 30% hydrogen on day 1, moving to 100% by 2035. Safeguards have been introduced to ensure NOx pollutants will not increase as a result of the switch. (Source)

Case Study: Intermountain Power Project

This project includes the retirement of the existing coal-fueled units at the IPP site; installation of new natural gas-fueled electricity generating units capable of utilizing hydrogen for 840 megawatts net generation output; modernization of IPP's Southern Transmission System linking IPP to Southern California; and the development of hydrogen production and long-term storage capabilities. The new natural gas generating units will be designed to utilize 30 percent hydrogen fuel at start-up, transitioning to 100 percent hydrogen fuel by 2045. (Source)

Operational Characteristics

Plants are projected to be running at higher capacities during periods of peak demand and at lower capacity when demand is low, with system-wide capacity factor ranging from 10%-30%.

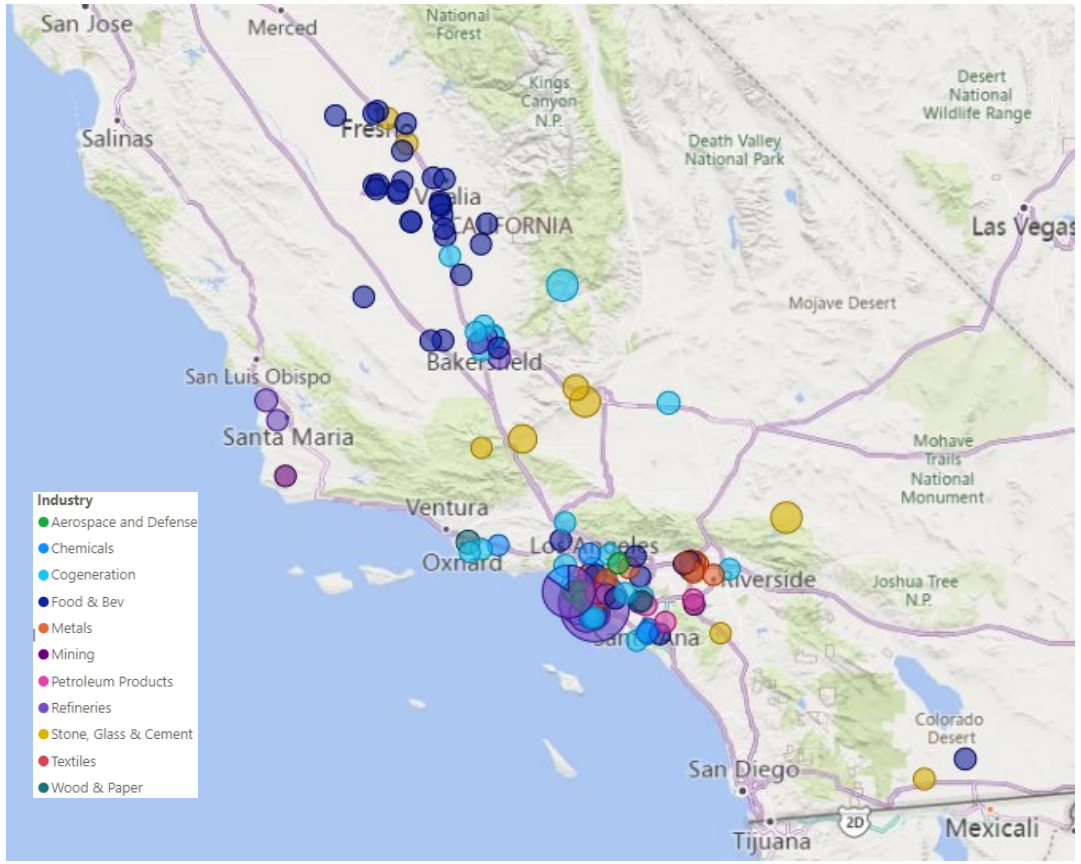
There are current turbines capable of up to ~30% hydrogen blend by volume.

INDUSTRIALS

SoCalGas

Industrials: Overview

Southern California has a diverse industrial base, with multiple industrial sectors across metals, food and beverage, paper, chemicals, and more



Sources: CARB Industrial Facilities Pollution Map, Interviews

- As the largest manufacturing state in the country, California has roughly **25,000 industrial enterprises.**

Key Industrial Sectors in Southern California

- Food and Beverage
- Metals
- Stone, Glass, Cement
- Mining
- Textiles
- Paper
- Chemicals
- Aerospace and Defense
- Refineries
- Petroleum Products

- There is a **significant concentration of industrial activity within Southern California**
- The industrial goods production sector in California currently **employs ~1.3M individuals**

Sub-Sector Opportunity for Clean Hydrogen

Across the industrial sector, there are a multitude of opportunities for hydrogen in different capacities

Cogeneration

CA GHG Emissions[1]	**3.0**	MTCO2e in 2022
Current NG Demand	**110**	BCF in 2021

Sub-Sector Overview

- Largest presence is on oil fields in Kern County and refineries near the Port of Los Angeles
- Locations on additional commercial and industrial facilities

Opportunity for Clean H2

- SB 100 mandates that all retail electricity must come from renewable and zero-carbon resources by 2045
- Fuel switching from natural gas to hydrogen blending and hydrogen turbines

Food & Beverage

CA GHG Emissions[1, 2]	**1.0**	MTCO2e in 2021
Current NG Demand	**18.9**	BCF in 2021

Sub-Sector Overview

- Large number of facilities, primarily concentrated in Central California, near Bakersfield
- Wide variety of food and beverage industries (e.g., dairies, breweries)

Opportunity for Clean H2

- Fuel switching from natural gas for industrial equipment such as heating, cooling, and refrigeration

Stone, Glass, Cement

CA GHG Emissions[1]	**1.7**	MTCO2e in 2021
Current NG Demand	**1.3**	BCF in 2021

Sub-Sector Overview

- Major cement facilities located in Kern County, with smaller glass and cement facilities distributed in the LA Basin
- SB 596: 100% net zero GHG target in cement by 2045

Opportunity for Clean H2

- Short- and medium-term opportunities are for fuel switching for high temperature equipment (e.g. kilns)
- Potential long-term opportunity for synthetic methanol, not currently quantified

Refining

CA GHG Emissions[1]	**10.0**	MTCO2e in 2021
Current NG Demand	**126**	BCF in 2021

Sub-Sector Overview

- Highly concentrated near the Port of Los Angeles and in San Joaquin Valley
- At present, hydrogen used in refineries is produced mainly from natural gas by SMR

Opportunity for Clean H2

- Clean fuel switching from natural gas, and transitioning from grey to clean, renewable hydrogen for refinery direct processes and production of renewable diesel and SAF

Metals

CA GHG Emissions[1]	**0.4**	MTCO2e in 2021
Current NG Demand	**6.8**	BCF in 2021

Sub-Sector Overview

- Primarily concentrated in the Los Angeles Basin
- Large presence of fabricated metal facilities with some high emissions usage primary metals
- No production of raw steel

Opportunity for Clean H2

- Fuel switching from natural gas for high temperature equipment such as boilers and furnaces
- Hydrogen-based direct reduction of iron (DRI) used in raw steel processing (No presence in SoCal)

Pulp & Paper

CA GHG Emissions[1]	**0.7**	MTCO2e in 2021
Current NG Demand	**5.2**	BCF in 2021

Sub-Sector Overview

- Few number of facilities, concentrated in the LA Basin
- Significant cogeneration operations at paper plants and are captured in cogeneration section

Opportunity for Clean H2

- Fuel switching from natural gas for high-temperature industrial equipment such as boilers and kilns

Chemicals

CA GHG Emissions[1]	**1.0**	MTCO2e in 2021
Current NG Demand	**2.6**	BCF in 2021

Sub-Sector Overview

- Few mid-sized chemical facilities, concentrated in LA Basin
- Primary chemicals presence in SoCal is in H2 production, which is not in scope

Opportunity for Clean H2

- Fuel switching from natural gas for industrial equipment such as boilers
- Use as feedstock in chemical processing

Aerospace & Defense

CA GHG Emissions[1]	**0.01**	MTCO2e in 2021
Current NG Demand	**0.8**	BCF in 2021

Sub-Sector Overview

- Large number of businesses in Los Angeles, however, few have sizeable onsite manufacturing
- Many aerospace parts are manufactured in metal fabrication shops, captured in metals category

Opportunity for Clean H2

- Fuel switching from natural gas for industrial equipment such as boilers
- Could serve as an early adopter given the strategic importance of the defense sector

1. Emissions value and current natural gas demand are from large facilities in SoCalGas service territory, 2. Relatively low emissions due to low-intensity processes

Industrials: Methodology – Fuel Switching

Fuel switching H_2 demand within the industrials sector is modelled from the multiplication of the following factors

Total Addressable Natural Gas

Base natural gas demand from eligible large facilities per sub-sector[1]

- CO2e emissions due to natural gas emissions from facilities are brought per sub-sector using the CARB Pollution Map, EPA FLIGHT dataset, and Industry Research
- CO2e emissions are then converted to NG demand

Base natural gas demand is broken out into heating – end use cases. The breakdown of heating – end use case will vary per sub-sector

- Breakdowns, by sub-sector provided by EIA's Manufacturing Energy Consumption Survey
- Breakdown categories related to fuel switching include:
  - Indirect Heat (Boilers)
  - Direct Process Heat (e.g. furnaces, kilns)
  - Indirect Process Heat (e.g., HVAC)

Annual natural gas demand is adjusted to reflect industry growth rates

- Conservative Scenario: No industry growth
- Moderate and Ambitious Scenario: Industry growth is derived EIA's Annual Energy Outlook – Macroeconomic Indicators dataset

Annual natural gas demand is updated to reflect removal of demand that will be electrified

- Electrification is an adoption curve that varies from 2025 – 2045
- Electrification adoption differs per heating end use case

Demand from refineries fuel switching is only included in the ambitious scenario

Natural Gas to Hydrogen Adoption Rate

Adoption rate methodology

1. Adoption factors are assigned impact values and then weighted to develop adoption rates for the short / medium/ horizon terms
2. Short/medium/horizon term adoption rates are translated to annual adoption rates by incorporating a lag parameter that accounts for the percent of the addressable market that can be addressed based on asset lifetime

Key adoption factors used in analysis

1. **Technical Feasibility:** In each sub-sector, the shift in technology feasibility and commercial availability of hydrogen combustion technology (e.g. boilers, kilns) was assessed from 2025 to 2045
2. **Alternatives:** For each heating end-use case, hydrogen technology and availability is compared to the costs and viability of alternatives, namely electrification and CCUS
3. **Business Readiness (Performance Impact & Capital Investment):** Sensitivity of each sub-sector to the capital investments necessary to implement 100% H2 technology and short-term performance impacts from switching to hydrogen
4. **Asset Lifetimes:** In the industrial sector, natural gas assets are expected to be potentially replaced with hydrogen technology near end of life. Depending on the equipment, asset turnover periods can range from 15 – 20 years

1. Eligible facilities are sites located directly in SoCalGas territory or regions where SoCalGas provides wholesale natural gas (e.g. City of Vernon, City of Long Beach)

Industrials: Methodology – Cogeneration

Cogeneration H_2 demand within the industrials sector is modelled from the multiplication of the following factors

Facility-Level Fuel Consumption, 2025-2045

Current Plant Data from EIA 923 and EIA 860

Operator, nameplate capacity, historical generation & fuel consumption on an MMBTU basis, turbine type, summer and winter nameplate capacity, and heat rates.

Cogeneration – Steam Turbines

H2 consumption is determined by calculating the H2 equivalent of current fuel consumption using the ratios of:

- Heat content of hydrogen on an MMBTU basis
- Hydrogen turbine efficiency

Data is taken straight from the EIA 923 and EIA 860 databases, which includes current natural gas consumption at the plant and turbine level on an MMBTU basis

Facility data was filtered to include only facilities in SoCalGas territory

Natural Gas Transition Rate

H2 Upgrade Probability X **System-Wide Capacity Factor** = **Natural gas transitioned in 2045**

Probability for capacity to switch to H2 in 2045 based on commercial availability between H2 and alternatives

- Costs for hydrogen upgrades between various blending levels are calculated at the plant level
- Total profit is determined across H2, CCUS, and battery based on plant capacity, costs, and revenues
- Weighted ratio of profit to comparable power purchase profit across options is used as hydrogen upgrade %

2045 capacity factor based on external studies and interviews, projected future natural gas capacity factors, and current capacity factors, with a range across scenarios

- LADWP projections for hydrogen are used as the starting point, with adjustments based on interviews for the conservative capacity factor
- Capacity factor inputs are updated in moderate and high scenarios based on additional external reports with projected future natural gas capacity factor (Glendale CEC CARB) and current natural gas capacity factor (EIA)

Adoption Curve from 2025-2045

Adoption curve from current consumption to 2045 consumption is determined based on **key milestones and associated adoption factors**

Legislation	Technical Feasibility	Business Readiness
*SB100**	*Timeline to 100% H2 turbines*	

Demand will need to be further mapped to locational areas to assist with other Angeles Link studies

**Ambitious assumption of zero emission at SB100 2045 milestone used, while SB100 framework allows an emission budget*

Industrials: Methodology – Grey to Green Hydrogen Conversion

Grey to Green H_2 conversion demand is included only within the ambitious case, and is modelled by the below factors

Hydrogen Demand – Petroleum Refining

Base Petroleum Refining Demand

- Base production capacity of refinery capacity is pulled from CEC Refinery Inputs and Production report
- Renewable fuels capacity is removed from consideration and refinery utilization rate is identified for each facility to determine total production of petroleum.
- Refinery utilization is identified in CEC Petroleum Watch Report
  - Southern California Utilization – 89%
  - Average California Utilization – 80%

Annual refining demand adjusted to reflect projected decline in petroleum consumption

- 2025: 0%
- 2030: -5%
- 2040: -25%
- 2050: -50%

Hydrogen demand is then identified for petroleum refining

- Assumptions (Industry Research)
  - Sulfur Removal: 0.264kg of H2 per barrel
  - Hydrocracking: 6kg of H2 per barrel

Hydrogen Demand – Renewable Fuels

Currently Announced Production

- Industry research conducted to identify current and future renewable fuel announcement per refinery in SoCalGas territory

Additional production is estimated by evaluating replacement of petroleum refining capacity with renewable fuels production

- As petroleum refining demand decreases, the analysis assumes that a portion of the capacity at utilities will be substituted with production of renewable diesel (RD) and sustainable aviation fuel (SAF)
- Assumptions (SME Input):
  - 25% of petroleum refinement decrease from base capacity will be replaced with RD production
  - 25% of petroleum refinement decrease from base capacity will be replaced with SAF production

- **Hydrogen demand is then identified for renewable fuel production**
  - Assumptions (Industry Research)
    - Renewable Diesel: 1.1 kg of H2 per barrel
    - SAF: 5.3 kg of H2 per barrel

Grey Hydrogen to Green Hydrogen Adoption

Adoption rate assumptions formed using SME input and validated with industry interviews. Adoption rate is scaled linearly in years between assumption points.

2025: 0% of grey hydrogen can be transitioned from grey hydrogen to green hydrogen

2030: 50% of merchant hydrogen can be transitioned from grey hydrogen to green hydrogen; **30% of total refinery hydrogen demand**

2040: 100% of merchant hydrogen can be transitioned from grey hydrogen to green hydrogen; **60% of total refinery hydrogen demand**

2045: 100% of merchant hydrogen can be transitioned from grey hydrogen to green hydrogen and 25% of on-site produced hydrogen can be replaced by green hydrogen; **70% of total refinery hydrogen demand**

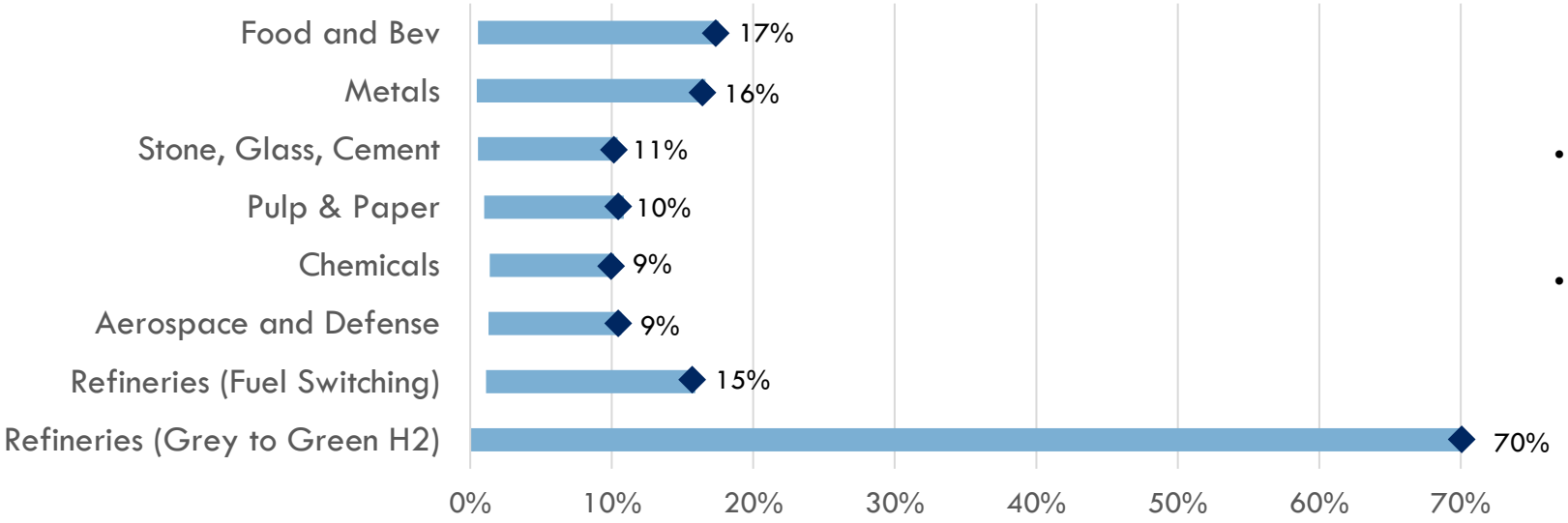
Assumption: 40% of hydrogen used on refineries is produced on site, 60% is merchant hydrogen (commercially procured)

Industrials: Adoption Rates

Fuel switching and green hydrogen demand adoption rates apply to all scenarios whereas cogeneration adoption rates vary per scenario

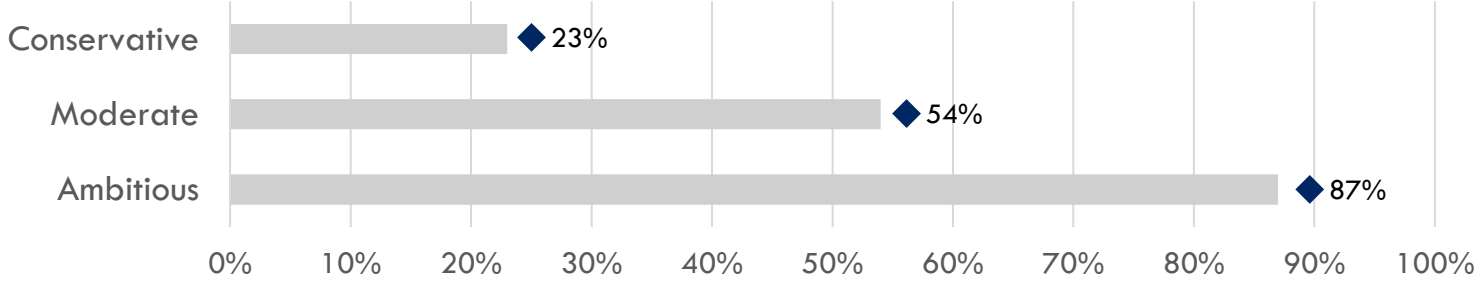
◆ 2045 Adoption Rate

Adoption Rates for Fuel Switching and Grey to Green Hydrogen Demand – All Scenarios



- Higher adoption rates observed in grey to green hydrogen conversion due to high technology readiness and low performance and capital impact, assuming cost parity with existing fuels
- For fuel switching, adoption factors are assigned impact values and then weighted to develop adoption rates for the short / medium / horizon terms
- These short / medium / horizon term adoption rates are translated to annual adoption rates by incorporating a lag parameter that accounts for the percent of the addressable natural gas volume that can be converted to hydrogen based technology based on asset lifetime

Adoption Rates for Cogeneration – Varies Per Scenario



- Transition rate reflects % of plants upgrading to H2 in addition to change from current capacity factors to projected 10-30%
- Key adoption factors used in the analysis include:
  1. Hydrogen Upgrade Probability
  2. Capacity Factor
  3. Policy and Legislation Milestones

Industrials: Assumptions and Considerations

Modelling assumptions and considerations were developed and validated through research & interviews

Model Factor	Assumptions and Considerations	Data Source
Addressable Market	• Only large facilities with significant natural gas emissions were considered for the demand analysis • Facilities that currently produce hydrogen or are jointly developed with companies producing hydrogen were not considered potential end users	CARB Pollution Map, EPA FLIGHT dataset, and Industry Research
Legislation and Regulation	Senate Bill 100 • Requires renewable energy and zero GHG emissions resources to supply 100% of electric generation by 2045 • Provides interim milestone of 60% of electric retail sales to be met by eligible renewable resources by 2030 Senate Bill 596 • Requires cement producers to reduce GHG emissions by 40% by 2030 and sets a target for 100% net-zero GHG emissions by 2045 Senate Bill 32 • Requires CARB to ensure that the state's GHG levels are reduced to 40% of 1990 levels by 2030 Assembly Bill 1279 • Requires CARB to ensure that the state's GHG levels are reduced to 85% of 1990 levels by 2045	SB100 , SB 596, SB 32, AB 1279
Technical Availability	• For most industrial facilities within SoCalGas's territory, the primary opportunity for hydrogen will be fuel switching for process heat, switching from natural gas-based combustion to hydrogen-based combustion technology • An estimated 40% of emissions from the cement industry are from combustion, the remaining emissions are from the production of clinker • Hydrogen adoption for industrial and commercial sited cogeneration turbines is expected to follow the same levels of technical feasibility growth as the other cogeneration turbines described in the Power sector section of this report.	Industry Research, Interviews with Facilities Operations

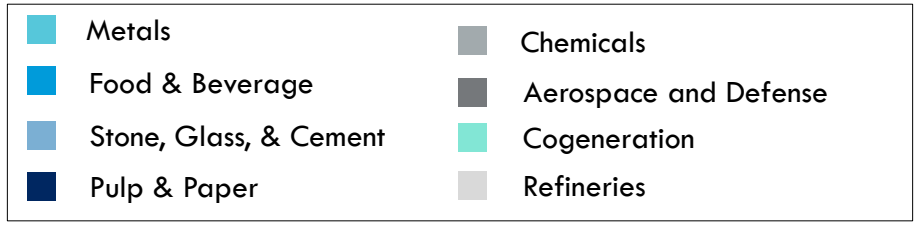
Commercial Availability and Alternatives	• Currently, there is a prohibition on transporting CO2 via pipeline in California for purposes of carbon capture and storage (CCS)
	• Certain heating processes are expected to be electrified and non-addressable for hydrogen uses. These electrification rates begin at 0% and scale to the following values by 2050:
	  • Boilers: 5%
	  • Direct Heating Application: 5% - 20%
	  • Direct Nonprocess uses: 80%
	  • Feedstock: 0%
	• Cogeneration commercial availability parameters are expected to be the same as commercial availability for peaker and baseload plants
		EPRI analysis

Business Readiness	• Facilities will only consider replacement of existing equipment with hydrogen-based technology when existing assets near end of life • Turnover period for boilers and direct process heat equipment is 20 years, turn over period for non-direct process heat equipment is 15 years • Facilities can blend up to 20% hydrogen with minimal increase in technology and cost penalties • Cogeneration business readiness parameters are expected to be the same as commercial availability for peaker and baseload plants	EPRI Analysis, Validated through Interviews
Sector Growth	• In the conservative scenario, industry growth is 0% for all sub-sectors as no additional increase in industrial goods production is expected • In the moderate and high scenario, natural gas usage is expected to increase in-line with increase in industrial goods production per sub-sector • No additional increase in demand at cogeneration facilities across all scenarios	EIA's Annual Energy Outlook Macroeconomic Indicators dataset

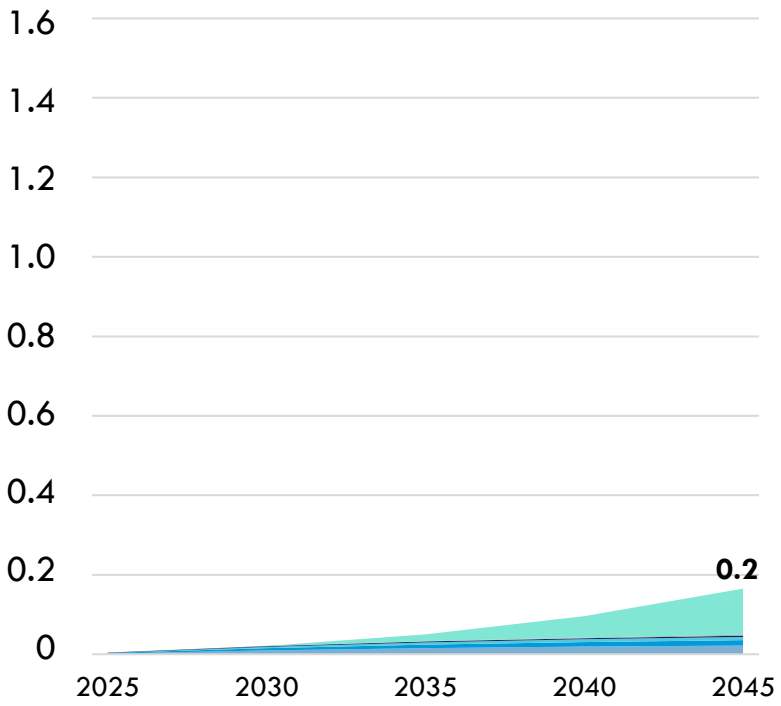
Industrials: Outputs

Total Expected Clean Renewable Hydrogen Demand

Values in million TPY | Reflects SoCalGas service territory only

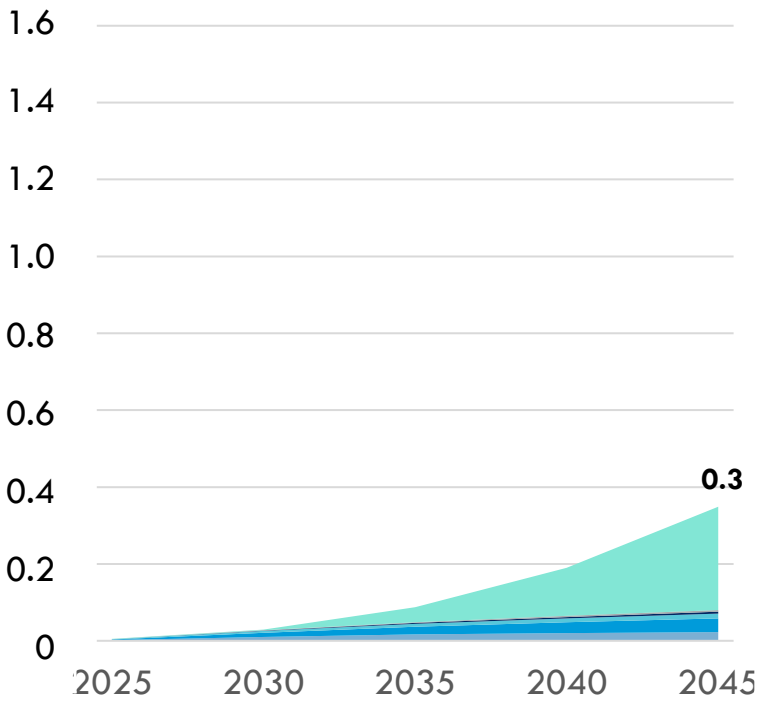


Conservative Case (M TPY)



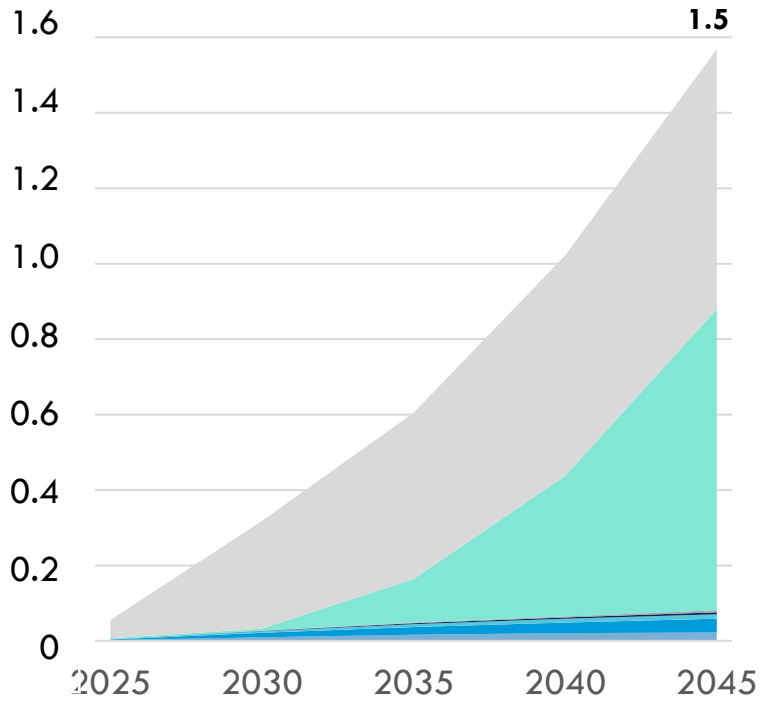
- No production expanse in California for identified industries; facilities will not expand beyond current production capabilities. Increased demand will be satisfied by out of region facilities
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 10%

Moderate Case (M TPY)



- California facilities will expand production in existing or new facilities to match growing market demand
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 20%

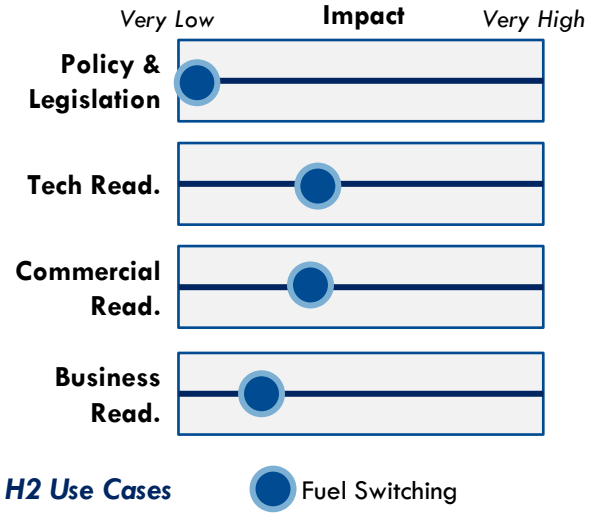
Ambitious Case (M TPY)



- Potential decarbonization legislation or market drivers in the refining industry could lead refineries to gradually transition to green H2
- California facilities will expand production in existing or new facilities to match growing market demand
- Cogeneration – Capacity factor of 30%

Sample Use Cases | Food & Beverage

Major Southern California Facilities



Food & Beverage

H2 Demand Forecast

14k – 36k

TPY by 2045

Statistics

Estimated Annual NG Usage: 18.1 BCF

Policy & Regulation Considerations

Besides Cap-and-Trade, there are no current policy mandates regarding the reduction of greenhouse gases. Notable regulations affecting H2 demand are the NOX limits set forth by the SQAMD.

Industry Characteristics

There are a wide variety of food and beverage industries in Southern California (e.g. dairies, breweries). Decarbonization pathways related to hydrogen adoption are expected to be similar across industries.

Many food & beverage plants are in more remote locations compared to other industries, which makes the availability of energy infrastructure a challenge for any shifts to alternative energy sources

The predominant sources of carbon emissions in this sector are due to heating, cooling, and refrigeration.

Case Study: Budweiser Brewing Group UK&I

Budweiser Brewing Group UK&I collaborates with green energy firm Protium, introducing a large-scale hydrogen generation system in their South Wales brewery, eliminating 15,500 tons of CO2 emissions annually. The existing on-site wind and solar assets will be used to manufacture the green hydrogen at Protium's hydrogen production facility. The facility will also include a hydrogen refueling station for heavy goods vehicles (HGVs) used to transport beer on-site. It will be the first large-scale hydrogen generation system installed at a brewery in the UK. This pioneering move is driven by AB InBev's global commitment to source 100% renewable electricity by 2025. "Hydrogen... could play a crucial role in supporting the transition to a decarbonized global economy," stated the company. (Source)

Operational Characteristics

Food & beverage processing facilities often run 24/7, with few idle periods apart from needed maintenance. Some types of food processing plants will have potential longer idle periods (e.g. tomato processing) due to seasonal agricultural trends

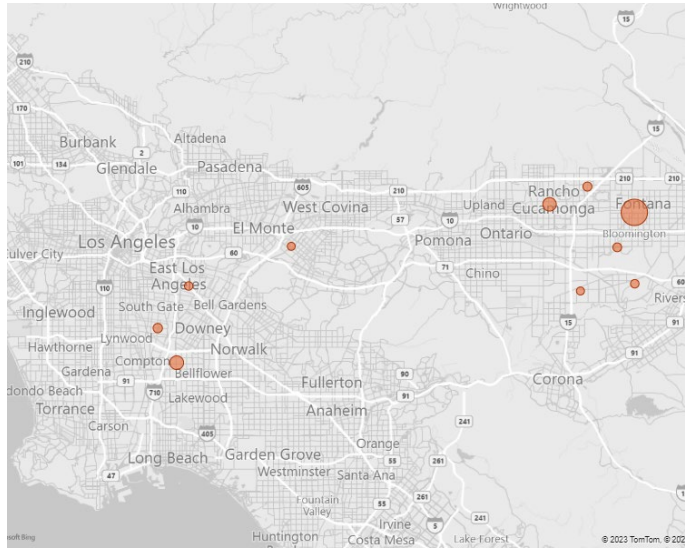
Key equipment (e.g., dryers) can have long lifetimes, lasting 20+ years

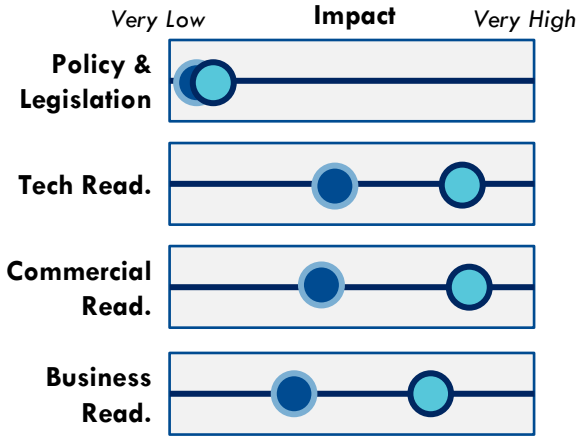
Natural gas usage and supply is integrated across multiple processes and sections within a facility.

Data and insights based on interviews, market research, and Accenture calculations from EPA's Facility Level GHG Emissions database

Sample Use Cases | Primary and Fabricated Metals

Major Southern California Facilities





H2 Use Cases Fuel Switching Direct Reduced Iron

Primary and Fabricated Metals

H2 Demand Forecast

8.1k -12.3k

TPY by 2045

Statistics

Estimated Annual NG Usage: 6.7 BCF

Policy & Regulation Considerations

Besides Cap-and-Trade, there are no current policy mandates regarding the reduction of greenhouse gases. Notable regulations affecting H2 demand are the NOX limits set forth by the SQAMD. New "Buy America" provisions in recent federal infrastructure acts stipulate preferences for domestically manufactured steel, potentially increasing demand

Industry Characteristics

Metals industry serves a wide variety of critical industries in California (e.g., construction, automotives, aerospace & defense)

Southern California metals industry does not consist of raw ore processing, which is the largest potential adopter of hydrogen in the industry through the use of Direct Reduced Iron (DRI).

While decarbonization of the metals industry has been progressing slowly in the US, there have been significant efforts in Europe. The European steel industry has set goals to cut carbon emissions by 55% by 2030 and reach climate neutrality by 2050.

Case Study: Cleveland-Cliffs

Cleveland-Cliffs completed a hydrogen injection trial at its Middletown Works blast furnace in Cleveland, OH during May 2023. This trial was the first H2 injection trial in North America. The hydrogen was delivered via existing pipeline infrastructure in place for the facility's other hydrogen uses, including for its annealing furnaces. Notable quote from Cleveland-Cliffs CEO states ""This achievement proves our ability to use green hydrogen throughout our footprint when it becomes readily and economically available…"

Operational Characteristics

Primary metal facilities often run 24/7, with few idle periods apart from needed maintenance, whereas fabricated metal facilities can have more downtime between operations depending on the end products

Furnaces and other key equipment have long lifetimes, lasting 30+ years in operation

Natural gas usage and supply is integrated across multiple processes and sections within a facility.

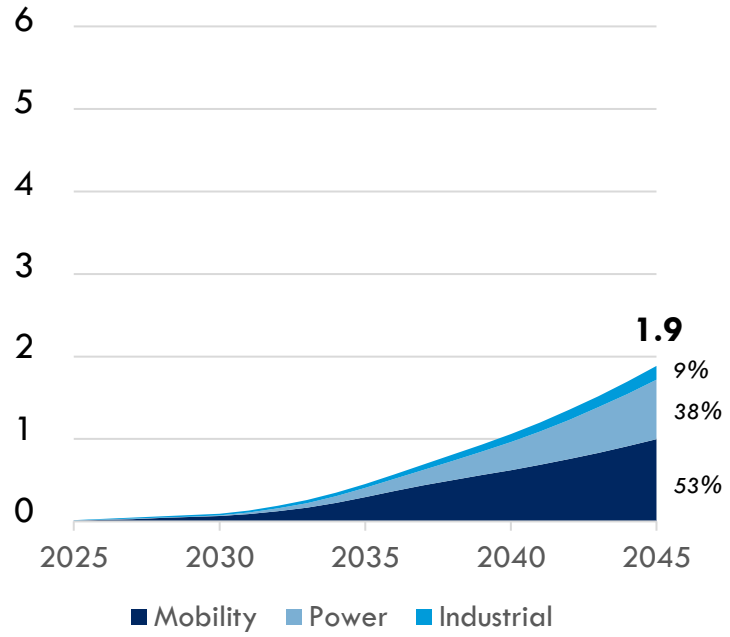
Data and insights based on interviews, market research, and Accenture calculations from EPA's Facility Level GHG Emissions database.

SUMMARY OF PRELIMINARY OUTPUTS

Overview of Preliminary Clean Renewable Hydrogen Demand Outputs

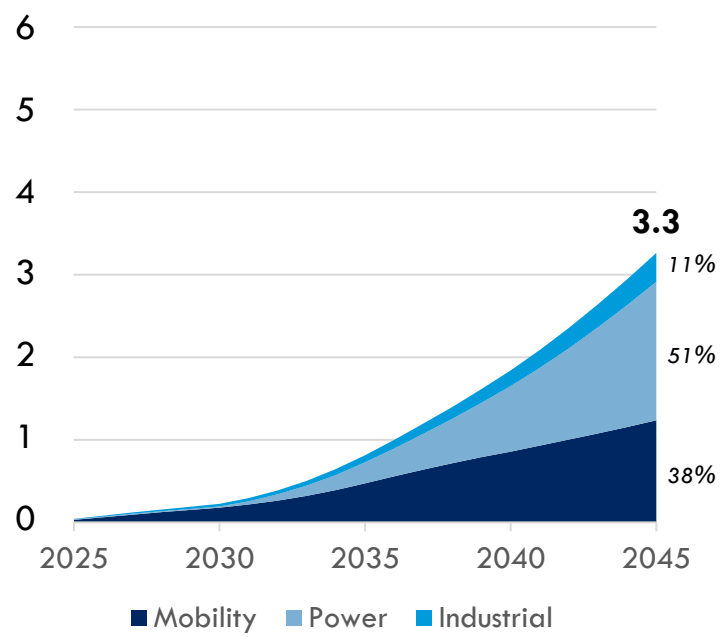
Total Expected Clean Renewable Hydrogen Demand Values in million TPY | Reflects SoCalGas service territory

Conservative



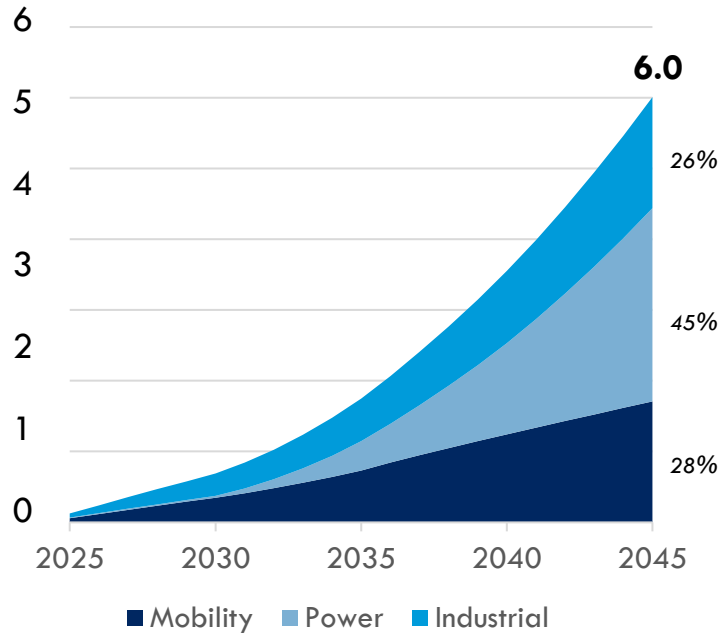
The conservative scenario reflects current legislation and conservative estimates for H_2 adoption factors and/or utilization rates. **Mobility drives majority of demand** in the conservative case

Moderate



The moderate scenario reflects assumptions of higher hydrogen adoption and utilization compared to the conservative case, with **Power taking on a larger share of hydrogen demand**

Ambitious



Significant growth occurs in the power and industrial sectors in the ambitious case, driven by **higher capacity utilization in Power and incorporation of refinery demand in Industrials respectively**

APPENDIX

SoCalGas

Summary of PAG & CBO Feedback

Not Exhaustive

Feedback Topic	Feedback Description	SoCalGas Response
Localized Hub Scenarios	1. A localized hub scenario should assess the availability of the precursors for hydrogen generation and the feasibility of generating hydrogen near the main source of demand. Such a scenario would evaluate both the existing water and energy transmission infrastructure, and the ability to expand such infrastructure to facilitate the development of hydrogen generation near the main source of demand.	1. The Demand Study includes a locational factor, which when integrated with the Production study, will inform the pipeline scenarios, including the localized hydrogen hub.
Alignment with State & Federal Agency initiatives	1. The technical approach for the demand study should clarify collaborative efforts with regulatory agencies such as the air districts and California Air Resources Board (CARB), as well as Original Equipment Manufacturers (OEMs) involved in the hydrogen production. 2. Alignment with the DOE H2 roadmap and any national plans related to hydrogen pipelines should be part of the market validation. 3. The analysis of demand should consider the potential future demand created by federal/state hydrogen hub efforts to ensure the project's long-term viability.	1. The demand study includes market participant interviews and peer review sessions with organizations (e.g. CARB, ARCHES, CEC) to ensure that it is well informed and aligned to the state's hydrogen efforts. 2. The Demand Study takes into account projects that have been publicized and that may be part of hydrogen hub efforts. 3. SoCalGas is collaborating with ARCHES as a part of the statewide hydrogen hub efforts.
Alternatives	1. The Demand Study should include numerous inputs and outputs. Each alternative listed should be analyzed as a component of the demand study. 2. Scattergood is trying to mix biogas with hydrogen fuel cell, interested to know if this will be considered. 3. The demand study should explore new sectors that were not previously served by Compressed Natural Gas (CNG), as hydrogen can serve both combustion and electricity generation purposes.	1. Hydrogen costs, production and supply, and overall alternatives will be covered in other Angeles Link Phase 1 studies. The Demand Study does consider hydrogen alternatives at the end user level across the three sectors modeled: mobility, power generation, and industrials. 2. The Demand Study will be considering end users blending hydrogen at the end use for power generation, but is not assessing what other fuels besides natural gas that the hydrogen will be mixed with. 3. The demand study explores fuel switching which includes both diesel and natural gas in the mobility and power gen sectors, and does not look at sectors with significant CNG use.
Grid Reliability	1. It is important that Phase 1 include assessments of the proposed infrastructure against chronic and acute events that may threaten its operation. As LADWP decarbonizes it's power system with variable energy resources like solar and wind, it will need green-hydrogen-fueled firm power generation to maintain system reliability and resiliency. It is critical that the green hydrogen supply is available when called upon. 2. It is imperative to assess the demand not only for prime power generation but also for clean backup power generation and the support of microgrids.	1. An assessment of chronic and acute events that may threaten operation is not within scope of the Demand Study. 2. The Demand Study takes into account cogeneration needs along with natural gas peaker plants.
Cost of Hydrogen	1. Hydrogen demand forecasts should include more than the total demand by year, it should also include demand by end use by year for at least 5 hydrogen cost levels. The hydrogen cost levels should be (1) current costs (2) the DOE's $1/kg cost goal (plus the cost of all delivery infrastructure required to get the hydrogen to the end customer, SoCalGas profits, financing costs, O&M costs and other costs); (3) three cost points distributed green hydrogen & DOE goal costs 2. Estimated pricing for hydrogen is currently DOE $1/kilogram, but if the cost ends up being higher, the demand might not be the same. Clarify how the demand analysis will approach this.	1. Hydrogen costs, production and supply, and overall alternatives will be covered in other Angeles Link Phase 1 studies. 2. The Phase 1 Demand Study aims to understand potential end users, end uses, and demand with less price constraints. Refer to cost assumptions on page 25. Hydrogen costs will be assessed in the High-Level Economic Analysis & Cost Effectiveness Study.
Storage Facilities	1. Scope of work missing commitment to closing the Aliso Canyon methane gas storage facility and the Playa del Rey methane gas storage facility.	1. Assessing current storage facilities are not within scope of the Demand Study.

Sub-Sector Specific In-Scope Analyses

	Included	Excluded
On-Road	• Heavy Duty Transit, Medium Duty Vehicles, Cargo Handling Equipment	• Light Duty Vehicles
Off-Road	• Cargo Handling Equipment, Ground Support Equipment, Agricultural Equipment, Construction & Mining Vehicles	
Marine	• Commercial Harbor Craft, Ocean Going Vessels	
Aviation	• Hydrogen Fuel Cell Aviation Vehicles	• Sustainable Aviation Fuel (Included in Industrials under Refineries
Baseload Combustion Generators	• Baseload Power Plants in SCG territory	• Any facilities below 1MW • New potential hydrogen power generation capacity
Flexible / Peaker Combustion Generators	• Peaker Power Plants in SCG territory	• Any facilities below 1MW
Food and Beverage Manufacturing	• Large food and beverage processing and manufacturing facilities identified in CARB pollution map or EPA FLIGHT databases	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Primary and Fabricated Metals	• Large primary metal and fabricated metal facilities identified in CARB pollution map or EPA FLIGHT databases • Primary metals includes steel processing and aluminum production facilities	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Stone, Glass, and Cement	• Large stone, glass, and cement manufacturing facilities identified in CARB pollution map or EPA FLIGHT databases • Stone includes both gypsum and clay processing facilities	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Wood and Paper	• Large paper processing facilities identified in CARB pollution map or EPA FLIGHT databases	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Chemicals	• Large chemical production and processing facilities identified in CARB pollution map or EPA FLIGHT databases	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases • Current hydrogen manufacturers
Co-Generation	• All cogeneration facilities identified in EIA 923 and EIA 860 databases	• Any facilities below 1MW
Aerospace and Defense	• Large aerospace and defense manufacturing facilities	• Any aerospace and defense facilities without manufacturing capabilities • Small facilities
Refineries	• Large petroleum refineries	• Facilities producing alternative fuels in direct partnership with existing hydrogen suppliers

ANGELES LINK

Environmental and Environmental Social Justice Analysis

Scope Revision Discussion

August 2023

SoCalGas

Summary of Changes

ANGELES LINK

- We heard your comments at the last PAG/CBOSG meeting regarding the proposed Environmental Social Justice (EJ) analysis
  - We are grateful for the feedback and have incorporated it into our study scope
- Based on your recommendations, we have taken a more outreach focused approach
- The EJ analysis portion of this study will now have two parts:
  - Part 1: EJ analysis using desktop tools developed by public agencies
  - Part 2: A stakeholder engagement plan, which will be developed with your input and implemented in Phase Two of the Angeles Link Project

Summary of Changes

ANGELES LINK

- A stakeholder engagement plan for addressing and mitigating impacts to disadvantaged communities will be drafted with PAG/CBOSG input
  - Development of the plan will be part of Phase One
  - Boots on the ground outreach to communities will occur during Phase Two when Project routing is further defined
- Input is welcome and will be considered for incorporation. Examples of input include:
  - Pertinent EJ Studies
  - Examples of mitigation
  - Relevant work completed by academia and/or agencies

Part 1: EJ Analysis

ANGELES LINK

» Part 1: EJ Analysis Methodology

- Similar mapping exercise as Desktop Environmental Analysis
- Identify disadvantaged communities (DACs) along the planned routes using agency adopted EJ desktop tools
- Analyze potential impacts and benefits to communities along the planned routes
- Include census tract info including socioeconomic, language, race, etc.

SoCalGas

Part 2: Stakeholder Engagement Plan (New)

ANGELES LINK

- The purpose of the stakeholder engagement plan is to establish an approach/strategy for engaging disadvantaged communities in Phase Two that may be impacted by the project
- Stakeholder engagement focused on:
  - Gathering community input
  - Education of hydrogen-related topics and benefits of clean renewable hydrogen
- Identify communities of concern through PAG/CBOSG input and utilization of EJ mapping tools
- Report of engagement activities conducted in Phase One
  - Include Project modifications accepted based on PAG/CBOSG feedback
- Demonstrate how Phase One aligns with the California Public Utilities Commission (CPUC) Environmental and Social Justice Action Plan and Assembly Bill 617

Future Opportunities for Stakeholder Input

- Continue to solicit input on Phase One milestones
  - Prior to finalizing study descriptions
  - Prior to finalizing the technical approaches
  - Following receipt of preliminary data and findings
  - Upon receiving draft reports
- One comment period allocated for each milestone
  - Comment periods typically will be 30 days
- Feedback will be provided through the following repositories:
  - Designated email address
  - Mail
  - Interim and quarterly meetings
  - Online form

ANGELES LINK

Discussion

ANGELES LINK

Appendix

CPUC Environmental and Social Justice (ESJ) Action Plan (2022)

- "The ESJ Action Plan is intended to serve as a resource for CPUC staff, intervenors, stakeholders, and the public. The goals and objectives provide the broad vision and steps the CPUC will take to ensure equity in its programs and services."
- https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/news-and-outreach/documents/news-office/key-issues/esj/esj-action-plan-v2jw.pdf

CPUC ESJ Action Plan
Goals 1 and 2

- Goal 1 - Consistently integrate equity and access considerations throughout CPUC regulatory activities
- Goal 2 - Increase investment in clean energy resources to benefit ESJ communities, especially to improve local air quality and public health
  - 2.1 Outreach & Engagement
    - Broaden and deepen outreach and engagement with ESJ communities early in proceedings and processes related to resilient, clean energy
  - 2.2 Research & Analysis to Understand Impact
    - Further research and analytical opportunities to understand impacts in ESJ communities
  - 2.4 Address Impacts in ESJ Communities

CPUC ESJ Action Plan
Goals 4 and 5

- Goal 4: Increase climate resiliency in ESJ communities
  - Emphasize Adaptive Capacity
- Goal 5: Enhance outreach and public participation opportunities for ESJ communities to meaningfully participate in the CPUC's decision-making process and benefit from CPUC programs
  - 5.1 Improve Communication with ESJ Lens
  - 5.2 Continue to Emphasize Engagement with CBOs
  - 5.3 Build Pathways for Public Participation
  - 5.4 Enhance Engagement with Particular ESJ Communities and Individuals

CPUC ESJ Action Plan
Goal 7

- Goal 7: Promote high road career paths and economic opportunity for residents of ESJ communities
  - 7.1 Maximize Authority to Promote High Road Career Paths
  - 7.2 Educate on High Road Careers
  - 7.3 Partner with Utilities and Sister Agencies

ANGELES LINK

ESJ Action Plan
Other Goals

» What about goals not mentioned?

- Goal 3 refers to metrics for CPUC staff to meet in other industries it regulates (i.e., water, transportation)
- Goal 6 refers to CPUC enforcement actions
- Goal 8 refers to CPUC goals for training its staff on EJS
- Goal 9 refers to CPUC goals for monitoring success of the program

ANGELES LINK

Assembly Bill 617 Communities

- The California Air Resources Board (CARB) established the Community Air Protection Program (CAPP) to reduce exposure in communities most impacted by air pollution
  - Community members work with local air districts to conduct air monitoring and prepare community emissions reduction programs
  - Strategies to reduce air pollution or exposure at the community level include new regulations, targeted incentive funding, enhanced enforcement, and coordinating efforts with other agencies based on community priorities

ANGELES LINK

Assembly Bill 617 Communities

» Community Air Protection Program (CAPP)

- In 2018, CARB selected an initial ten communities for community air monitoring and/or community reduction programs under the CAPP
  - Additional communities for inclusion in the program have been selected annually since 2018
- Communities enrolled in the CAPP that may be potentially affected by the Project will be identified in the Desktop Environmental EJS Analysis

August 28, 2023
10 a.m. - 12 p.m.

ANGELES LINK

COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP

DEMAND & ENVIRONMENTAL JUSTICE ANALYSIS WORKSHOP

SoCalGas™

Warm welcome to our participants!
We will be starting shortly after 10:00 a.m. to make sure everyone is present.

HOUSEKEEPING:

This meeting will be recorded (video and audio), and a court reporter will be transcribing the meeting. Please announce yourself before you speak.

Zoom microphones are muted by the host to eliminate background noise. You will need to unmute your microphone when called on to speak.

We encourage you to turn on your cameras so we can better engage with you.

Please feel free to use the Zoom chat to provide input and ask questions throughout the meeting.

If you would like to speak, please use the "Raise Hand" button at the bottom of the Zoom screen.

AGENDA

- Self-Introduction
- Zoom Poll
- Demand Study Analysis
  - Member Discussion
- Environmental Justice Analysis
  - Member Discussion
- Next Steps

ANGELES LINK

Self-Introductions

ANGELES LINK

Zoom Survey

Survey

How familiar are you with the supplemental Demand materials provided last **week?**

Very familiar

Somewhat familiar

Somewhat unfamiliar

Very unfamiliar

What Demand topics are you most interested in discussing?

Scope & Process

Methodology

Preliminary Outputs: Mobility

Preliminary Outputs: Power

Preliminary Outputs: Industrial

ANGELES LINK

DEMAND STUDY ANALYSIS - HIGHLIGHTS

Technical Approach and Preliminary Outputs

August 2023

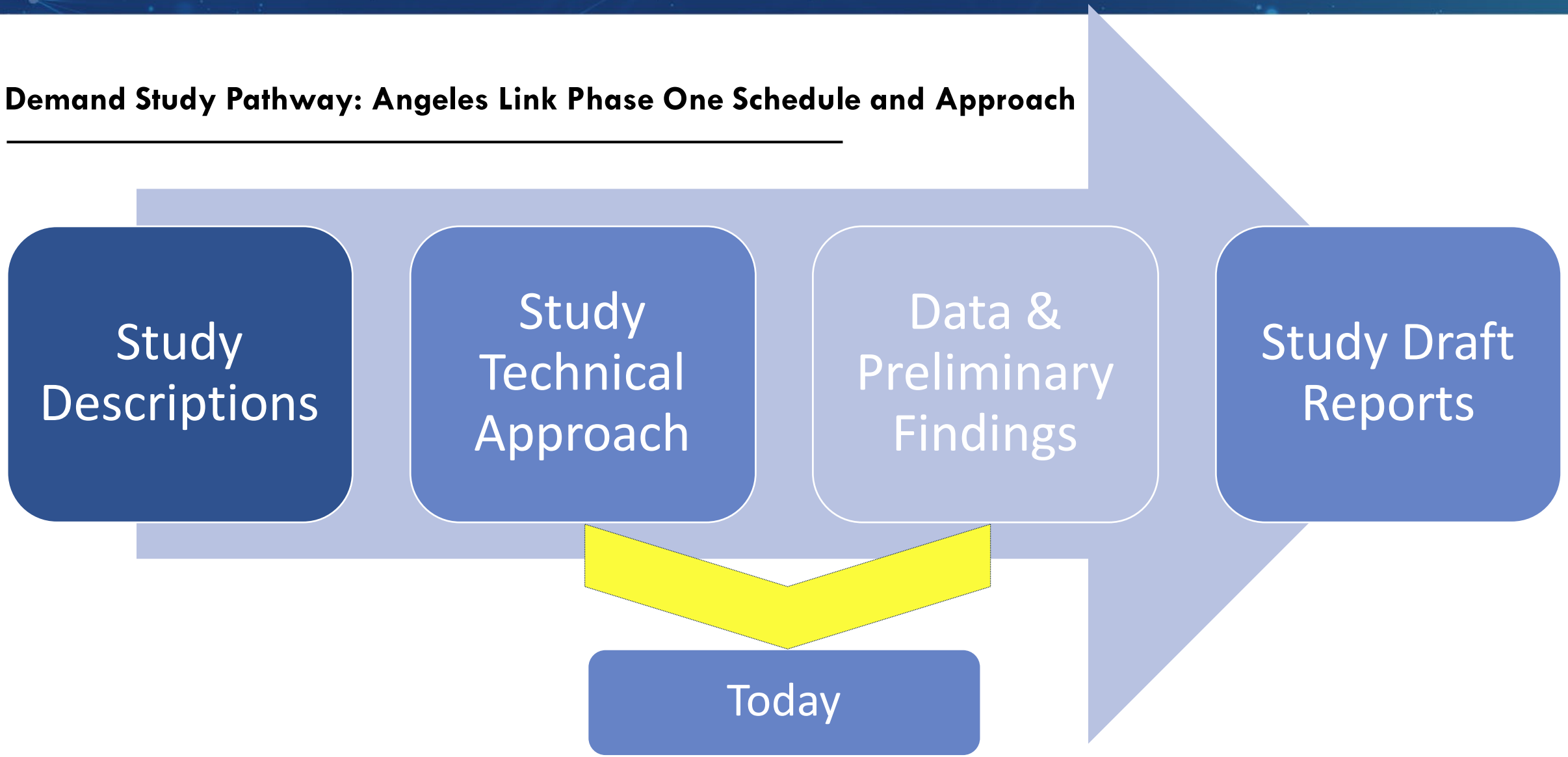
SoCalGas™

PAG/CBOSG FEEDBACK

SoCalGas

DEMAND STUDY: INTRODUCTION AND AGENDA

Demand Study Pathway: Angeles Link Phase One Schedule and Approach



SCOPE, PROCESS, METHODOLOGY

SoCalGas

DEMAND STUDY: INTRODUCTION AND AGENDA

Recap

- December, 2022: CA Public Utilities Commission (CPUC) approves SoCalGas' request to establish the Angeles Link Memo Account
- **Demand** and **End Uses** for Angeles Link is one of 16 feasibility studies
  - CPUC directs SoCalGas to identify demand and end uses for Angeles Link and make the data, findings, and results available to the public (General Order 66-D)
- The **Demand Study** focuses on investigating the potential hydrogen demand across select sectors in SoCalGas' service territory from 2025 – 2045.

Presentation Objectives

Approach and Methodology

Provide a high-level overview of the model development process

Modeling Assumptions

Share important inputs, assumptions and inputs across modeled sectors

Analysis Outputs

Present a summary view of preliminary model outputs

Key Considerations on Scope and Areas for Further Analysis

- This analysis focuses on a bottom-up assessment of demand potential for clean renewable hydrogen across the Mobility, Power Generation, and Industrial sectors
- To be conservative, the model does *not* account for certain variables that would be expected to increase future demand for hydrogen, such as:
  - Use of hydrogen to facilitate energy system reliability and maintain Loss of Load Expectations against an increasing share of intermittent renewable resources on the grid
  - Potential additions to generation capacity to meet demand growth in 2045, as seen in the projected new resources identified in CARB's Scoping Plan (including approximately 9 GW of hydrogen turbine capacity)
  - Carbon pricing (e.g., LCFS and cap-and-trade) impacts on demand which may be influenced by pending regulatory proceedings
- These variables may be further assessed in future studies

Demand Analysis Approach

An initial model was developed and revised through input from potential end-users and market participants

Model Definition

- Establish a clear set of objectives, scope, and approach for the demand analysis
- Assess academic and market analysis to identify priority sub-sectors and applications for clean hydrogen demand

Model Buildout

- Develop detailed model methodology; identify relevant datasets and inputs
- Quantify total addressable market for clean hydrogen and estimate adoption rates for each sub-sector and application by evaluating alternatives

Model Refinement (In Progress)

- Share preliminary outputs with PAG / CBO members and gather feedback
- Incorporate feedback (where possible) into the model and integrate findings with other Angeles Link Phase One studies

Sector Interviews & Peer Reviews (In Progress)

- Conduct targeted interviews with subject matter experts across industry, academia and government agencies to test model approach, inputs, assumptions and outputs

DEMAND MODEL METHODOLOGY

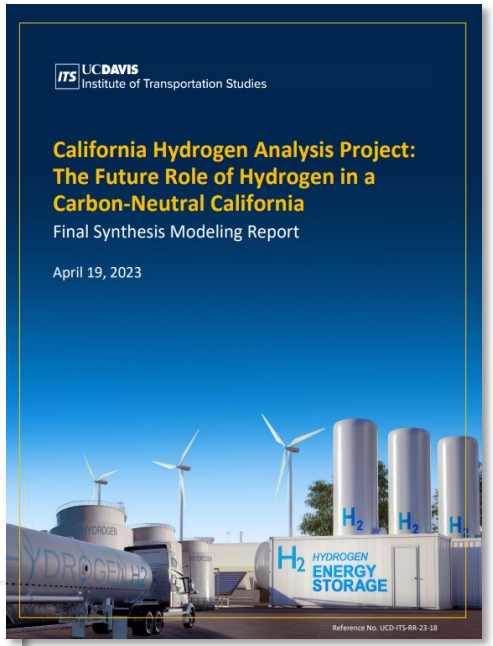
The model methodology projects transition of current fuel to hydrogen for priority sub-sectors, with validation through end user interviews and peer reviews

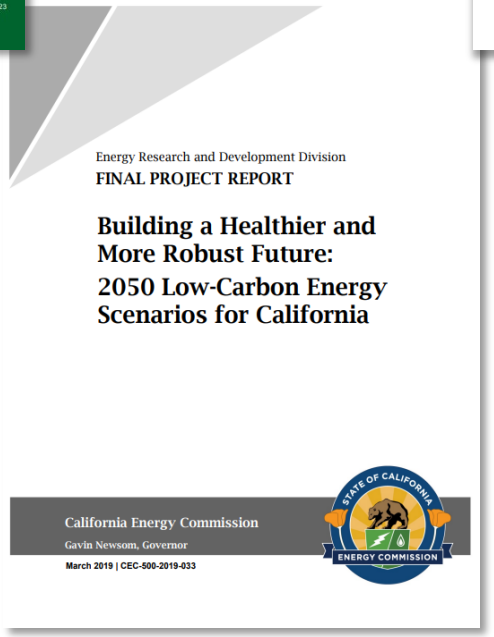
- **Identify** top sub-sectors using historical natural gas, diesel, and gasoline consumption data
- **Align** on key data sets and assess how to close information gaps
- **Test** technical feasibility to help fill information gaps

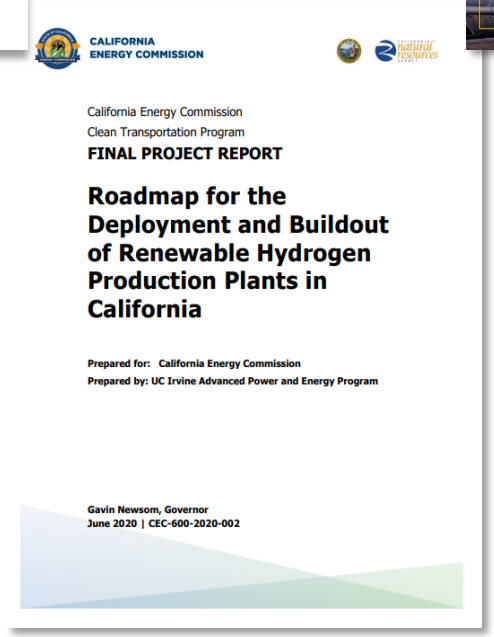
- **Model Total Addressable Market (TAM)** to determine industry growth rates and define industry-specific characteristics
- **Apply Zero-Emission (ZE) and H2 adoption rates to TAM** to forecast net-zero transition broadly and hydrogen specifically using key adoption factors
- **Develop demand scenarios** through qualitative assessment of decarbonization alternatives, technology commercialization, and cost to adopt hydrogen

- **Interview** end-users and conduct peer reviews
- **Engage** Planning Advisory Group (PAG) and Community-Based Organization Stakeholder Group (CBOSG)
- **Incorporate feedback from PAG/CGO** as appropriate

RESEARCH OVERVIEW







SCENARIO AND ADOPTION RATE OVERVIEW

Description of Scenarios

Conservative

- No new legislation but continued progress in hydrogen viability
- Hydrogen is adopted across sectors and sub-sectors where alternatives are considered less viable

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Moderate

- No new legislation but increased hydrogen viability, driving higher adoption rates across sectors and sub-sectors

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload, Cogen

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Ambitious

- More ambitious policies are put in place and businesses are incentivized to support widespread hydrogen adoption

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV,* Aviation

Power: Peaker, Baseload, Cogen

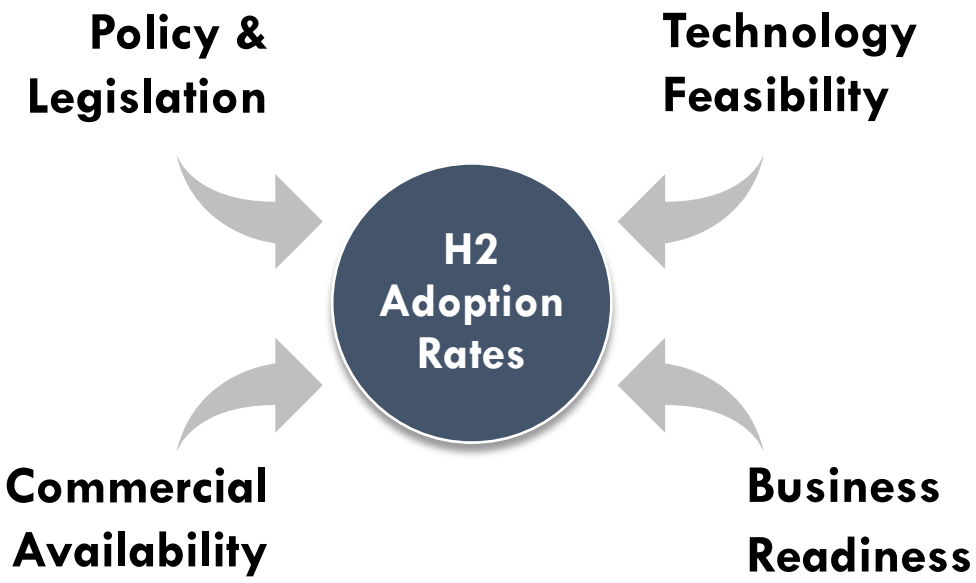
Industrials: Refineries, Cogen, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

*HDV (Heavy Duty Vehicles), MDV (Medium Duty Vehicles), CHE, (Cargo Handling Equipment), GSE (Ground Support Equipment), Ag (Agricultural Equipment), C&M (Construction & Mining Vehicles), CHC (Commercial Harbor Craft), OGV (Ocean Going Vessels; *Diesel consumption only, not main engine heavy fuel)*

Cogeneration in Conservative and Moderate scenarios excludes cogeneration plants at refineries

Base market growth rate approach and assumptions vary per sector and per scenario

Primary Factors Driving Adoption Rates



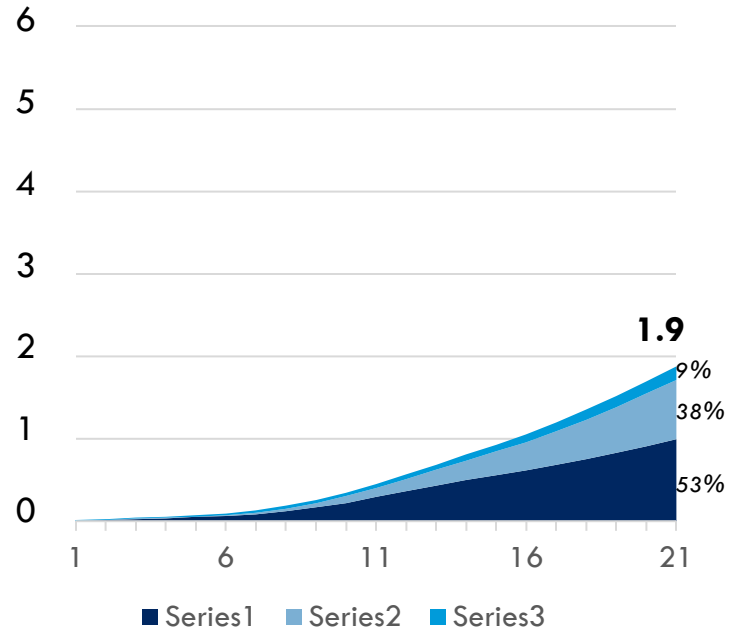
SUMMARY OF PRELIMINARY OUTPUTS

SoCalGas

Overview of Preliminary Clean Renewable Hydrogen Demand Outputs

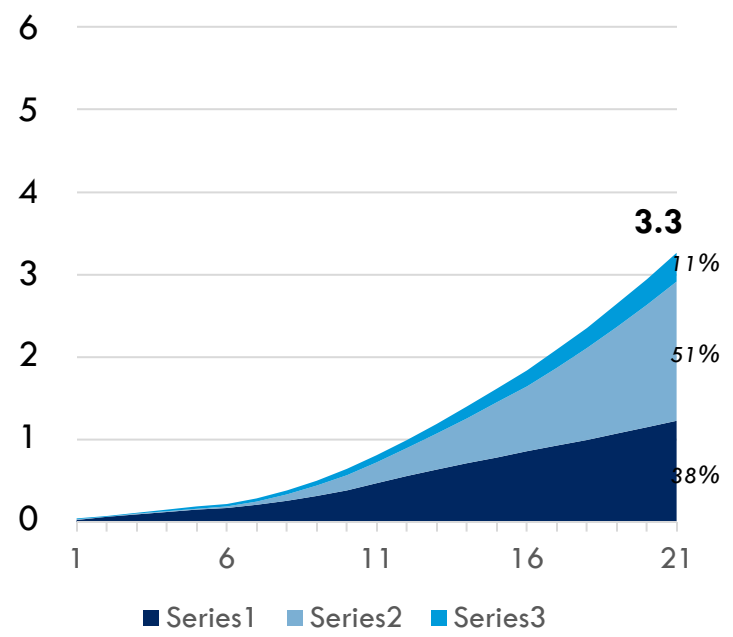
Total Expected Clean Renewable Hydrogen Demand Values in million TPY | Reflects SoCalGas service territory

Conservative



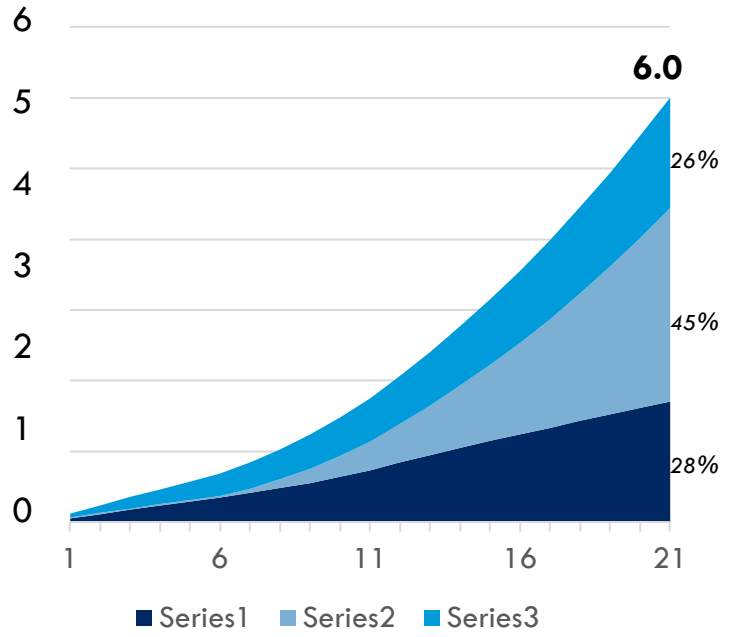
The conservative scenario reflects current legislation and conservative estimates for H_2 adoption factors and/or utilization rates. **Mobility drives majority of demand** in the conservative case

Moderate



The moderate scenario reflects assumptions of higher hydrogen adoption and utilization compared to the conservative case, with **Power taking on a larger share of hydrogen demand**

Ambitious



Significant growth occurs in the power and industrial sectors in the ambitious case, driven by **higher capacity utilization in Power and incorporation of refinery demand in Industrials respectively**

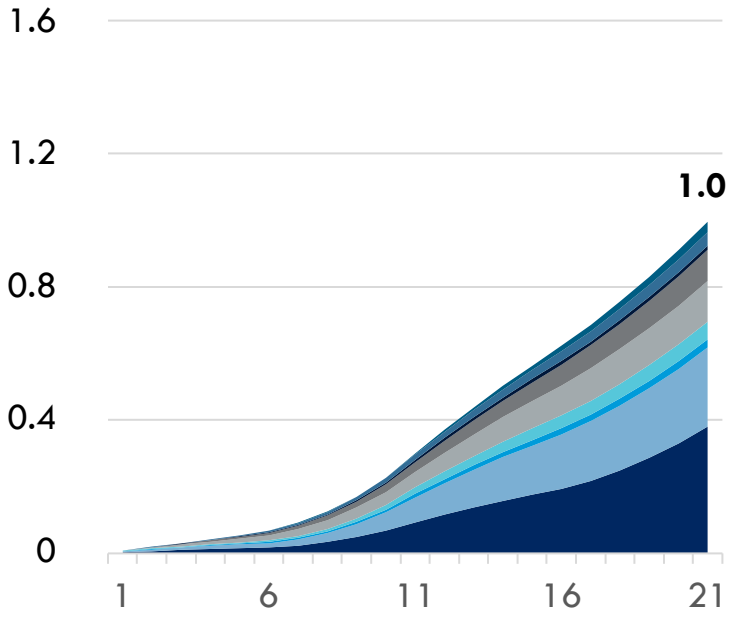
Mobility: Demand Outputs

Potential mobility sector H_2 demand in SoCalGas service territory is projected to be between 1.0-1.7M TPY by 2045

Total Expected Clean Renewable Hydrogen Demand

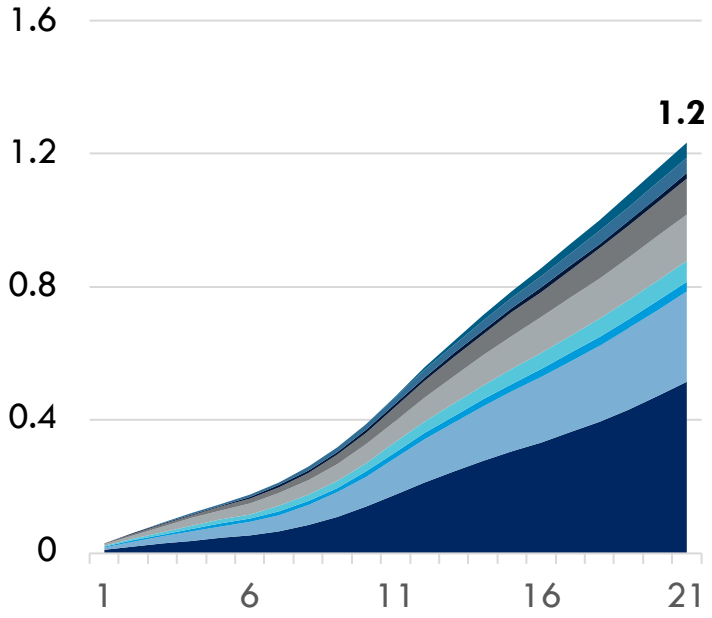
Values in Million TPY | Reflects SoCalGas service territory

Conservative



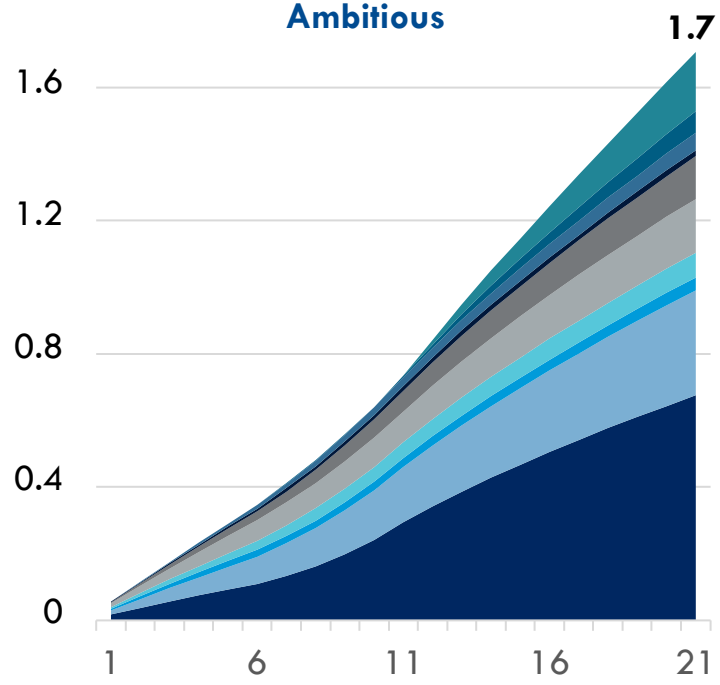
The conservative scenario reflects current legislation and relatively conservative estimates for hydrogen adoption.

Moderate



The moderate scenario reflects current legislation, assumes moderate estimates for hydrogen adoption.

Ambitious



The ambitious scenario builds on the moderate scenario with potential additional ZE legislation and more ambitious estimates for hydrogen adoption.

Note: MDV is Medium Duty Vehicles, Marine includes Commercial Harbor Craft (CHC) and Ocean Going Vessels (OGV), where OGV values reflect diesel consumption only (does not include main engine heavy fuel).

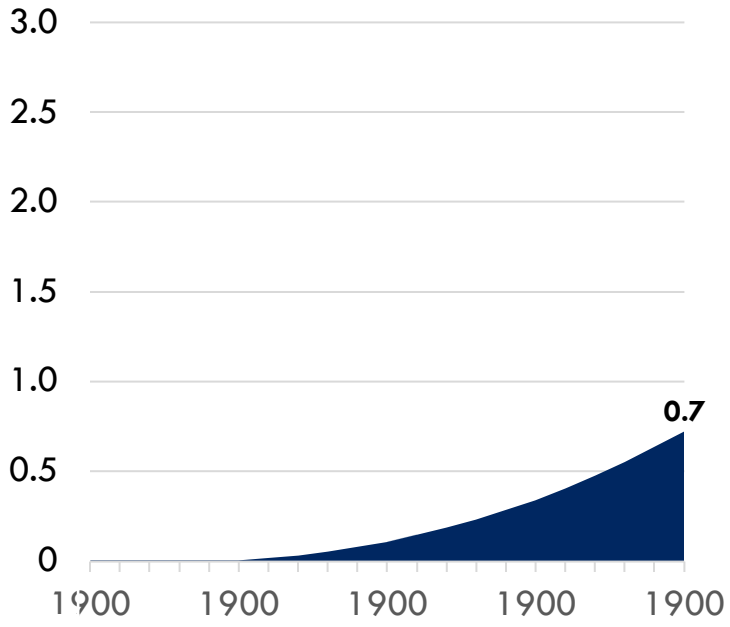
Power: Demand Outputs

Preliminary demand projections range from 0.7M – 2.7M tons of hydrogen/year in 2045, with increasing ramp up over time

Total Expected Clean Renewable Hydrogen Demand

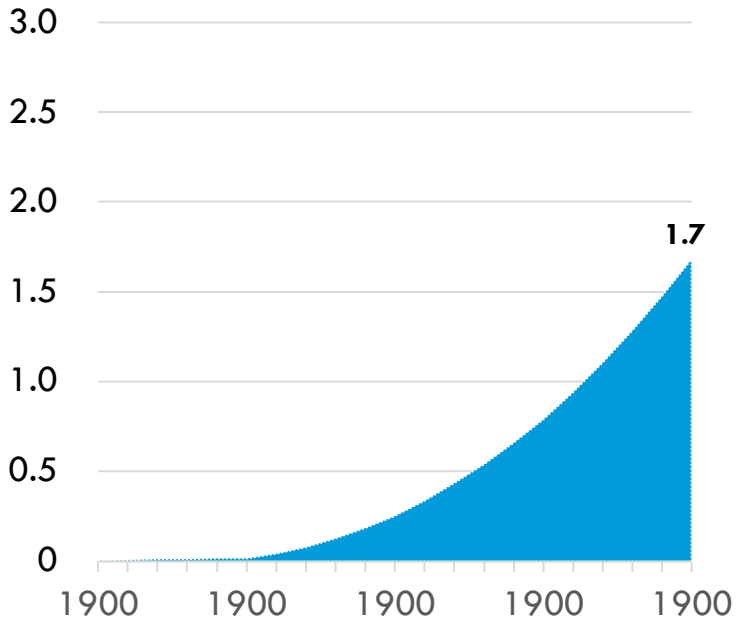
Values in million TPY | Reflects SoCalGas service territory

Conservative



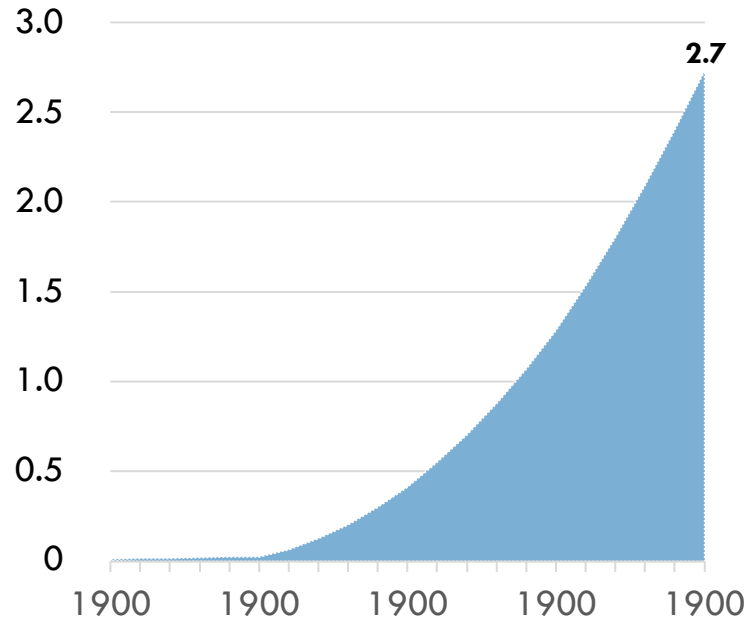
The conservative scenario reflects hydrogen demand under a low capacity factor scenario of 10%, assuming a decline in thermal combustion as other renewables increase and supply future load growth, based on external studies[1,2] and feedback from market participants[6]

Moderate



The moderate scenario reflects hydrogen demand under a capacity factor scenario of 20%, representing continued need for dispatchable generation, although at lower levels than we see today. Capacity factor assumption based on future natural gas capacity factors projected by the CARB scoping plan[3] and CEC reports[4]

Ambitious



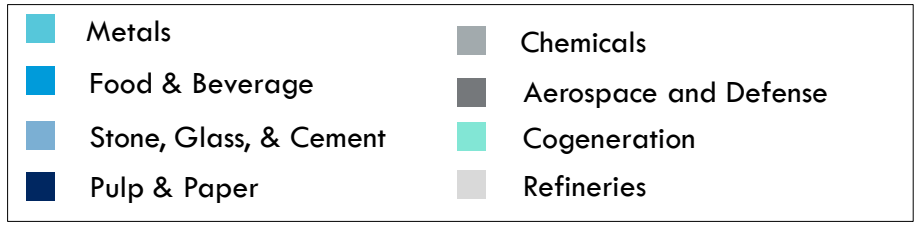
The ambitious scenario determines future hydrogen demand under the assumption that capacity factors continue to follow historical trends (~30%)[5]

References: (1) LA100 (2) LADWP (3) CARB (4) CEC (5) EIA (6) Interviews held with power plant owners, OEMs, academia, and governmental and regulatory organizations

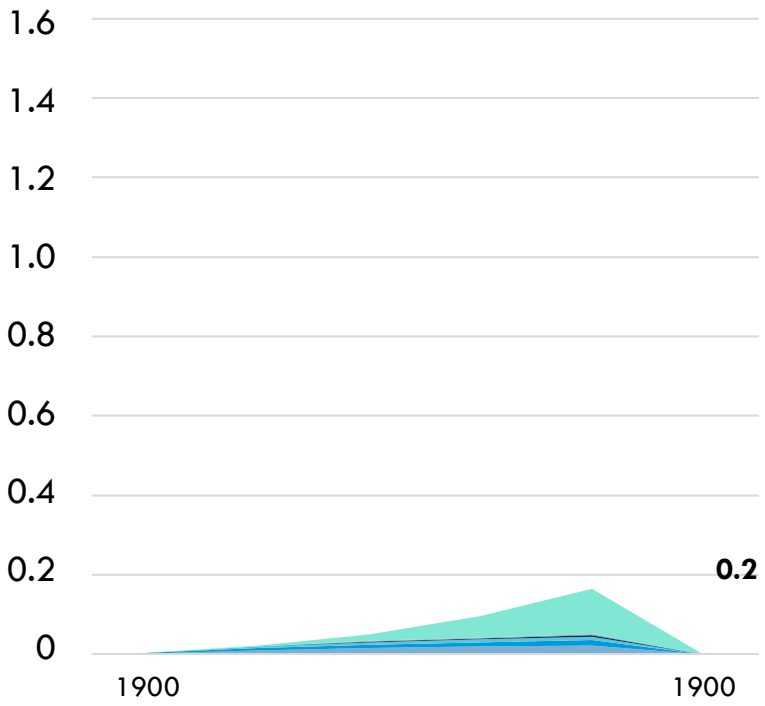
Industrials: Outputs

Total Expected Clean Renewable Hydrogen Demand

Values in million TPY | Reflects SoCalGas service territory only

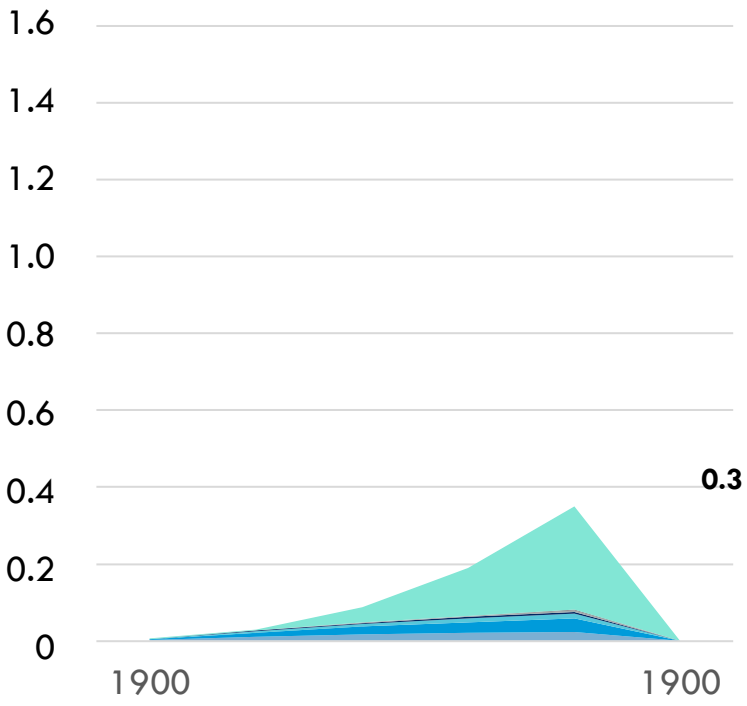


Conservative Case (M TPY)



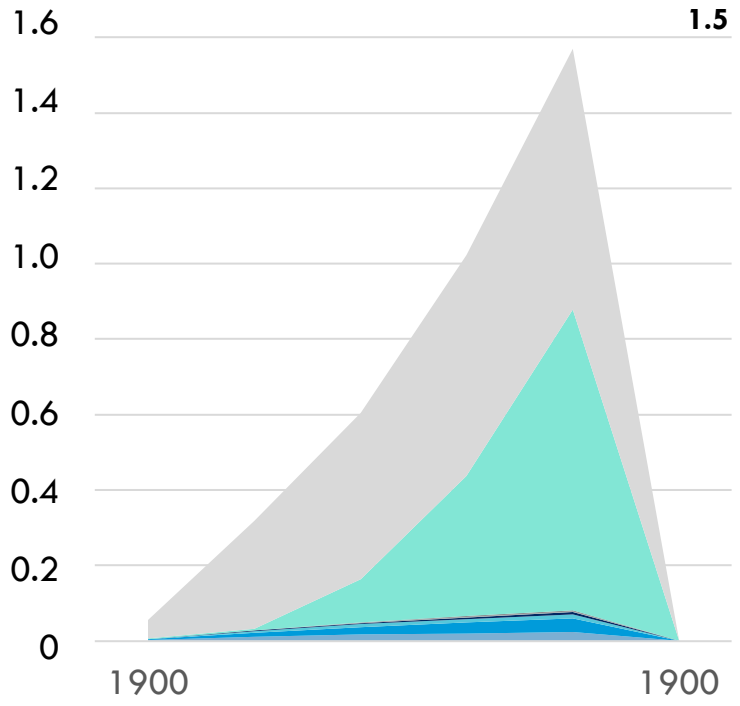
- No production expanse in California for identified industries; facilities will not expand beyond current production capabilities. Increased demand will be satisfied by out of region facilities
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 10%

Moderate Case (M TPY)



- California facilities will expand production in existing or new facilities to match growing market demand
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 20%

Ambitious Case (M TPY)



- Potential decarbonization legislation or market drivers in the refining industry could lead refineries to gradually transition to green H2
- California facilities will expand production in existing or new facilities to match growing market demand
- Cogeneration – Capacity factor of 30%

ANGELES LINK

Discussion

Please announce your name and speak directly into the microphone

Be concise and focus on discussion topics

Verbal comments are not the only way to provide input, feel free to type a chat

We are accepting input on the Demand Study until Tuesday, September 25

ENVIRONMENTAL AND ENVIRONMENTAL SOCIAL JUSTICE ANALYSIS

SCOPE REVISION DISCUSSION

AUGUST 2023

SoCalGas™

ANGELES LINK

Member Discussion

Please announce your name and speak directly into the microphone

Be concise and focus on discussion topics

Verbal comments are not the only way to provide input, feel free to type a chat

We are accepting input after this meeting if we run short on time or you think of things later

NEXT STEPS

- Comments on the Demand Study are due Tuesday, September 25, 2023
- Please send comments to Insignia Environmental at ALP1_Study_CBO_Feedback@insigniaenv.com
- Living Library coming soon
- The Study Technical Approach comment period will open on Tuesday, September 5 and will close on October 13, 2023
- Invoices will be sent soon for your confirmation
- Join us for our next Quarterly Meeting on September 26 at the Energy Resource Center in Downey

SoCalGas

ANGELES LINK

Thank You

WELCOME CBOSG MEMBERS

Arrival and Continental Breakfast

Welcome, Land Acknowledgement,
SoCalGas Safety Message, Roll Call

SoCalGas Opening Remarks

Decorum Policy Review

Glossary of Terms

DNV Hydrogen Overview Presentation

BREAK

Environmental Justice Community Engagement Plan
- Breakout Sessions

Air Emissions 101: SoCalGas & Guest Speaker: Mitsubishi

Schedule Review and Next Steps
- Quick Brainstorm: Future Meeting Locations

Adjourn/Lunch

ENVIRONMENTAL JUSTICE COMMUNITY ENGAGEMENT ACTIVITY

INTRODUCTION

An Environmental Justice Engagement Plan (Plan) is being prepared during Phase One of the Angeles Link Project (Project). The Plan will identify elements of engagement activities that are proposed to occur in future phases of the Angeles Link Project, subject to approval by the California Public Utilities Commission (CPUC). SoCalGas proposes to prepare the Plan with input from Community-Based Organizations (CBOs) and the Planning Advisory Group (PAG). As the Project progresses and a detailed Project description is developed, the Plan would identify specific stakeholders. SoCalGas is soliciting input on the Plan at this time, however, the Plan is anticipated to evolve over time as the Project is further studied and developed. In the event future activities are authorized by the CPUC, the Plan would be further refined to reflect the Project description at that time.

PLAN ELEMENTS

The following elements have been identified as potential items to include in the Plan, for which we are seeking input. SoCalGas has developed several questions *(in italics)* to help facilitate discussion and identify the important strategies to so that future engagement activities with communities can be conducted in an effective and efficient manner.

Topic 1: Goals and Objectives

- *Identify two to three main goals and objectives related to communications and engagement activities that should be conducted as part of future Angeles Link activities.*

- *What will a successful Plan look like? Specifically, what tools, factors, and/or strategies facilitate successful interactions with regards to engaging disadvantaged communities? Identify two to four tools, factors, or strategies.*

Topic 2: Disadvantaged Communities

We previously shared that during Phase One of the Project, Disadvantaged Communities are being identified for the Environmental Justice Study using agency screening tools and input from CBOs, the PAG, and their leadership or representatives. Answers to the following question will help further frame the Plan:

- *How can we enhance our identification process to supplement outreach to communities that these agency screening tools may not be catching?*

Topic 3: Native American Tribes, Tribal Groups, and Individuals

As part of future Project development efforts, SoCalGas and/or regulatory agencies may be required to identify tribes for consultation under federal (National Historic Preservation Act Section 106) or state (Senate Bill 18/Assembly Bill 52) law. We will seek assistance from CBO and PAG members in further identifying tribes and/or tribal groups as routing alternatives are further identified.

- *Which specific tribes, tribal groups, and/or individuals should be engaged in future activities? Identify any leaders or representatives to include.*

Topic 4: Others Who May be Affected by or Have a Concerted Interest in the Project Based on Solicited Feedback

In addition to the communities and tribes identified under Topics 2 and 3, we seek assistance in identifying other groups or citizens with a concerted interest in the Project that should be included.

- *Which specific neighborhoods, communities, and/or groups should be engaged in future activities? Identify any leaders or representatives to include.*

ENGAGEMENT ACTIVITIES (FUTURE PHASES)

In future Project Phases, SoCalGas intends to finalize the Plan and initiate further engagement activities. The following questions pertain to the communications aspects of the Plan, with a focus on efforts to enhance meeting effectiveness and efficiencies.

Topic 5: Meetings

- *Regarding in-person meetings:*

    a. *What specific engagement activities should be implemented to efficiently and effectively inform communities and individuals about the Angeles Link Project? Provide at least two specific examples.*
    b. *For each unique community or tribal group when (i.e., what time of day) and where should meetings be held? Are community centers, places of worship, or other local gathering locations appropriate?*

- *Should interpreters be provided in certain communities? If so, for which languages should interpreters be provided?*

- *What kind of incentives are recommended to encourage attendance at these meetings? Who from the Angeles Link Project team should attend these meetings with communities? What expertise should those staff members have?*

- *What type of meeting format would be most effective? For example, should the meetings be conducted as open houses with workstations? Would smaller sessions with smaller groups be more effective? Would virtual and/or hybrid meetings be acceptable and for what context?*

Engagement Materials

- *Describe the visual, written, and/or digital materials that could be developed to support the engagement efforts in these communities.*

- *Considering the responses to question 10 (regarding interpreters), in what languages should written materials be developed?*

Topic 6: Topics and Subject Matter Experts

- *SoCalGas proposes to include the following subject matter subjects for discussion at planned community in-person meetings. Should other subject matters be included?*

Hydrogen Production and Transportation System

Communications for this subject may include an introduction and overview of hydrogen production and transportation systems, and use of hydrogen as an energy source.

Operation/Maintenance of Hydrogen System Facilities

Communications for this subject may include an introduction and overview of operating and maintaining hydrogen facilities, including public safety and mitigation measures to address environmental and health issues.

Preferred Location(s) of Hydrogen System Facilities

Communications for this subject may include geographic information systems (GIS) mapping of the preferred routing alternatives as well as production and storage facilities to notify stakeholders of locations of potentially impacted communities, including disadvantaged communities. Potential mitigation measures and alternatives incorporated to further minimize impacts would also be shared.

Potential Public Benefits to be Realized by Project Implementation

Communications for this subject may include potential public benefits to be realized from the Project, including utilizing hydrogen as a source of energy for all stakeholders, including disadvantaged communities, would be shared. Topics to be shared include energy system reliability, workforce development, GHG emissions reductions and air quality benefits,

Topic 7: Project Communication Challenges and Contingency Planning

As proposed, the Plan will identify and offer mitigation or strategies to address potential communication challenges, either during the meeting planning phase or during the engagement meetings.

- *What are the potential challenges that could potentially impact communications? Identify potential mitigating measures that could be applied to support a response to those challenges.*

Glossary of Commonly Referred Terms

TERM (from Work Descriptions and Technical Approach)	DEFINITION
Above ground storage technologies	Methods of storing energy or materials above the surface of the earth.
Anion exchange membrane (AEM) electrolyzer	An AEM electrolyzer is a type of electrolyzer that uses an anion exchange membrane (AEM) as the electrolyte. An AEM electrolyzer operates at low to medium temperatures (50-100°C) and pressures (1-30 bar) and can use water or alkaline solutions as the feedstock.
Assembly Bill 617	A California law passed in 2017 that aims to improve air quality and public health in communities that are disproportionately affected by pollution by requiring the California Air Resources Board and regional air districts to develop and implement additional emissions reporting, monitoring, reduction plans, and measures.
Biogas fueled steam methane reformers	Biogas fueled steam methane reformers are devices that use biogas, a renewable and low-carbon fuel derived from organic waste, to produce syngas through a catalytic reaction with steam. Biogas fueled steam methane reformers can be used to generate clean and sustainable hydrogen for various applications, such as fuel cells, power generation, or chemical synthesis.
Biomass gasification	A process that converts biomass, such as wood, agricultural residues, or municipal solid waste, into syngas.
Blended hydrogen	A mix of hydrogen with natural gas. Blended hydrogen can be used to generate heat and power with lower emissions than using natural gas alone. Blended hydrogen can also be a way of delivering pure hydrogen to markets, using separation and purification technologies downstream to extract hydrogen from the natural gas blend.
CalEnviroScreen	A tool that identifies California communities that are most affected by multiple sources of pollution and that are most vulnerable to its effects. CalEnviroScreen uses environmental, health, and socioeconomic data to score and rank every census tract in the state based on their exposure and sensitivity to various environmental hazards.
Capital expenditures (CAPEX)	Funds used by a company to acquire, upgrade, and maintain physical assets such as property, plants, buildings, technology, or equipment. CAPEX are often used to undertake new projects or investments by a company that can improve its operational efficiency, increase its revenue in the long term, or make improvements to its existing assets.
Climate and Economic Justice Screening Tool (CEJST)	A geospatial mapping tool t to identify disadvantaged communities that face burdens created in response to a January 2020 Executive Order. CEJST helps identify disadvantaged communities that should receive 40 percent of overall benefits of federal climate, clean energy, and agency designated programs. The purpose of CEJST is to identify communities with potential underinvestment in energy, transportation, housing and water infrastructure, employment, and exhibit environmental burden(s).
Common carrier transmission pipelines	Pipelines that transport large volumes of fuel (e.g., natural gas and oil) from production sources to processing plants, refineries, or distribution networks by an entity that offers to these transportation services to the public or a portion of the public without discrimination.
Compressor Stations	Facilities that help the transportation of gas from one location to another by increasing the pressure and flow of the gas through pipelines.

TERM (from Work Descriptions and Technical Approach)	DEFINITION
Compressor venting	The process of releasing gas from a compressor to the atmosphere or to a flare system.
Department of Transportation (DOT)	A federal agency of the United States government that oversees the transportation system of the country. The DOT aims to ensure the safety, efficiency, accessibility, and sustainability of various modes of transportation, such as air, road, rail, water, pipelines, and transit. The DOT also supports the development and innovation of transportation infrastructure, technology, and policy.
Design Pressure	Design Pressure is the maximum pressure that an energy system can be exposed to and sets the system relief valve at the same pressure.
Efficiency rates	Measures of how well a system, process, or device converts input energy or resources into output energy or products. Efficiency rates can be expressed as ratios, percentages, or fractions, depending on the context and units of measurement. Efficiency rates can be used to evaluate the performance, cost-effectiveness, and environmental impact of various technologies and applications.
Electrification	The process of replacing technologies or processes that use fossil fuels, such as internal combustion engines and gas boilers, with electrically-powered equivalents, such as electric vehicles or heat pumps.
Energy system	A system that converts, transports, stores, and uses energy from various sources to meet the needs and demands of human activities.
EPA EJScreen data	A set of environmental and demographic data that can be used to identify and map areas with potential environmental justice concerns.
Franchise agreement	A negotiated contract between a municipality and a public utility that grants the utility the right to serve customers in the city's jurisdiction. The contract often specifies the period of service and a fee remitted back to the municipality.
Geographic Information Systems (GIS)	Systems that capture, store, analyze, and display spatial or geographic data. GIS can be used to create maps, models, and simulations that show the patterns, relationships, and trends of various phenomena that occur on the Earth’s surface or in the atmosphere.
Grid Electricity	The electricity that is delivered to homes and businesses through a network of transmission and distribution lines. Grid electricity can come from various sources, such as fossil fuels, nuclear, hydro, wind, solar, and other renewable or non-renewable energy sources.
Hard to Electrify Sectors	Those sectors of the economy that are difficult or costly to switch from fossil fuels to electricity as a source of energy. These sectors include heavy industry, aviation, shipping, and long-distance road transport. These sectors account for a significant share of global greenhouse gas emissions and pose a major challenge for achieving climate goals.
Industrials	A term that refers to the sector of the economy that consists of companies that produce or sell goods and services that are used in manufacturing, construction, or resource extraction.
Levelized delivered cost of clean renewable hydrogen	A metric that measures the average cost of producing, storing, and delivering hydrogen from renewable sources over the lifetime of a project.
Mainline valves (MLVs)	Valves that are installed along a pipeline to control the flow of fluids, such as oil, gas, water, or steam.

TERM (from Work Descriptions and Technical Approach)	DEFINITION
Maximum Allowable Operating Pressure (MAOP)	The maximum pressure at which equipment may be operated under.
Mobility	Referring to the mobility sector: land transportation, marine, aviation, heavy trucking, medium to light duty vehicles, etc.
Naturally occurring hydrogen	Also known as white hydrogen, is a form of molecular hydrogen that is found on or in the Earth, as opposed to hydrogen produced in the laboratory or by industrial processes.
Operation expenditures (OPEX)	The costs that a business incurs through its normal business operations.
Original Equipment manufacturers (OEMS)	Companies that produce parts or products that are often used by another company as components to create a final product that is sold to customers
Particulate matter (PM)	Refers to inhalable particles, composed of sulphate, nitrates, ammonia, sodium chloride, black carbon, mineral dust or water. PM can be of different size and is generally defined by their aerodynamic diameter, with PM 2.5 and PM 10 the most commonly regulated.
Piggability	The ability to have In-Line Inspection (ILI) tools including Pipeline Integrity Gauges (PIGs), which are devices that travel inside the pipeline and collect data using various sensors, and enter and exit a pipeline without damage to the pipe. There are different types of ILI tools, such as: Cleaning PIGs, smart PIGs, etc.
Pipe coating	A protective layer that is applied to a pipe to prevent or reduce corrosion, erosion, abrasion, or other damage.
Pipeline corridor	A term that can describe a pathway or an area that contains one or more pipelines that transport fluids or gases, such as water, oil, natural gas, etc.
Power Generation	The process of producing electricity from various sources of energy, such as fossil fuels, nuclear energy, renewable energy, or other alternative energy. Power generation can be classified into two types: centralized and distributed.
Rights of way (ROW)	The legal right, established by usage or grant, to pass along a specific route through grounds or property belonging to another.
Supervisory Control and Data Acquisition (SCADA) system	A type of industrial control system that uses computers, networked data communications, and graphical user interfaces to monitor and control machines and processes.
Syngas	A mixture of hydrogen, carbon monoxide, carbon dioxide, methane, and other gases that can be used to generate heat, electricity, or fuels.
Third-party storage facilities	Storage facilities that are owned and operated by a different entity than the owner of the goods or materials that are stored there.
Turbines	Devices that convert the kinetic energy of a fluid, such as water, steam, air, or gas, into mechanical energy or electrical power. Turbines consist of a rotor with blades that spin when the fluid flows through them, creating a torque that drives a generator or a shaft.
Underground reservoirs	Geologic structures that due to their features can store fluids or gases such as carbon dioxide, gas, oil, or water.
Underground storage technologies	Methods of storing fluids or gases below the surface of the earth. They can have various purposes, such as: geologic sequestration of carbon dioxide, Hydrogen underground storage, Underground storage tank system.

TERM (from Work Descriptions and Technical Approach)	DEFINITION
Wall grade	A term that refers to the quality and durability of a pipeline wall or a pipeline wall covering material. Wall grade can be influenced by various factors, such as the type of material, the thickness, the finish, the installation, and the maintenance.
Wall thickness	The distance between one surface of an object and its opposite surface.

September 26, 2023
9:30 a.m. – 12:00 p.m.

ANGELES LINK

Community Based Organization Stakeholder Group (CBOSG)

Quarterly Group Meeting #3

Warm welcome to our participants!
We will be starting shortly after 9:30 a.m.
to make sure everyone is present in-person and online.

SoCalGas

WELCOME FROM OUR FACILITATORS

ANGELES LINK

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

CHESTER BRITT
Executive Vice President
Arellano Associates
PAG Lead

SoCalGas

HOUSEKEEPING:

This meeting will be recorded (video and audio), and a court reporter will be transcribing the meeting. Please announce yourself before you speak

Zoom microphones are muted by the host to eliminate background noise. You will need to unmute your microphone when called on to speak. *For both in-person and online participants please speak directly into the microphone to ensure everyone can hear*

We encourage you to turn on your cameras so we can better engage with you

Please feel free to use the Zoom chat to provide input and ask questions

If you would like to speak, please use the "Raise Hand" button at the bottom of the Zoom screen

Wireless microphones will be passed to those speakers attending in person

AGENDA: QUARTERLY MEETING #3

- Arrival and Continental Breakfast
- Land Acknowledgement, Safety Message & Roll Call
- SoCalGas Opening Remarks
- Decorum Policy Review
- Glossary of Terms
- DNV Hydrogen Overview Presentation
- BREAK
- Environmental Justice: Community Engagement Plan
  - Breakout Sessions
- Air Emissions 101: SoCalGas & Mitsubishi
- Schedule Review and Next Steps
  - Quick Brainstorm: Future Meeting Locations
- Adjourn and Lunch

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LAND ACKNOWLEDGEMENT, SAFETY MESSAGE & ROLL CALL

SoCalGas

SOCALGAS WELCOME AND OPENING REMARKS

ANGELES LINK

ANDY CARRASCO
Vice President Communication,
Local Government &
Community Affairs

SoCalGas

GLA Greater LA

PODCAST

LISTEN 6 MIN

GREATER LA

‘We're chasing that trophy’: Boyle Heights students on competing in robotics

Written by Amy Ta, produced by Christian Bordal • Sep. 19, 2023 TRANSPORTATION

Members of Los Stemateros stand with their coach, Israel Hernandez (far right).

Photo courtesy of Los Stemateros.

A team of students from Boyle Heights STEM Magnet High School built their own hydrogen-powered remote control racing car. They made it through the preliminary rounds in California, and qualified to compete in Las Vegas over the weekend against teams from over 20 countries. They call themselves Los Stemateros.

SoCalGas

ANGELES LINK

DECORUM POLICY REVIEW

SoCalGas

REVIEW: GLOSSARY OF TERMS

ANGELES LINK

AMY KITSON
Angeles Link Director
Engineering & Technology

KATRINA REGAN
Engineering & Technology
Development Manager

SoCalGas

GLOSSARY OF TERMS: SOME EXAMPLES

Blended hydrogen

Capital Expenditures (CAPEX)

Open Access/Common Carrier Pipelines

Compressor Stations

Design Pressure

Hard to Electrify Sectors

Levelized Cost of Clean Hydrogen

Piggability

HYDROGEN OVERVIEW: DNV

ANGELES LINK

PEDRAM FANAILOO
Low Carbon Segment Leader for North America
DNV

CYNTHIA SPITZENBERGER
Principal Consultant, Hydrogen Center of Excellence
DNV

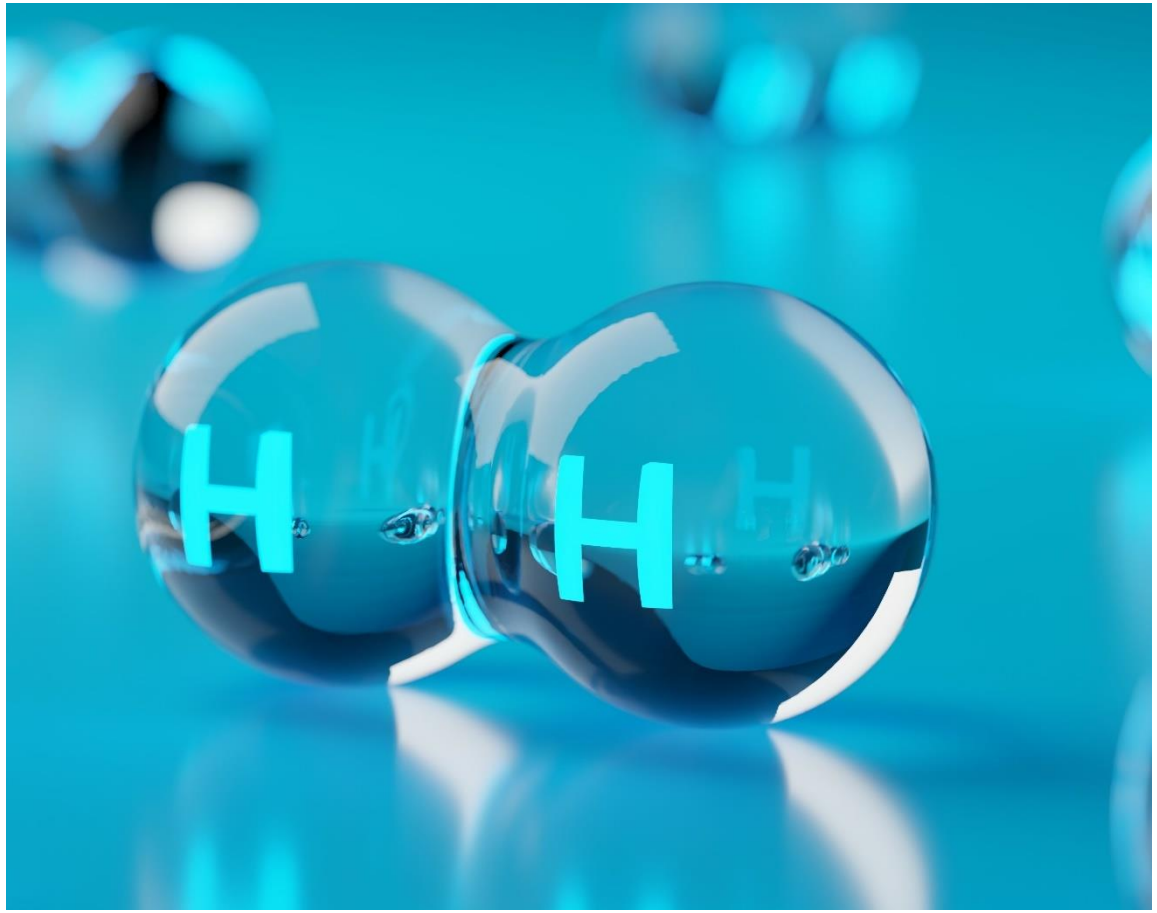
SoCalGas

WHEN TRUST MATTERS

Hydrogen Overview

Tuesday, September 26, 2023

Topics

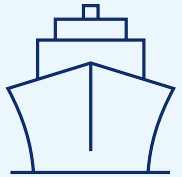


A global assurance and risk management company

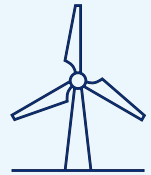
159	~13,000	~100,000	100+	5%+
years	employees	customers	countries	of revenue in R&D

Our purpose: To safeguard life, property, and the environment

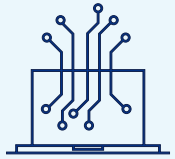
Ship and offshore classification and advisory



Energy advisory, certification, verification, inspection and monitoring



Software, cyber security, platforms and digital solutions



Management system certification, supply chain and product assurance

DNV

We pride ourselves on our uncompromising standards of quality and integrity

90 years of experience

We have more than 90 years of experience in helping customers manage risk and complexity with confidence through our advisory, certification, verification, inspection and digital monitoring services

100 customers & 350 PtX projects

More than 350 Power-to-X (PtX) projects and 100 large power utilities, end users, operators, manufacturers and technology developers trust us as their energy and technical advisors

15 joint industry projects

We are at any time leading and facilitating typically 15 to 30 JIPs and actively participate in research programs

100 industry standards

We own, develop and provide critical input to more than 100 DNV owned industry standards and recommended practices.

65% of pipelines

Our pipeline code from 1976 has achieved global recognition, winning prestigious industry awards and currently 65% of all new projects globally are designed to it.

18 Technology Centres

We operate 8 world leading Technology Centres with 18 individual laboratories across three continents, focusing on materials technology, renewable gas and failure analysis

DNV key publications to guide strategic decisions

Industry Outlook

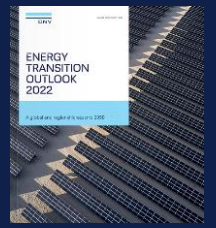
the industry outlook for the year ahead

Technology Outlook

the technology landscape of the next decade

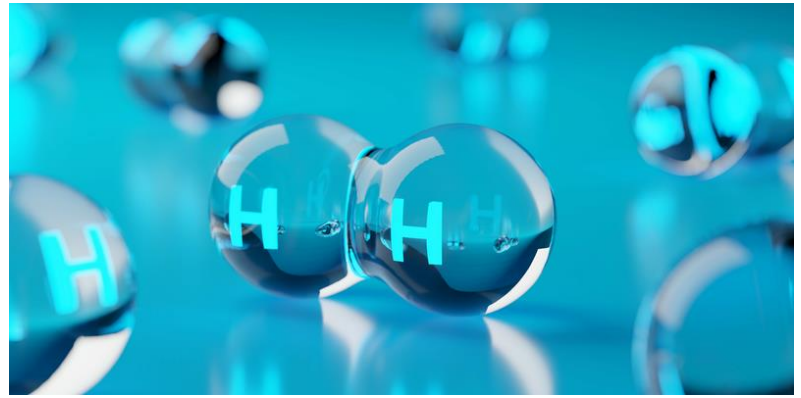
Energy Transition Outlook

independent forecast of energy demand and supply



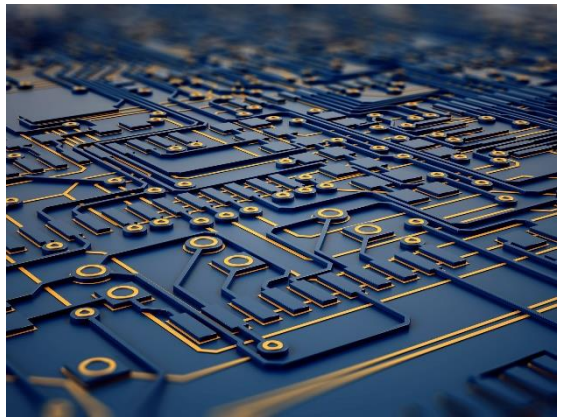
Hydrogen (H_2) Basics

- Colorless, odorless, tasteless, non-toxic, and flammable gaseous substance
- Hydrogen is the most abundant element in the universe
  - Occurs in large quantities as part of water in the oceans and in the atmosphere
  - Occurs as part of numerous carbon compounds, hydrogen is present in all animal and plant forms
  - Main ingredient of the stars
- Note hydrogen can be in both liquid and gas form
  - This presentation mainly discusses hydrogen as a gas



Hydrogen (H_2) Basics

- Currently hydrogen's main use is in industrial applications
  - Refining petroleum, producing chemicals
  - Treating metals, production of stainless steel alloys
  - Pharmaceutical manufacturing
  - Glass manufacturing
  - Electronics, semi-conductor chip manufacture process
- Increasingly used as clean energy carrier
  - Created from water + electricity
  - Energy storage, electricity generation and heating, etc.



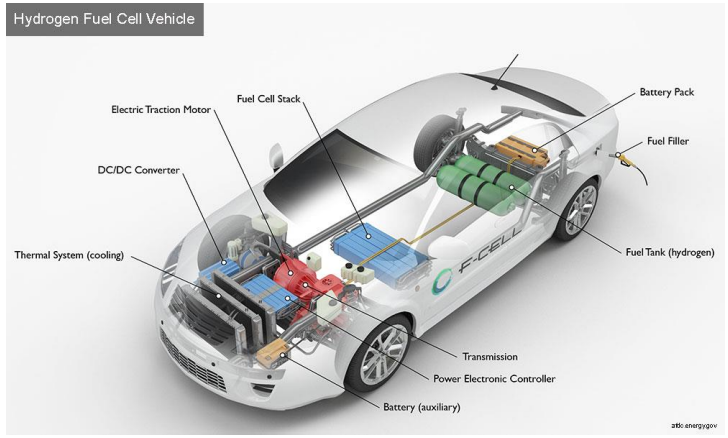
DNV

Misconception: Hydrogen = *Hindenburg*

https://abcnews.go.com/International/photos/hindenburg-flight-80-years-ago-today-37382164/image-37382641

- *Hindenburg* airship disaster occurred in 1937
- Hydrogen used as lifting gas for the airship
  - Helium was not used due to limited supply and less payload capacity
- Many theories about the cause of the disaster; still unknown definitively today
  - Static electricity, Sabotage, Incendiary paint coating
- Points that can be made:
  - Airship was designed for use with helium; hydrogen was applied in an incorrect design / environment
  - The resulting fire was a mix of hydrogen and other burning materials and fuels

Hydrogen vehicles misconceptions



https://afdc.energy.gov/vehicles/how-do-fuel-cell-electric-cars-work

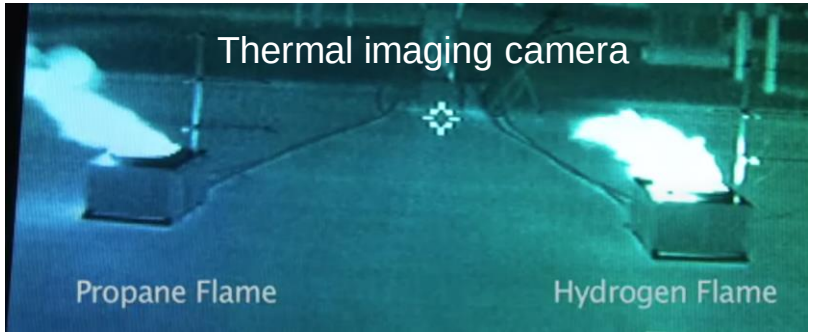
https://h2fcp.org/blog/30th-retail-hydrogen-station-opens-torrance-california

- Fuel cell electric vehicles (FCEVs) use hydrogen + oxygen to generate electricity to power the car
  - Emits only water + warm air
  - More efficient than gasoline internal combustion engine
- Stored as compressed gas in vehicle tanks
  - Leak of hydrogen would vent as gas and quickly disperse in few minutes
  - Leak of gasoline would release over period of time and may pool under vehicle

Comparison with other flammable fuels

HYDROGEN	NATURAL GAS	GASOLINE
Fuel/Flammable Gas	Fuel/Flammable Gas	Fuel/Flammable Gas
Colorless	Colorless	Greenish or slightly bluish in color
Non-toxic	Non-toxic	Toxic
Asphyxiant (at high concentration causes displacement of oxygen)	Asphyxiant	Vapor may cause asphyxiation in enclosed, poorly ventilated, or low-lying areas
New method to odorize	Odorized	Odorized
Non-corrosive, can cause embrittlement	May be corrosive	At some conditions (products of oxidization)
Almost invisible bluish flame with low radiant energy	Blue flame with high radiant energy	Yellow/Orange flame with high radiant energy

Similarities | Differences



ImageWorks, Department of Energy (DOE), Hydrogen Safety: Hydrogen Flame Prop Demonstration
https://www.youtube.com/watch?v=r-8H5u4YzuY

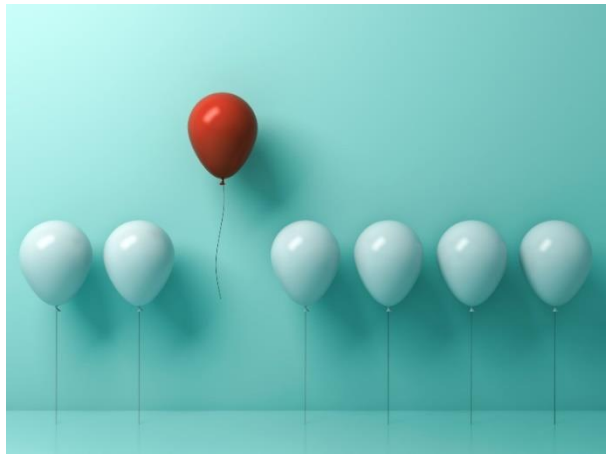
Comparison with other flammable fuels

Buoyancy
(relative to air)

Hydrogen – 14x lighter

Natural gas – 2x lighter

Gasoline – vapor is 3.75x heavier



Diffusivity in air
(at normal Normal Temperature and Pressure, 20°C (68°F) and 1 atm)

Hydrogen – 3.8x more than Natural gas

Flammable with wider range of concentrations in air than natural gas

→ Limit the potential for hydrogen to accumulate and collect in enclosed areas

Energy require to ignite hydrogen-air mixture is less than for natural gas

→ Stricter equipment design and ignition controls to minimize potential for sparks and ignition

Fire Triangle

Fire is a chemical reaction. It is an oxidation process that happens very fast so that light, heat and sound are released. The fire triangle identifies the three essential components.

Oxygen source. Normal air contains 21% oxygen. Fuel may also contain oxygen.

Heat source to make fuel burn, cause ignition. Examples: Hot surface, sparks, friction, electrical energy, etc.

Fuel

Something that will burn
Can be solid (coal, wood), liquid (gasoline, alcohol), or gas (natural gas, hydrogen)

Hydrogen Regulations and Standards

NFPA
NATIONAL FIRE PROTECTION ASSOCIATION
The leading information and knowledge resource on fire, electrical and related hazards

CGA
Compressed Gas Association
The Standard For Safety Since 1913

ISO

CENTER FOR Hydrogen SAFETY
Connecting a Global Community

OSHA
Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov

U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

API
American Petroleum Institute

ASME
SETTING THE STANDARD

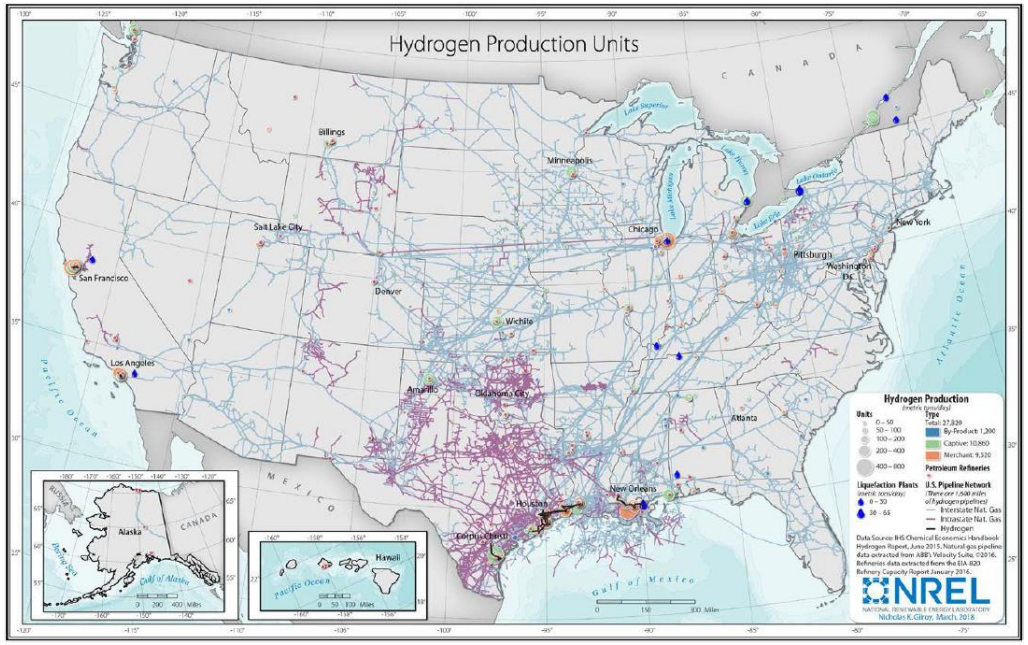
And many more international regulatory and industry groups

Short list of key standards included as appendix

DNV

Pipeline Management

- The U.S. Department of Transportation (DOT) has regulated hydrogen pipelines since 1970
  - 49 CFR Part 192, Transportation Of Natural And Other Gas By Pipeline: Minimum Federal Safety Standards
  - Gas pipeline integrity management requirements were added in 2003
- Over 1,600 miles of hydrogen pipelines operating in US
  - ~700 miles of hydrogen pipelines are currently under PHMSA regulatory jurisdiction
- PHMSA's research and development (R&D) focus is mainly on addressing hydrogen effects on steel pipelines



NREL, Regional Supply of Hydrogen, 2018, https://www.nrel.gov/docs/fy19osti/71566.pdf

- PHMSA is participating with the DOT, Research and Innovation Technology Administration (RITA), the U.S. Department of Energy (DOE), U.S. Department of Commerce (DOC), National Institute of Standards and Technology (NIST) and others towards establishing a National Hydrogen Energy Roadmap

Key Messages

- Hydrogen is a fundamental element, present in water and in all living things
- Hydrogen is in use today in many different industries
- Similar to other flammable fuels, it requires hazard management and best safety practices
- Hazards can be effectively prevented or mitigated through adequate design, operation and response actions
- Hydrogen may be new to many, but past experience and best practices can be used for guidance in the transition to a clean energy future

Thank you

Cynthia Spitzenberger
Principal Consultant, Low Carbon, DNV Energy USA, Inc.
cynthia.spitzenberger@dnv.com

www.dnv.com

ANGELES LINK

BREAK

SoCalGas

ENVIRONMENTAL JUSTICE COMMUNITY ENGAGEMENT PLAN

ANGELES LINK

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

EMILY GRANT
Angeles Link
Sr. Public Affairs Manager
SoCalGas

SoCalGas

ENVIRONMENTAL JUSTICE COMMUNITY ENGAGEMENT PLAN

Currently, SoCalGas is in Phase One, but SoCalGas proposes to prepare an Environmental Justice Engagement Plan with input from Community-Based Organizations (CBOs) and Planned Advisory Groups (PAGs) that would be implemented in a future phase of the project.

Phase One

What work falls within Phase One?*

- ❑ Develop initial EJ Engagement Plan
- ❑ Review with PAG/CBOSG members
- ❑ Conduct 16 feasibility studies

Phase Two

What is the plan for Phase Two?

- ❑ If approved for Phase Two, execute EJ Community Engagement Plan

*Ordering Paragraph 3 (f) prohibits SoCalGas from recording any public outreach costs in Phase One.

SoCalGas

ENVIRONMENTAL JUSTICE COMMUNITY ENGAGEMENT PLAN

Topic 1: Goals and Objectives

Topic 2: Disadvantaged Communities Most Burdened and Vulnerable

Topic 3: Native American Tribes, Tribal Groups, and Individuals

Topic 4: Others Who May be Affected by or Have an Interest in the Project Based on Solicited Feedback

Topic 5: Meetings

Topic 6: Topics and Subject Matter Experts

Topic 7: Project Communication Challenges and Contingency Planning

SoCalGas™

ANGELES LINK

BREAKOUT SESSIONS: EJ COMMUNITY ENGAGEMENT PLAN

- To create an enriching discussion, we will breakout into groups of 3-4 members
- In-person and online members will be able to participate
- There will be one scribe per group
- Be concise and focus on discussion topics
- Feel free to utilize the post-it notes throughout the meeting to provide additional feedback on any topic
- Additional feedback on the Community Engagement Plan can be received until Friday, 10/13

SoCalGas

ANGELES LINK

GROUP REPORT OUT:
EJ COMMUNITY ENGAGEMENT PLAN

- A representative from each group will share the discussions and outcomes from their breakout session
- In-person and online members will be able to participate
- Be concise and focus on discussion topics
- Feel free to utilize the post-it notes throughout the meeting to provide additional feedback on any topic
- Additional feedback on the Community Engagement Plan can be received until Friday, 10/13

SoCalGas

AIR EMISSIONS 101: INTRODUCTION

ANGELES LINK

DARRELL JOHNSON
SoCalGas Manager
Environmental Services

SoCalGas

AIR EMISSIONS 101

Why are We Studying NOx?

What is NOx?

1. **NOx = Nitric Oxide (NO) + Nitrogen Dioxide (NO_2)**

2. The air in Earth's atmosphere is made up of approximately **78 percent nitrogen (N_2)** and **21 percent oxygen (0_2)**

3. Thermal NOx is formed by oxidation of nitrogen in air and requires sufficient temperature and time to produce NOx

4. NOx is emitted from various sources when fuel is combusted at high temperatures, including industrial, commercial and residential combustion units, motor vehicles and electric utilities

5. NOx is a criteria air pollutant, and is known to contribute to the formation of smog and acid rain as well as affecting trospheric ozone

6. Federal and state control measures, including federal emissions standards for motor vehicles, regulations for electric utilities and programs to reduce regional transport of NOx have resulted in significant reductions of NOx in the past 30 years

SoCalGas

AIR EMISSIONS 101

Hydrogen Combustion and NOx

1

As a carbon-free fuel, hydrogen has the desirable property that its combustion releases no CO2, which is a powerful greenhouse gas

2

However, H2 combustion does generate NOx since, as noted above, NOx is formed when air is heated to high temperatures as part of the fuel combustion process

3

Hydrogen burns with a very hot flame and the temperatures generated in that flame.

4

Mitigation measures (which is part of our Phase One studies) such as equipment design and controls technology reduce NOx emissions from H2 combustion to within regulatory limits as it has other fuels.

AIR EMISSIONS 101: GUEST SPEAKER

ANGELES LINK

PETER SAWICKI
Regional Vice President, West
Mitsubishi Power Americas, Inc.

SoCalGas

SOCALGAS: UPDATED SCHEDULE & APPROACH TO PHASE 1 STUDY FEEDBACK

ANGELES LINK

JILL TRACY
Angeles Link
Senior Director
Regulatory & Policy

SoCalGas

Schedule and Approach to Angeles Link Phase One Study Stakeholder Feedback (Original Version)

	2023							2024					
PHASE 1	JUN	JUL	AUG	SEP (Today)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Phase 1 **Study Descriptions**	✓ Q2 PAG/CBO Quarterly Meetings to Discuss Purpose and Need, Alternatives Study/Feedback ✓ Distribute Remaining Study Descriptions to Stakeholders ✓ Mid-July – Virtual feedback gathering sessions ✓ End of July – PAG/CBO Final feedback due												
Phase 1 **Study Technical Approach**			✓ Distribute Phase 1 Technical Approach Summaries to Stakeholders ✓ Q3 PAG/CBO Quarterly Meetings to Discuss Technical Approach Summaries ✓ Additional Technical Approach Stakeholder Feedback Gathering Sessions ✓ PAG/CBO Final Feedback to Technical Approach Summaries Due										
Phase 1 **Data and Preliminary Findings**						✓ Distribute Phase 1 Preliminary Findings/Data received to Stakeholders ✓ Q4 PAG/CBO Meetings to Discuss Preliminary Findings/Data/Feedback ✓ Additional Preliminary Findings/Data Stakeholder Gathering Sessions Feedback Gathering Session* ✓ PAG/CBO Final Feedback Due						
Phase 1 **Study Draft Reports**										✓ Distribute Phase 1 Study Draft Reports ✓ Q1 PAG/CBO Meetings ✓ Virtual Feedback Gathering Session ✓ PAG/CBO Final Feedback Due			
Phase 1 **Study Final Reports**											✓ Issue Final Reports		

*allows 2 additional weeks due to holidays

Preliminary Schedule and Approach to Angeles Link Phase One Study Stakeholder Feedback (September 29, 2023)*

PHASE 1	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
	202 Today							2024							
Phase 1 **Study Descriptions**	✓ Q2 PAG/CBO Quarterly Meetings to Discuss Purpose and Need, Alternatives Study/Feedback														
	✓ Distribute Remaining Study Descriptions to Stakeholders														
		✓ Mid-July – Virtual feedback gathering sessions													
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Phase 1 **Study Technical Approach**				✓ Distribute Phase 1 Technical Approach Summaries to Stakeholders											
					✓ Q3 PAG/CBO Quarterly Meetings to Discuss Technical Approach Summaries										
						✓ Additional Technical Approach Stakeholder Feedback Gathering Sessions									
							✓ PAG/CBO Final Feedback to Technical Approach Summaries Due								
Phase 1 **Data and Preliminary Findings**							✓ Distribute Phase 1 **Preliminary Findings**/Data received to Stakeholders								
								✓ Q4 Quarterly PAG/CBO Meetings to Discuss Preliminary Findings / Data / Feedback*							
									✓ Additional Preliminary Findings/Data Stakeholder Gathering Sessions Feedback Gathering Session						
										✓ PAG/CBO Final Feedback Due					
Phase 1 **Study Draft Reports**										✓ Distribute Phase 1 Study **Draft Reports**					
											✓ Q1 PAG/CBO Meetings				
												✓ Virtual Feedback Gathering Session			
													✓ PAG/CBO Final Feedback Due		
Phase 1 **Study Final Reports**														Issue **Final Reports** ✓	

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**Status of individual studies may vary and therefore the above deliverables may deviate from this preliminary schedule*

ANGELES LINK

MEMBER DISCUSSION: UPCOMING MEETINGS

- SAVE-THE-DATE: OCTOBER WORKSHOPS
  - THURSDAY, OCTOBER 19 AT THE ENERGY RESOURCE CENTER in DOWNEY • December meeting location TBD
  - Hybrid option will be available
  - The studies reviewed during the October workshop will be open for feedback until Thursday, November 2
- Comments on the remaining Technical Approach Summaries are still due on Friday, October 13 to ALP1_Study_CBO_Feedback@insigniaenv.com
- Today's presentation and meeting recording will be available soon on the living library

SoCalGas

Thank you for your participation!

Please join us for lunch

APPENDIX 4 – AG MEETING MATERIALS

July 18, 2023
9a.m. - 2:30 p.m.

ANGELES LINK

Planning Advisory Group (PAG)

Workshop #1

Warm welcome to our participants!
We will be starting shortly after 9:00 a.m. to make sure everyone is present in-person and online.

SoCalGas

WELCOME FROM OUR FACILITATORS

ANGELES LINK

CHESTER BRITT
Executive Vice President
Arellano Associates
PAG Lead

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

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INTRODUCTIONS

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HOUSEKEEPING:

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AGENDA: PHASE ONE STUDY FEEDBACK

- Arrival and Continental Breakfast: 8:30-9:00am
- SoCalGas Safety Message, Welcome and Agenda Review: 9:00-9:15am
- Plan for Applicable Safety Requirements: 9:15-9:25am
  - Member Discussion: 9:25-9:55am
- Workforce Planning & TrainingEvaluation: 9:55-10:05am
  - Member Discussion: 10:05-10:35am
- Preliminary Routing/Configuration Analysis: 10:35-10:45am
  - Member Discussion: 10:45-11:15am
- Demand Study: 11:15 –11:25am
  - Member Discussion:11:25-11:55am
- Lunch/On-Site Tour - [H2] Innovation Experience: 11:55-12:55pm
- Production Planning & Assessment: 12:55-1:05pm
  - Member Discussion: 1:05-1:35pm
- Break: 1:35-1:45pm
- High-Level Economic Analysis & Cost Effectiveness: 1:45-1:55pm
  - Member Discussion: 1:55-2:25pm
- Debrief/Wrap-Up and Thank You: 2:25-2:30

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SOCALGAS SAFETY MESSAGE

ANGELES LINK

EDITH MORENO
Regulatory Strategy & Policy Manager

SoCalGas

SOCALGAS WELCOME AND OPENING REMARKS

ANGELES LINK

NEIL NAVIN
Chief Clean Fuels Officer
SoCalGas

SoCalGas

PLAN FOR APPLICABLE SAFETY REQUIREMENTS SCOPE DISCUSSION

ANGELES LINK

AMY KITSON
Angeles Link Director
Engineering & Technology

KATRINA REGAN
Engineering & Technology
Development Manager

SoCalGas

PLAN FOR APPLICABLE SAFETY REQUIREMENTS SCOPE DISCUSSION

SoCalGas seeks to evaluate safety considerations and develop plans for applicable safety requirements for Angeles Link, which will consist of a safety assessment with the following features:

1. **Safety Considerations**
2. **Specifications, Standards, and Protocols**
3. **Employee, Contractor, System, and Public Safety**

PLAN FOR APPLICABLE SAFETY REQUIREMENTS SCOPE DISCUSSION

Description of Work

- Hydrogen Public Awareness Plans
- Hydrogen safety training and operator qualifications
- Key safety risks & potential mitigations
- Key safety codes
- Physical & chemical properties of hydrogen
- Leak Detection: specifications, standards & protocols
- Operations & maintenance considerations

ANGELES LINK

MEMBER DISCUSSION: PLAN FOR APPLICABLE SAFETY REQUIREMENTS

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

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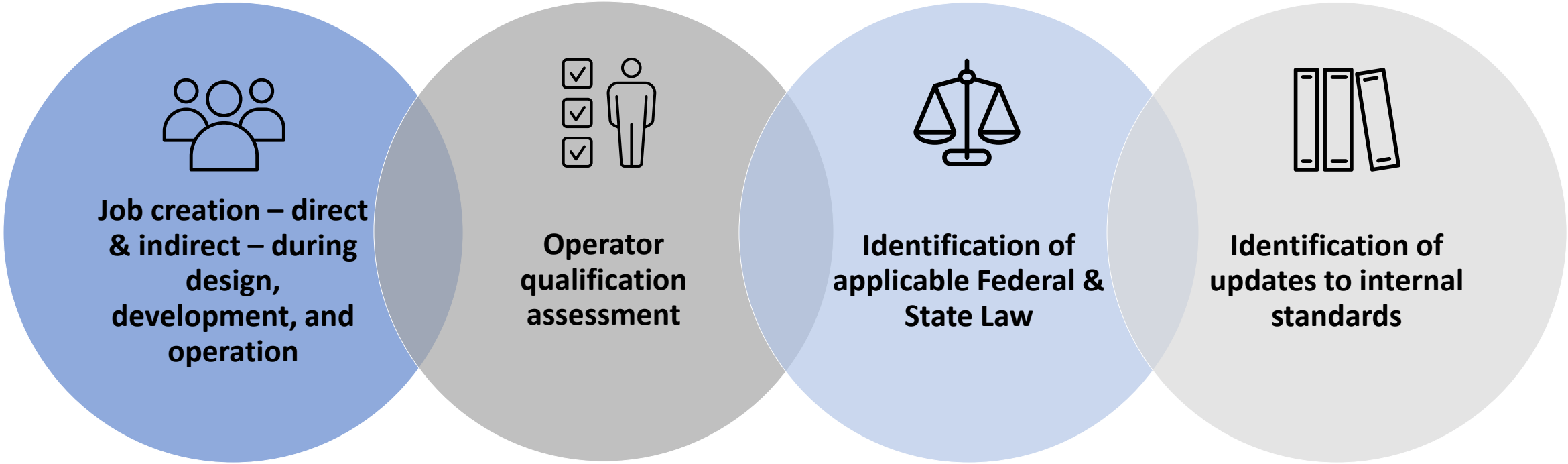
WORKFORCE PLANNING & TRAINING EVALUATION SCOPE DISCUSSION

Assessment & strategic evaluation of current workforce & internal training standards compared to future workforce classification & training needed to build, transfer, and transition workforce to maintain & operate the proposed Angeles Link clean renewable hydrogen transportation infrastructure system.



WORKFORCE PLANNING & TRAINING EVALUATION INTRODUCTION

Description of Work

- Operations & Maintenance Protocols
- DOT and Other Construction Qualifications/Protocols
- Changes to Existing Processes
- Changes to Technology & Implementation
- Workforce Staging Timeline
- Comparison to Existing Company Facilities
- DOT & Other Construction Qualifications
- Risk / Mitigation Assessment

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MEMBER DISCUSSION: WORKFORCE PLANNING & TRAINING

- Please announce your name and speak directly into the microphone
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PRELIMINARY ROUTING/CONFIGURATION ANALYSIS SCOPE DISCUSSION

High-level construction staging for implementation, initial evaluation of localized hydrogen hub and an initial evaluation of hydrogen storage technology both above and underground for Angeles Link will all factor into this study. The following areas will be considered in this study:

Pipeline routing & constructability factors

Potential production & storage locations

Potential locations of demand

PRELIMINARY ROUTING/CONFIGURATION ANALYSIS

Description of Work

Constructability

- Workspace
- Crossing Methods
- Open-Cut Trench
- Trenchless Installation
- Construction Methods
- Valves

Evaluation Criteria

- Engineering
- Social
- Environmental

Route Selection

- Weighted Value
- Scoring
- Ranking

ANGELES LINK

MEMBER DISCUSSION: PRELIMINARY ROUTING/CONFIGURATION ANALYSIS

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DEMAND STUDY SCOPE DISCUSSION

ANGELES LINK

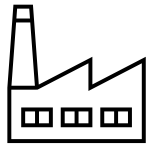
YURI FREEDMAN
Senior Director
Business Development

SoCalGas

DEMAND STUDY OVERVIEW AND INTRODUCTION

SoCalGas to identify:

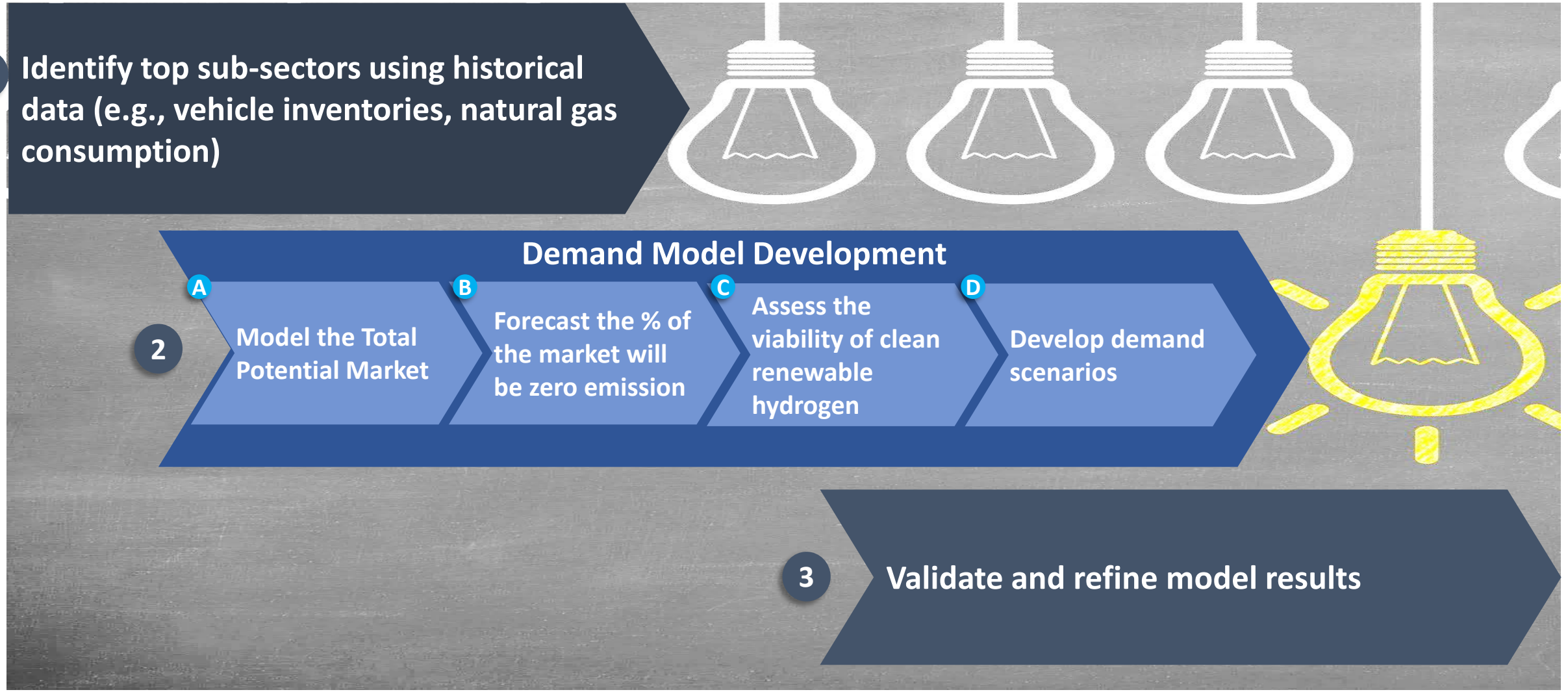
Hydrogen demand, end uses, and end-users by 2045 (including current natural gas customers and future customers) of the Project.



This study is evaluating potential clean renewable hydrogen demand and assess adoption with a priority on the Mobility, Power Generation, and Industrial sectors.

DEMAND STUDY DESCRIPTION

Technical Approach



DEMAND STUDY DESCRIPTION

Market Validation

The demand assumptions will be validated through interviews with potential end users and key industry and subject matter advisors.

Industry

Various sector participants coming from Mobility, Power Generation, and Industrial Companies

Research & Academia

Potential subject matter advisors:

University of California

National Laboratories

Public Agencies & Consortiums

Potential advisors/references:

PAG/CBOSG (including CPUC) feedback, California Air Resources Board, California Energy Commission, South Coast Air Quality Management District, CA Hydrogen Fuel Cell Partnership (H2FCP)

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MEMBER DISCUSSION: DEMAND STUDY

- Please announce your name and speak directly into the microphone
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Lunch/Optional On-Site Tour - [H2] Innovation Experience

PRODUCTION PLANNING & ASSESSMENT SCOPE DISCUSSION

Overview

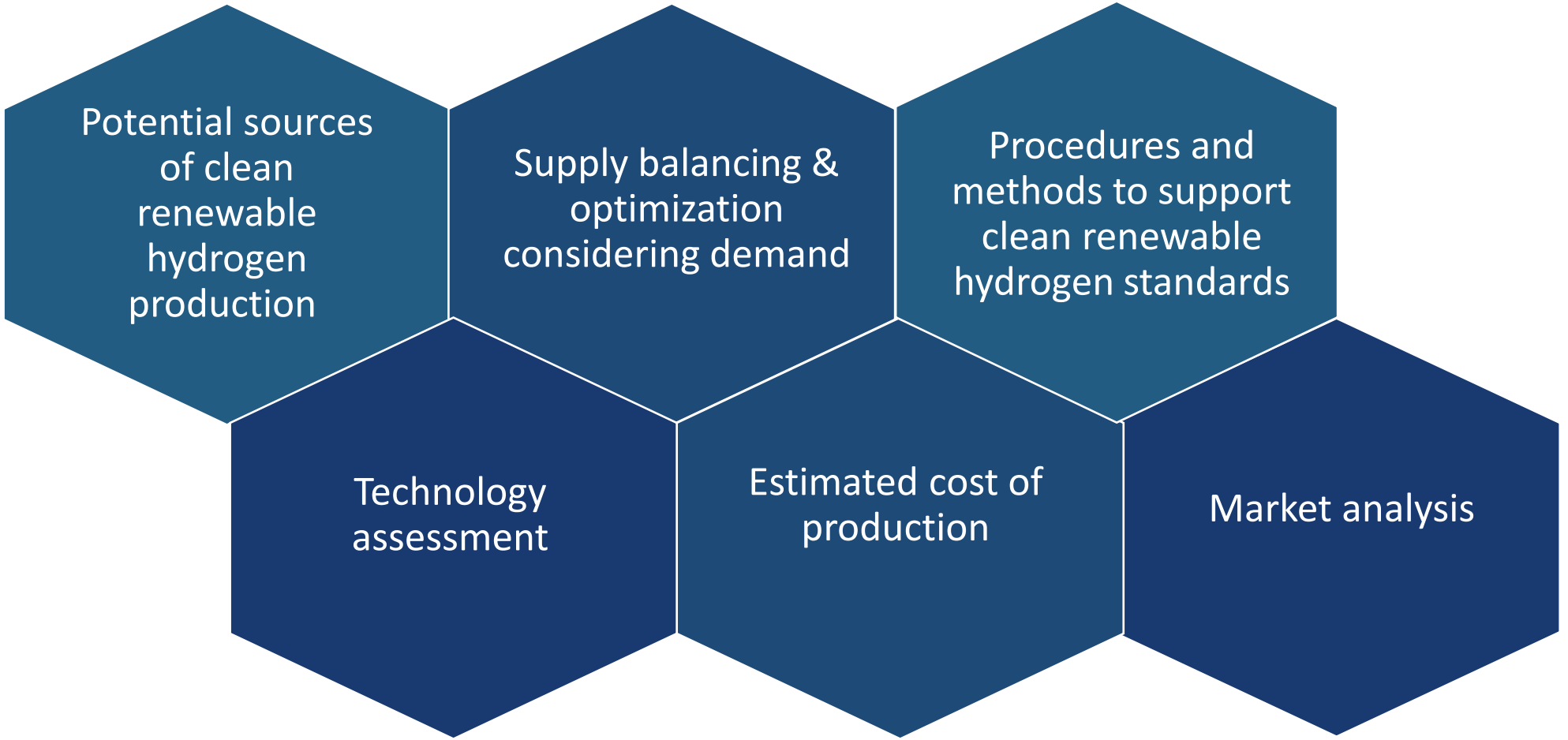
- SoCalGas to identify:

The potential sources of hydrogen generation for the Project

Plans to ensure the quality of the hydrogen gas meets the clean renewable hydrogen standards set in the Decision

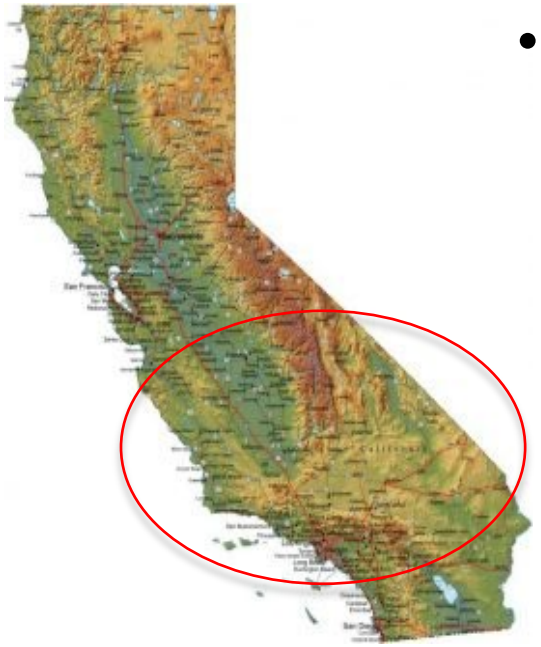
PRODUCTION PLANNING & ASSESSMENT INTRODUCTION

This Production Planning & Assessment will cover various topics, including:



PRODUCTION PLANNING & ASSESSMENT DESCRIPTION

- Identify eligible renewable resources and hydrogen generation technologies



- Assess how much hydrogen can be produced, focusing on SoCalGas's service territory

- Perform a market analysis to understand what businesses are doing or may do in the future

- Discuss ways hydrogen production will meet the Final Decision's hydrogen production standard

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MEMBER DISCUSSION: PRODUCTION PLANNING & ASSESSMENT DESCRIPTION

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BREAK

SoCalGas

HIGH-LEVEL ECONOMIC ANALYSIS & COST EFFECTIVENESS DESCRIPTION

Analysis output: A levelized delivered cost comparison of hydrogen pipeline systems compared to decarbonization alternatives and other methods of delivery.

Levelized Cost of Hydrogen (LCOH)

Determine a cost-effectiveness methodology

Use CAPEX and OPEX to calculate pipeline system LCOH

Decarbonization Alternatives

Potential examples:

Electrification

Energy Efficiency

Renewable Natural Gas (RNG)

Carbon Management

Non-pipeline Hydrogen Delivery

Potential examples:

Trucking

Train

Marine

Hybrid (trucking/train)

In-basin hydrogen production

ANGELES LINK

MEMBER DISCUSSION: HIGH LEVEL ECONOMIC ANALYSIS & COST EFFECTIVENESS

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ANGELES LINK

DEBRIEF / WRAP-UP

SoCalGas

Thank you for your participation!

Please drive safely.

SoCalGas

July 20, 2023
9a.m. - 2:20 p.m.

ANGELES LINK

Planning Advisory Group (PAG)
Workshop #2

Warm welcome to our participants!
We will be starting shortly after 9:00 a.m. to make sure everyone is present in-person and online.

SoCalGas

WELCOME FROM OUR FACILITATORS

ANGELES LINK

CHESTER BRITT
Executive Vice President
Arellano Associates
PAG Lead

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

SoCalGas

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AGENDA: PHASE ONE STUDY DESCRIPTION FEEDBACK

- Arrival and Continental Breakfast: 8:30-9:00am
- SoCalGas Safety Message, Welcome and Agenda Review: 9:00-9:15am
- Environmental & Social Justice Analysis: 9:15-9:25am
  - Member Discussion: 9:25-9:55am
- Break 9:55-10:10am
- Hydrogen Leakage Assessment: 10:10-10:20am
  - Member Discussion: 10:20-10:50am
- Greenhouse Gas Emissions Evaluation : 10:50-11:00am
  - Member Discussion: 11:00-11:30am
- Lunch: 11:30-12:00pm
- Nitrogen Oxides (NOx) Emission Assessment: 12:00-12:10pm
  - Member Discussion: 12:10-12:40pm
- Stakeholder Feedback Tracking: 12:40 – 12:50pm
  - Member Discussion: 12:50-1:20pm
- Break: 1:20-1:35pm
- Water Resources Evaluation: 1:35-1:45pm
  - Member Discussion: 1:45-2:15pm
- Debrief/Wrap-Up and Thank You: 2:15-2:20pm

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SOCALGAS SAFETY MESSAGE

ANGELES LINK

SONIA RODRIGUEZ
Safety & Health Manager

SoCalGas

LISTEN TO YOUR BODY

- Listening to your body is a crucial step in identifying and treating illnesses.
- <u>3 Steps:</u>
    1. Pay attention and don't ignore symptoms:
        - Losing or gaining weight too quickly
        - Excessively tired
        - Excessively hungry or excessively thirsty or using the restroom frequently at night
        - Hands, feet, ankles or arms swell, experiencing headaches
        - Your face feels a little different and your smile is slightly crooked
        - Swelling of ankles, coughing, wheezing, shortness of breath
        - Other signs
    2. STOP, don’t brush it off
    3. Don’t wait, get checked

LISTEN TO YOUR BODY

- Stress
  - Good vs. Bad
  - Recognizing the symptoms
  - How your body deals with stress
  - Ways to cope
    - Exercising
    - Spending time with loved once
    - Talking to someone
    - Taking your vacation time

SOCALGAS WELCOME AND OPENING REMARKS

ANGELES LINK

JILL TRACY
Angeles Link
Senior Director
Regulatory & Policy

SoCalGas

ENVIRONMENTAL & SOCIAL JUSTICE: SCOPE DISCUSSION

ANGELES LINK

SEBASTIAN GARZA
SoCalGas Angeles Link
Project Manager

ALISA LYKENS
Insignia
Director

SoCalGas

ENVIRONMENTAL ANALYSIS: SCOPE

Desktop Environmental Analysis will address:

- ❑ Potential pipeline routes and associated facilities (e.g., compressor stations)
- ❑ Third-party production facilities
- ❑ Potential third-party storage facilities

Desktop Environmental Analysis involves:

- ❑ Collection of publicly available and confidential datasets (such as landownership, conservation area, vegetation communities, species data, wetlands and waters, known hazard sites, soils and geology, etc.)
- ❑ Use of GIS and aerial photography to determine where potential project components intersect sensitive resources
- ❑ Making an initial determination of whether impacts can be avoided or mitigated

Objective: Demonstrate compliance with environmental law and public policies and baseline existing environmental conditions

ENVIRONMENTAL ANALYSIS: CRITERIA

- ❑ Aesthetics
- ❑ Agriculture and forestry resources
- ❑ Biological resources
- ❑ Cultural and tribal resources
- ❑ Energy
- ❑ Geology and soils
- ❑ Hazardous materials
- ❑ Hydrology and water quality
- ❑ Land use and planning
- ❑ Noise
- ❑ Transportation

ENVIRONMENTAL & SOCIAL JUSTICE ANALYSIS: SCOPE

Identify Disadvantaged Communities

- **CalEnviroScreen Tool (State)**
- **Climate Economic Justice Screening Tool (Federal)**
- *Justice40 Initiative*

Identify "Hot Spots"

- **"Hot Spot" communities, or disadvantaged communities of concern based on threshold comparisons in data collected will be identified**

Conduct EJ Assessment

- **High-level analysis of Project's potential impact on communities of concern**
- **Evaluate mitigation measures to eliminate or reduce impacts**
- **Solicit feedback from CBO/PAG stakeholders**

Objective: Identify Potential Impacts to Disadvantaged Communities and Other Environmental Justice Concerns

ANGELES LINK

MEMBER DISCUSSION: ENVIRONMENTAL & SOCIAL JUSTICE ANALYSIS

- Please announce your name and speak directly into the microphone
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ANGELES LINK

BREAK (15 MINUTES)

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HYDROGEN LEAKAGE, GREENHOUSE GAS AND NO_X ASSESSMENTS: SCOPE DISCUSSION

ANGELES LINK

DARRELL JOHNSON
SoCalGas Manager
Environmental Services

SoCalGas

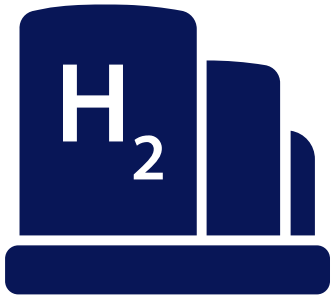
HYDROGEN LEAKAGE ASSESSMENT: SCOPE

Objectives:

- Assess the potential for hydrogen leakage associated with production, storage, and transportation of clean renewable hydrogen
- Identification and evaluation of potential mitigation measures

Study Approach:

- Estimate potential for leakage associated with the anticipated sources
- Identify potential leakage mitigation measures
- Use available technical information including from parallel Phase One studies
- Develop estimates making assumptions, as needed, based on availability of related and documented data



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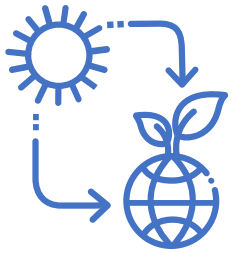
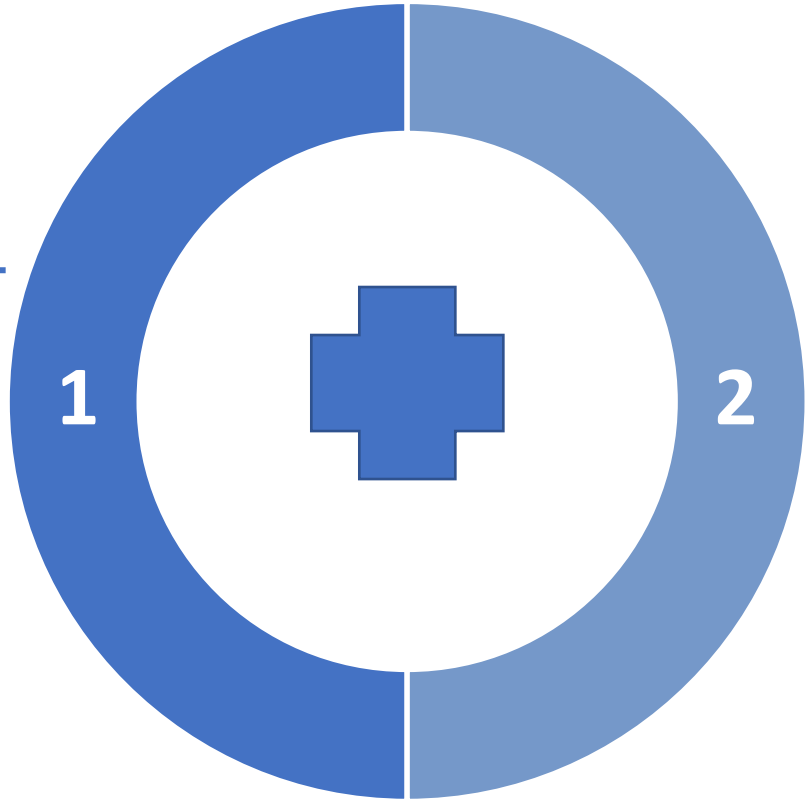
HYDROGEN LEAKAGE ASSESSMENT: TECHNICAL APPROACH



Identify Source Types

- Hydrogen production/ transportation/storage: electrolyzers, pipeline venting, compressor venting, compressor rod packing, fugitive components (i.e., valves, flanges, connections, etc.), above ground tanks, and underground reservoirs



Identify Mitigation Measures

- Potential mitigation measures for existing and emerging/new equipment
- Top-down evaluation to prioritize and rank the measures identified

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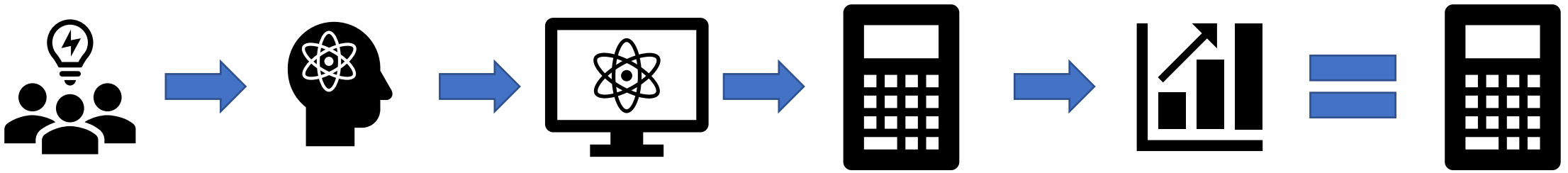
HYDROGEN LEAKAGE ASSESSMENT: TECHNICAL APPROACH (CONT.)

For each source type and mitigation measure:



Identify Potential Calculation Approaches

Determine Best Calculation Approach

Determine Calculation Method for Selected Approach

Prepare Calculations at Unit Level

Apply Scaling Factor

Calculate Estimated Impacts

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ANGELES LINK

MEMBER DISCUSSION: HYDROGEN LEAKAGE ASSESSMENT

- Please announce your name and speak directly into the microphone
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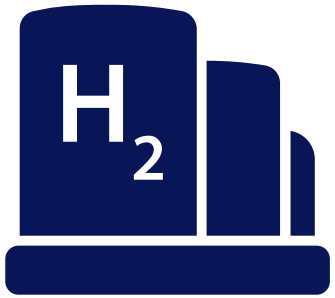
GREENHOUSE GAS EMISSIONS (GHG) EVALUATION: SCOPE

Objective:

- Assess the potential for both GHG emissions increases and reductions resulting from the Project, and
- Identify potential GHG emissions mitigation measures to reduce potential GHG emissions

Study Approach:

- Estimate GHG emissions associated with the anticipated emission sources
- Identify potential GHG emissions mitigation measures
- Compile available technical information including from parallel Phase One studies, regulatory and transportation agencies, etc.
- Develop estimates making assumptions, as needed, based on availability of related and documented data



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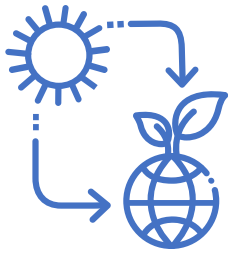
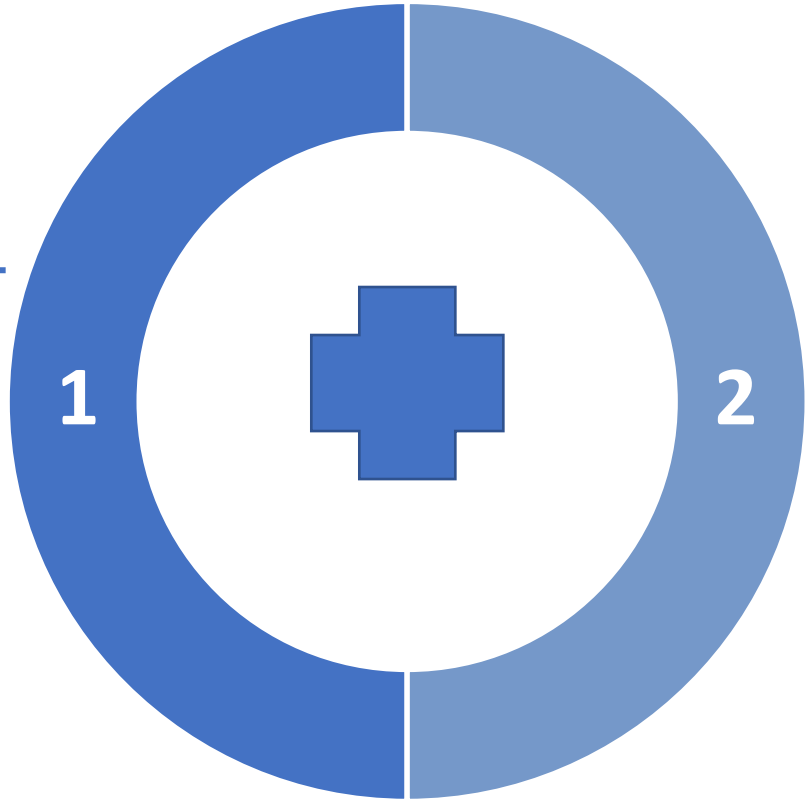
GREENHOUSE GAS EMISSIONS EVALUATION: TECHNICAL APPROACH



Identify Emission Source Types

- Hard to electrify industrial sectors of end users
- Mobility (focused on heavy-duty trucks)
- Power generation (initial focus on existing power plants)
- Storage and transportation of hydrogen



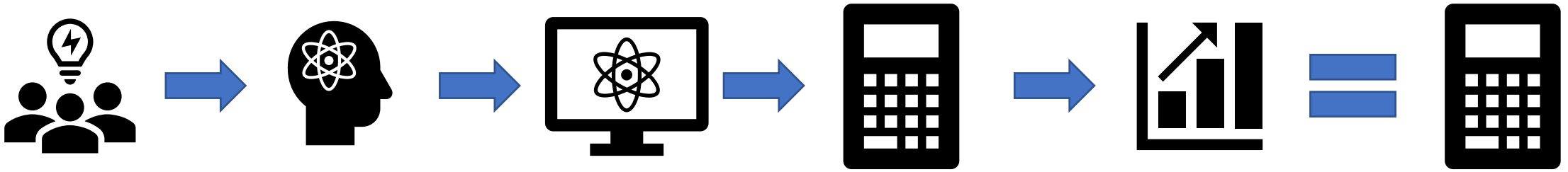
Identify Emission Mitigation Measures

- Potential GHG emission mitigation measures for existing and emerging/new equipment
- Top-down evaluation to prioritize and rank the measures identified for each source type

SoCalGas

GREENHOUSE GAS EMISSIONS: TECHNICAL APPROACH (CONT.)

For each emission source type and each mitigation measure:



Identify Potential Calculation Approaches

Determine Best Calculation Approach

Determine Calculation Method for Selected Approach

Prepare Calculations at Unit Level

Apply Scaling Factor

Calculate Estimated GHG Emissions

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ANGELES LINK

MEMBER DISCUSSION: GREENHOUSE GAS EMISSIONS EVALUATION

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

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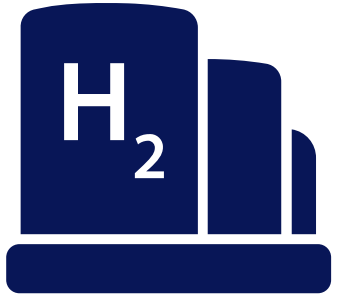
NO_x EMISSIONS ASSESSMENT: SCOPE

Objective:

- Assess the potential for both NO_x emissions increases and reductions resulting from the Project and identify potential NO_x mitigation measures to reduce potential NO_x emissions
- NO_x will be the primary focus and the study will also include a high-level review of other potential emissions

Study Approach:

- Estimate NO_x associated with the anticipated emission sources
- Identify potential NO_x mitigation measures
- Compile available technical information including from parallel Phase One studies, regulatory and transportation agencies, etc.
- Develop estimates making assumptions, as needed, based on availability of related and documented data



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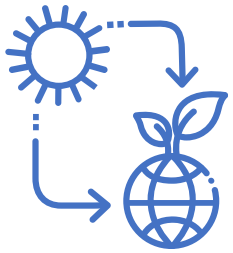
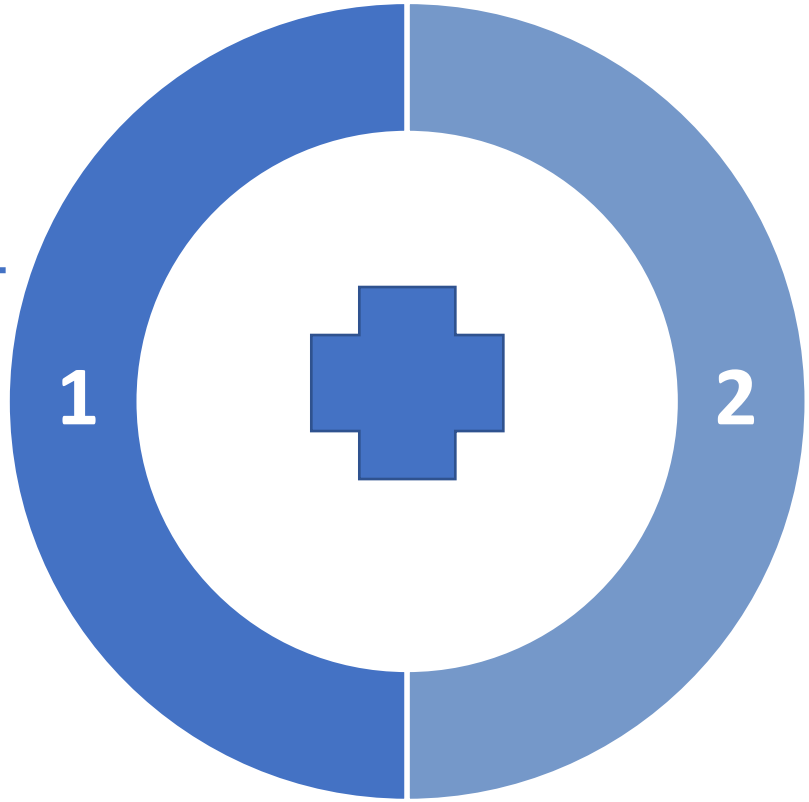
NO_x EMISSIONS ASSESSMENT: TECHNICAL APPROACH



Identify Emission Source Types

- ❑ Hard to electrify industrial sectors
- ❑ Mobility (focused on heavy-duty trucks)
- ❑ Power generation (initial focus on existing power plants)
- ❑ Storage and transportation of hydrogen



Identify Emission Mitigation Measures

- ❑ Potential NO_x mitigation measures for existing and emerging/new equipment
- ❑ Top-down evaluation to prioritize and rank the measures identified for each source type

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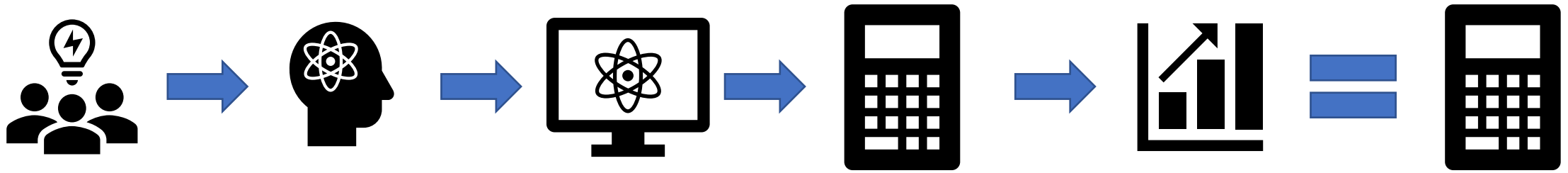
NO_x EMISSIONS ASSESSMENT: TECHNICAL APPROACH (CONT.)

For each emission source type and each mitigation measure:



Identify Potential Calculation Approaches

Determine Best Calculation Approach

Determine Calculation Method for Selected Approach

Prepare Calculations at Unit Level

Apply Scaling Factor

Calculate Estimated NO_x Emissions

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MEMBER DISCUSSION: NO_X EMISSIONS ASSESSMENT

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LUNCH

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INSIGNIA ENVIRONMENTAL: STAKEHOLDER FEEDBACK TRACKING SYSTEM

ANGELES LINK

ARMEN KEOCHEKIAN
Director
Insignia

SoCalGas

STAKEHOLDER FEEDBACK TRACKING SYSTEM

Phase One Feasibility Studies Milestones

- Study Descriptions of Work
- Study Methodology/ Technical Approach
- Preliminary Data and Findings
- Draft Reports

Comment Periods

- One comment period for each milestone
- Comment periods are approximately 4 weeks
- If some studies advance more quickly, we may combine milestones

Feedback Mechanisms

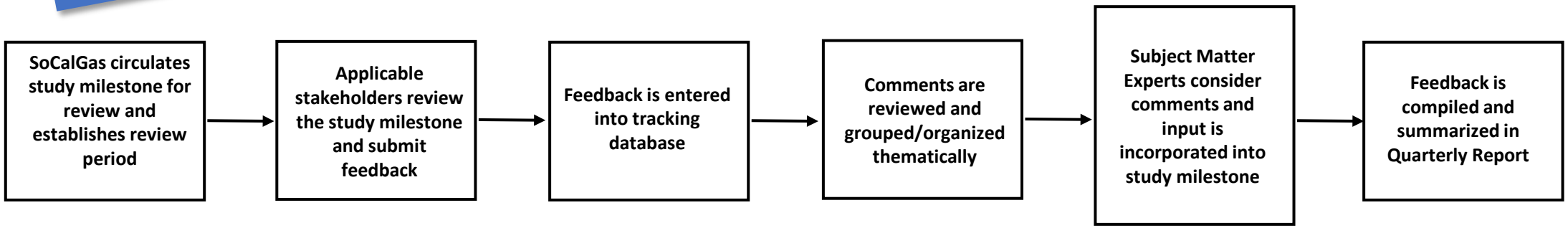
- Designated email address
- Mail
- Interim and quarterly meetings
- Online form

STAKEHOLDER FEEDBACK TRACKING SYSTEM

A Feedback Tracking System database has been created to track comments

Comments will be entered into the database, grouped thematically, and disseminated to SoCalGas Subject Matter Experts

Feedback is considered for current studies and process summarized in Quarterly Report



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MEMBER DISCUSSION: STAKEHOLDER FEEDBACK TRACKING SYSTEM

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BREAK (15 MINUTES)

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WATER RESOURCES EVALUATION: SCOPE DISCUSSION

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EDITH MORENO
Regulatory Strategy & Policy Manager

SoCalGas

WATER RESOURCES EVALUATION: INTRODUCTION

- This study will evaluate the availability and options of water resources for clean renewable hydrogen production

Key Components

Evaluate water availability for clean renewable hydrogen production

Evaluate challenges and opportunities associated with water availability that may impact the production

WATER RESOURCES EVALUATION: DESCRIPTION OF WORK

Identify Supply Types

Potential water sources include recycled water, imported surface water (exchange), wastewater, etc.

Supply availability validated through water management agency outreach

For Each Supply Type:

Estimate available quantities

Evaluate costs to acquire and cleanup (treatment) for electrolyzer use

Water Supply Prioritization

Evaluate challenges with access to water supply (e.g., water rights and water quality) and identify mitigation strategies

Evaluate opportunities and benefits

Develop prioritization recommendations based on challenges and opportunities

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MEMBER DISCUSSION: WATER RESOURCES EVALUATION

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DEBRIEF / WRAP-UP

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Thank you for your participation!

Please drive safely.

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DEMAND STUDY ANALYSIS

Technical Approach and Preliminary Outputs

August 2023

SoCalGas™

Document Contents

SoCalGas™

Recap of CPUC Decision and Presentation Objectives

CPUC Decision and Context

- In December 2022, the CPUC approved SoCalGas's request to establish the Angeles Link Memo Account to record the costs of performing Phase One feasibility studies for the Angeles Link Project.
- The CPUC's Decision requires, as part of the Phase One feasibility studies, SoCalGas to identify demand and end uses for Angeles Link and make the data, findings, and results available to the public unless SoCalGas is granted confidentiality of the data in accordance with General Order 66-D.
- Based on these guidelines, this analysis focuses on evaluating the potential hydrogen demand across select sectors in SoCalGas' service territory from 2025 – 2045.

Presentation Objectives

Approach and Methodology

Provide a high-level overview of the model development process

Modeling Assumptions

Share important inputs, assumptions and inputs across modeled sectors

Analysis Outputs

Present a summary view of preliminary model outputs

Key Considerations on Scope and Areas for Further Analysis

- This analysis focuses on a bottom-up assessment of demand potential for clean renewable hydrogen across the Mobility, Power Generation, and Industrial sectors
- To be conservative, the model does *not* account for certain variables that would be expected to increase future demand for hydrogen, such as:
  - Use of hydrogen to facilitate energy system reliability and maintain Loss of Load Expectations against an increasing share of intermittent renewable resources on the grid
  - Potential additions to generation capacity to meet demand growth in 2045, as seen in the projected new resources identified in CARB's Scoping Plan (including approximately 9 GW of hydrogen turbine capacity)
  - Carbon pricing (e.g., LCFS and cap-and-trade) impacts on demand which may be influenced by pending regulatory proceedings
- These variables may be further assessed in future studies

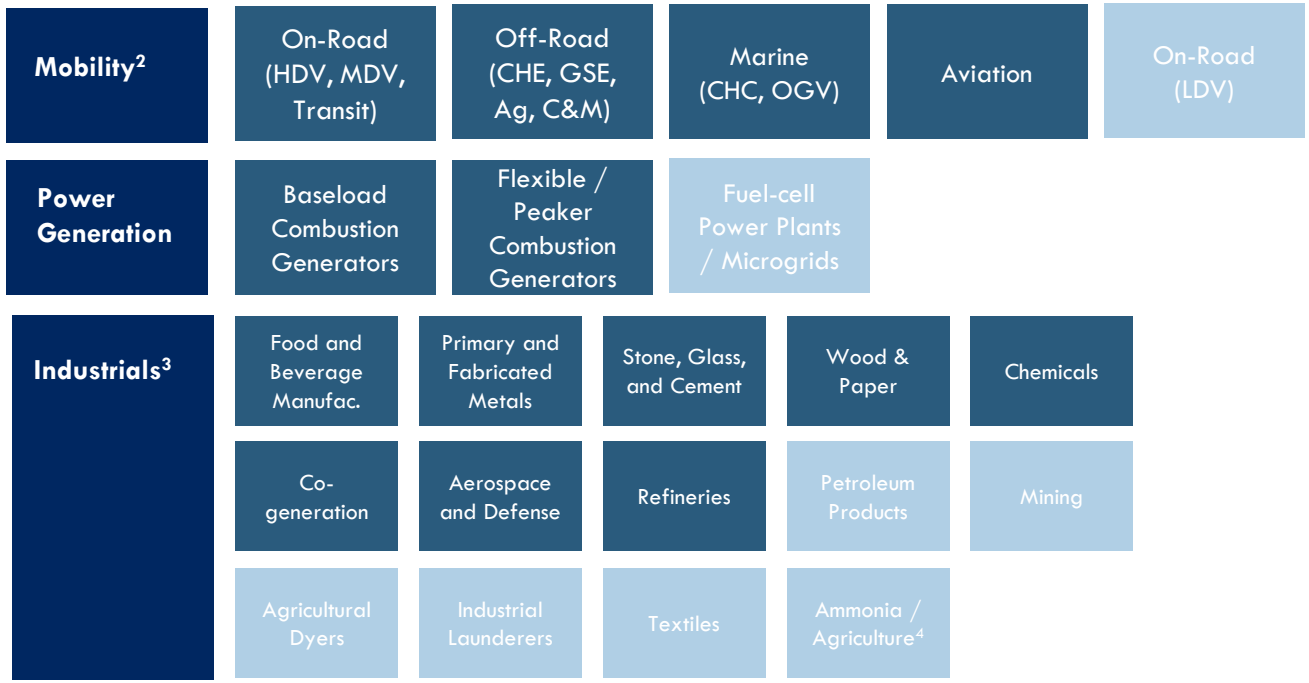
Demand Analysis Scope

The demand analysis focuses on three priority sectors: Mobility, Power Generation & Industrials, with multiple subsectors assessed based on their emissions footprint, current fuel consumption, and hard-to-electrify use cases

Demand Analysis Scope

	Mobility	Power Generation	Industrials
Adoption Drivers	Understand market adoption drivers including legislation and regulations, technical feasibility, commercial availability, and business readiness[1]		
Demand Volume	Create a model quantifying potential future demand by sector		
Decarbonization Alternatives	Understand how hydrogen compares to other decarbonization alternatives across costs, markets, and technical feasibility and how this impacts adoption		
Market Validation	Confirm outcomes and assumptions with market segment experts		

Sectors and Sub-Sectors Assessed for Demand Analysis



1. Additional analysis factors considered: Planned hydrogen projects and announcements; CARB's Scoping Plan

2. HDV (Heavy Duty Vehicles), MDV (Medium Duty Vehicles), CHE, (Cargo Handling Equipment), GSE (Ground Support Equipment), Ag (Agricultural Equipment), C&M (Construction & Mining Vehicles), CHC (Commercial Harbor Craft), OGV (Ocean Going Vessels)

3. Potential hydrogen demand from methanol production is not quantified in the current model but will be evaluated in a future phase.

4. Ammonia production for fertilizer manufacturing will also be assessed in a future phase.

Demand Analysis Approach

An initial model was developed and revised through input from potential end-users and market participants

Model Definition

- Establish a clear set of objectives, scope, and approach for the demand analysis
- Assess academic and market analysis to identify priority sub-sectors and applications for clean hydrogen demand

Model Buildout

- Develop detailed model methodology; identify relevant datasets and inputs
- Quantify total addressable market for clean hydrogen and estimate adoption rates for each sub-sector and application by evaluating alternatives

Model Refinement (In Progress)

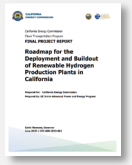
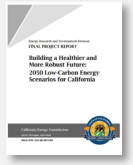
- Share preliminary outputs with PAG / CBO members and gather feedback
- Incorporate feedback (where possible) into the model and integrate findings with other Angeles Link Phase One studies

Sector Interviews & Peer Reviews (In Progress)

- Conduct targeted interviews with subject matter experts across industry, academia and government agencies to test model approach, inputs, assumptions and outputs

Research Overview

Several recent reports that evaluate the potential for hydrogen, both at the state and federal level, have been leveraged as inputs and references

Reference	Analysis Overview	Key Insights
 **DOE Clean Hydrogen Commercial Liftoff Report & U.S. National Clean Hydrogen Strategy and Roadmap** (Source 1, Source 2)	DOE overview of pathways to widespread clean hydrogen adoption throughout the U.S. analyzing various challenges, opportunities, and incentive programs	• 4-8 MMT per year of hydrogen demand expected nationwide in 2050 to supply energy storage and power generation • 5-8 MMT per year of hydrogen demand nationwide in 2050 for the medium and heavy-duty trucking sector • Open access hydrogen transport infrastructure will be key in ensuring long-term, self-sustaining demand growth
 **CARB 2022 Scoping Plan for Achieving Carbon Neutrality** (Source)	Discussions of expected future energy use in CA broken down by source and application. Includes an overview of CA state actions, regulations, and incentives	• The Scoping Plan Scenario models carbon neutrality by 2045 using a broad portfolio of fossil fuel alternatives and clean technologies while aligning with policy direction • 1.4 MMT per year of hydrogen non-LDV mobility energy demand in CA in 2045 under the Scoping Plan Scenario
 **UC Davis California Hydrogen Analysis Project: The Future Role of Hydrogen in a Carbon-Neutral California** (Source)	UC Davis analysis of potential future hydrogen transportation systems, demand across sectors, and sources of supply	• 3.2 MMT per year of hydrogen non-LDV mobility energy demand in CA in 2045 under the High case scenario • 30,654 FCEV long-haul trucks in service in CA in 2045
 **CEC and UC Irvine Roadmap for the Deployment and Buildout of Renewable Hydrogen Production Plants in California** (Source)	CEC and UC Irvine report on roadmaps for statewide clean hydrogen deployment in CA including potential hydrogen demand by sector	• 0.4 MMT per year of hydrogen demand in CA in 2050 for electricity generation • 1.1 MMT per year of hydrogen non-LDV mobility energy demand in CA in 2050 under the High case scenario
 **CEC Building a Healthier and More Robust Future: 2050 Low-Carbon Energy Scenarios for California** (Source)	CEC report with an overview of different future California specific energy mix projections with insight into potential capacity and generation numbers	• 320-490 TWh of electricity demand per year in CA in 2050 • FCEV fuel efficiencies are expected to improve by ~25% from 2020 to 2050

METHODOLOGY

Demand Model Methodology

The model methodology projects transition of current fuel to hydrogen for priority sub-sectors, with validation through end user interviews and peer reviews

Key Activities:

1. Identify top sub-sectors using **historical natural gas, diesel, and gasoline consumption** data
2. Align on key data sets and assess **modeling approach**
3. Test **technical feasibility** (gathering inputs from interviews when possible) to help fill information gaps

2a. **Model Total Addressable Market (TAM) using current fuel usage**

- Determine industry growth rates
- Define industry-specific characteristics (type of equipment used, efficiency rates and fuel consumption)

2b. **Apply Zero-Emission (ZE) and H2 adoption rates to TAM**

- Forecast transition to net-zero broadly and hydrogen specifically using key adoption factors:
  - Legislation and regulations, technical feasibility, commercial availability and business readiness

2d. **Develop demand scenarios**

- Define adoption scenarios through qualitative assessment of decarbonization alternatives, technology commercialization, and cost to adopt hydrogen

- Conduct **interviews with end-users to inform** model assumptions and overall outputs
- **Conduct peer-reviews** to validate approach, assumptions and outputs
- **Incorporate feedback** from interviews with end users and peer-reviews into the model and document appropriately
- **Incorporate feedback from PAG/CGO** as appropriate

Demand Model Methodology

The model considers current energy use assumptions, market growth, zero emission adoption, and hydrogen adoption to develop a quantitative demand projection

2A

Model the total addressable market (TAM)

Energy consumed (P)

Example inputs

- Equipment efficiency rates
- Fuel consumption rates

X

Market size/growth (Q)

Example inputs

- Utilization (ex: fleet size & VMT)
- Industry growth rates

=

2B

Apply ZE adoption rates

X

ZE adoption

Example inputs

- Legislation (State/Fed.)
- Interviews

=

2C

Apply H2 adoption rates

X

Hydrogen adoption

Example inputs

- Market research
- Interviews
- Efficiency gains

=

2D

Develop +/- demand scenarios

X

Demand scenarios

Example factors

- Alternatives
- Tech Availability

=

Total Energy Requirements (ex: MMBtus) → **Base Hydrogen Demand (ex: TPY/TPD)** → **Demand Range**

Note: ZE stands for Zero Emissions. For many sub-sectors, zero emissions legislation exists, such as for 100% of all drayage trucks to be ZE by 2035.

Scenario and Adoption Rate Overview

Three scenarios have been developed reflect a continuum of potential clean hydrogen adoption rates

Description of Scenarios

Conservative

Scenario assumes lower adoption rates for hydrogen across a limited set of use-cases within prioritized sectors and sub-sectors, primarily driven by existing legislation.

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Moderate

Scenario assumes increased hydrogen adoption across an expanded set of use-cases within prioritized sectors and sub-sectors, driven by existing legislation.

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload, Cogen

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Ambitious

Scenario assumes more ambitious policies are put in place and businesses are incentivized to support widespread hydrogen adoption within prioritized sectors and sub-sectors.

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV,* Aviation

Power: Peaker, Baseload, Cogen

Industrials: Refineries, Cogen, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

*HDV (Heavy Duty Vehicles), MDV (Medium Duty Vehicles), CHE, (Cargo Handling Equipment), GSE (Ground Support Equipment), Ag (Agricultural Equipment), C&M (Construction & Mining Vehicles), CHC (Commercial Harbor Craft), OGV (Ocean Going Vessels; *Diesel consumption only, not main engine heavy fuel)*

Cogeneration in Conservative and Moderate scenarios excludes cogeneration plants at refineries

Base market growth rate approach and assumptions vary per sector and per scenario

Primary Factors Driving Adoption Rates

Policy & Legislation

Is there a legislative or policy mandate that accelerates the transition to hydrogen? Are there incentives in place?

Technology Feasibility

Is hydrogen technically and/or operationally feasible? How does this compare against alternatives?

Commercial Availability

Is hydrogen commercially available? How does this compare against alternatives?

Business Readiness

Is the industry or sub-sector ready to adopt the technology?

MOBILITY

SoCalGas

Mobility: Scope of Applications Modelled

175+ vehicle classes have been modelled across the various mobility sub-sectors within the SoCalGas territory

On-Road Vehicles

Vehicle Class Type	# Vehicles in SCG territory (2024)
Class 8 Sleeper Cab Tractor	39,300
Class 7-8 Day Cab Tractor	76,300
Class 8 Vocational	36,600
Class 8 Drayage	18,100
Transit Bus / Motor Coach	8,300
Other Buses[1]	25,800
Class 8 - Other	11,200
Class 7 - Other	30,500
Class 6 - Other	85,400
Class 5 - Other	11,100
Class 4 - Other	54,200
Class 2b-3	565,800
Motor Home	63,400

1,026,000+ on-road vehicles across 50+ on-road applications are modelled[2]

Off-Road Vehicles, Marine Vessels, and Aircraft[3]

Vehicle Application Type	# Vehicles in SCG territory (2024)
Cargo Handling Equipment	4,100
Ground Support Equipment	5,400
Other Off-Road (Agricultural, Construction & Mining)	169,700
Marine Vessels (Ocean Going Vessels, Commercial Harbor Craft)	~149M gallons/yr diesel consumption
Aircraft	~1.6B gallons/yr jet fuel consumption[4]

180,000+ off-road vehicles across 100+ applications are modelled

25+ Marine vessel types are modelled*. Ocean going vessels includes auto carrier, bulk ,container, cruise, general cargo, reefer, RoRo, tanker, and vessel

Aviation is modelled as a single category**

# of vehicles based on data from CARB EMFAC Database; OGV diesel consumption from EMFAC; Aviation jet fuel consumption from EIA

1. Other buses includes a wide variety of vehicles that carry many passengers including school buses, shuttle buses, double decker buses
2. Model accounts for adjustments in vehicle counts for future years when determining hydrogen volumes
3. Rail applications may be considered in future analysis
4. Includes international travel

*Marine vessels have main engines and auxiliary engines. the model only accounts for replacing current diesel consumption by OGVs. Bunker fuel replacement (e.g. the main engine's typical fuel) is not considered

**Aircraft are modelled as a single category rather than by type or application of aircraft

Mobility: Methodology

H_2 demand for the mobility sector in SoCalGas service territory is modelled by multiplying the following factors

of Total vehicles & Fuel Consumption, 2025-2045

# of vehicles by class/application, fuel type, by county

On-Road	50+ vehicle applications (HDV, MDV, Bus: GVWR Class 2b-8 and buses)
Off-Road	15+ Port Cargo Handling Equipment (CHE) 30+ Airport Ground Support Equipment (GSE) 50+ Other Off-Road (agricultural, construction & mining equipment)
Marine	15+ Commercial Harbor Craft (CHC) 10+ Ocean Going Vessels (OGV)
Aviation	Aircraft

H2 consumption is determined by calculating the H2 equivalent of current fuel consumption using the ratios of:

- Ratio of energy density (btu per kg of H2, per gallon of diesel, etc)
- Ratio of engine efficiency

Data is taken straight from the CARB EMFAC Database which includes vehicle fleet size forecasts through 2050, as well as fuel consumption forecasts for all on-road and off-road vehicles and marine vessels.

Aviation is included in the ambitious scenario only, reflecting ambition in the 2022 CARB Scoping Plan, and fuel consumption data from EIA.

% of vehicles converted to ZE

Zero Emission adoption rates are applied to reflect current legislation or policies

The plans reflected in the model are:

- **Advanced Clean Fleets (ACF):** Conversion of 'priority fleets' by 2024 and all fleets by 2035
- **Innovative Clean Transit (ICT):** transit agency defined targets, generally 2030
- **Clean Shipping Act of 2023:** requires 100% clean shipping fuels by 2040
- **Clean Air Action Plan (CAAP):** POLA and POLB set targets for 100% ZEV CHE by 2030
- **Executive Order N-79-20:** sets targets for 100% ZEV by 2045 or earlier by application

Regulations support initiatives to achieve California Net Zero targets by 2045. New regulation is regularly coming out. Regulations modelled reflect those above, announced before July 1st, 2023.

ZE adoption rates

% of ZE vehicles that are FCEV (vs Alternatives)

Within ZE, the % of new vehicle or vessel purchases that are FCEV vs alternatives is based on assessment of 4 factors:

1. **Policy & Legislation:** held constant in Conservative and Moderate scenarios
2. **Technology Feasibility:** assessed across a serios of factors specific to application type. This is held constant across scenarios.
3. **Commercial Availability:** assessed by evaluating non-fuel costs to determine when price parity of FCEV vs alternatives is achieved (if ever). Price parity is used in initial phase of analysis, and will be integrated and updated depending on outputs of supply and engineering studies
4. **Business Readiness:** assessed to reflect company net zero targets in moderate and ambitious scenarios

The adoption factors were determined using third party research and interviews where possible, including assessments by the DOE (H2 Roadmap and Liftoff Report), as well as TCO analysis leveraging ANL's BEAN model, and more.

H_2 adoption rates

Mobility: Methodology (Example)

Sleeper cabs and drayage trucks are shown as examples for how hydrogen demand is calculated by vehicle class

# of Total vehicles & Fuel Consumption, 2025-2045 × **% of vehicles converted to ZE** × **% of ZE vehicles that are FCEV (vs Alternatives)**

Class 8 Sleeper Cab Tractor

2024 Total # of Vehicles[1]	Avg. Miles Travelled /day[1]	Avg. kg H2/Day
39,300	204.0	30.2

% of Vehicles ACF Applies To[2]	ZEV Adoption Rate (2045)[3]
67%	100%

The Advanced Clean Fleets (ACF) regulation requires 100% of sleeper cab sales to be ZE starting 2035, attempting for all to be 100% ZEV by 2042.

% 2045 H2 Adopt. Rate (new sales)	2045 # H2 Vehicles (conservative)	2045 H2 Demand (conservative, '000 TPY)
81-98%	34,542	380

- **Technical feasibility:** High to Very High likelihood of H2 adoption across technical requirements
- **Commercial availability:** At cost parity 2035-2045 by scenario
- **Business Readiness:** Market driven to fast follower by scenario
- **Legislation:** Considers existing ACF legislation only in Conservative and Moderate scenarios

Class 8 Drayage

2024 Total # of Vehicles[1]	Avg. Miles Travelled /day[1]	Avg. kg H2/Day
18,100	107.8	16.9

% of Vehicles ACF Applies To[2]	ZEV Adoption Rate (2045)[3]
100%	100%

The Advanced Clean Fleets (ACF) regulation requires 100% of drayage truck sales to be ZE starting 2024 and 100% of drayage trucks to be ZE by 2035 (in order to be allowed into enter seaports or intermodal railyards).

% 2045 H2 Adopt. Rate (new sales)	2045 # H2 Vehicles (conservative)	2045 H2 Demand (conservative, '000 TPY)
31-38%	4,074	25

- **Technical feasibility:** Medium-high across technical requirements
- **Commercial availability:** Close to parity 2025-2035 by scenario (never achieves cost parity with alternatives)
- **Business Readiness:** Market driven to fast follower by scenario
- **Legislation:** Considers existing ACF legislation only in Conservative and Moderate scenarios

1. Based on CARB EMFAC Database for SoCalGas service territory
2. Based on CARB assessment (see ACF)
3. Based on ACF regulation

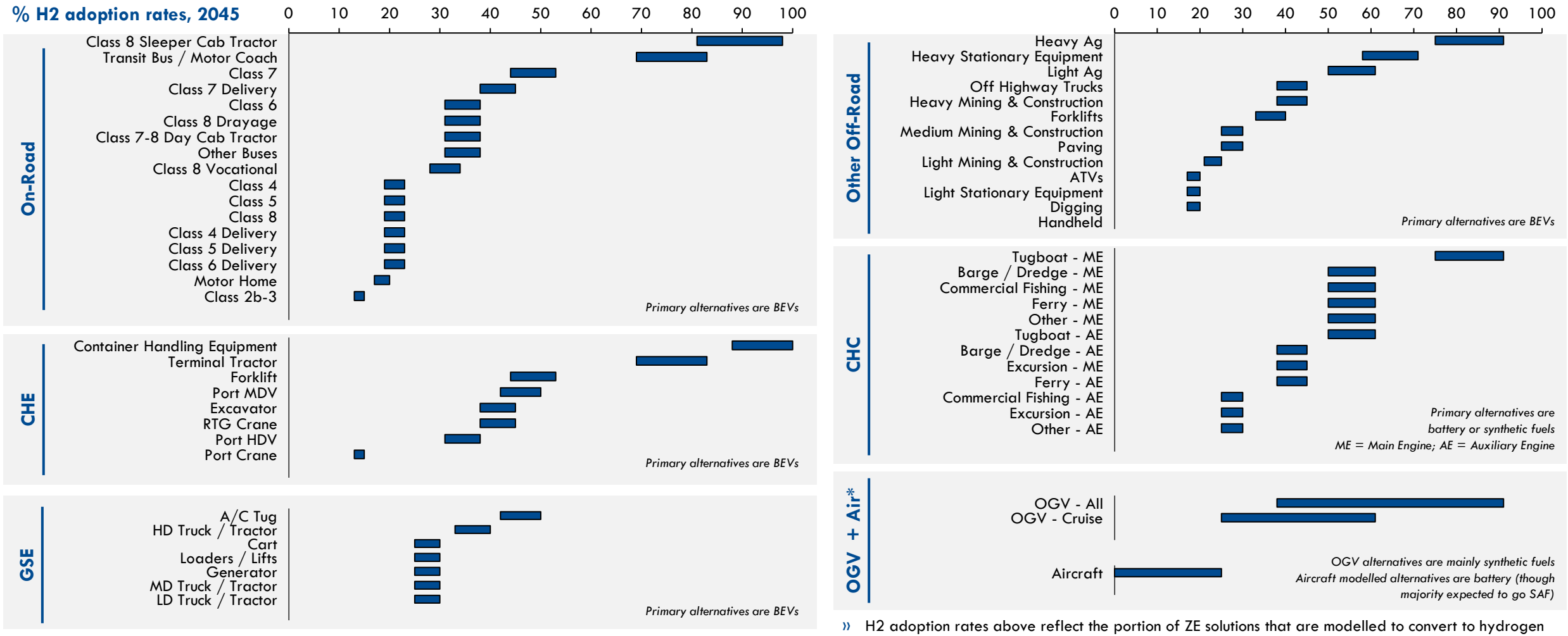
Mobility: Key Assumptions and Data Sources

Modelling assumptions across adoption rate factors were developed and validated through research & interviews

Adoption Factor	Assumptions / Inputs	Data Source
Vehicle / Vessel Operational Characteristics	**Fleet Sizes and Growth Rates** • Vary by application but are taken to exactly match the CARB EMFAC Database forecasts for SoCalGas service territory **Vehicle Lifespans and Retirement Rates** • On-Road: 17 years for MDV, 16 years for HDV, 12 years for Buses • Off-Road: Varies based on equipment type and associated research, generally 10-20 years for CHE, 10-20 years for GSE, 5-15 years for Agricultural, Construction & Mining equipment • Marine: 15-years for Commercial Harbor Craft **Fuel Consumption Rates** • Fuel consumption rate is calculated based on current diesel or gasoline consumption today (from CARB EMFAC Database), using energy density ratios and fuel cell vs combustion engine efficiency ratios • 0.5% increase in fuel cell efficiency and diesel engine efficiency per year	CARB EMFAC Database 2022 CARB Scoping Plan SCAQMD CAAP GSE Industry research Agriculture, Construction & Mining Industry Research DOE: H_2, diesel, and gasoline efficiency rates
Legislation and ZEV Adoption	**Advanced Clean Fleets Regulation** • Vehicle will retire using the Model Year Schedule, not the ZEV Milestones Option defined by ACF • % of vehicles estimated to be subject to ACF: 67% of Class 7-8 Tractors, 52% of Class 4-8 Vocational, 12% of Class 2b-3 • Vehicles subject to ACF will buy 100% ZEVs starting 2024 (per regulation, assuming no exceptions). Other vehicles will buy 100% ZEV starting 2035 ramped linearly from ~0% today, to 25% by 2030, to 100% by 2035. **Clean Air Action Plan (CAAP)** • 100% ZEV CHE by 2030 **Executive Order N-79-20** • Reflects 100% ZEV sales for GSE by 2035; by 2045 for other off-road equipment (where specific regulation doesn't otherwise exist) **Marine & Aircraft** • CHC sales 100% ZEV by 2035; OGV stocks 25% ZE by 2045; Aircraft fuel 20% battery or fuel cell by 2045	Advanced Clean Fleets CAAP EO-N-79-20 ZEAT 2022 ARB Scoping Plan
Commercial Readiness	• Assessed by modelling TCO assuming cost parity with incumbent fuel for on-road using ANL's BEAN model, and market research for non-on-road applications	ANL BEAN model

Mobility: H_2 Adoption Rates vs ZE Alternatives

H_2 fuel cell adoption rates in 2045 vary by application and scenario



Note: Left of bar is the 2045 Conservative scenario adoption rate; right of bar is the Ambitious scenario adoption rate.

- H2 adoption rates above reflect the portion of ZE solutions that are modelled to convert to hydrogen fuel cell technology (generally new sales). The inverse of the H_2 adoption rates shown reflects the modelled adoption rate of alternative ZE solutions
- Adoption rates are low in early years generally due to the assessed impact of commercial availability.

**H2 adoption rates reflect those for new sales only (not stocks), except for OGV and Aircraft which reflect stocks (of ZE). *Marine vessels have main engines and auxiliary engines. The model only accounts for replacing current diesel consumption by OGVs. Bunker fuel replacement (e.g. the main engine's typical fuel) is not considered*

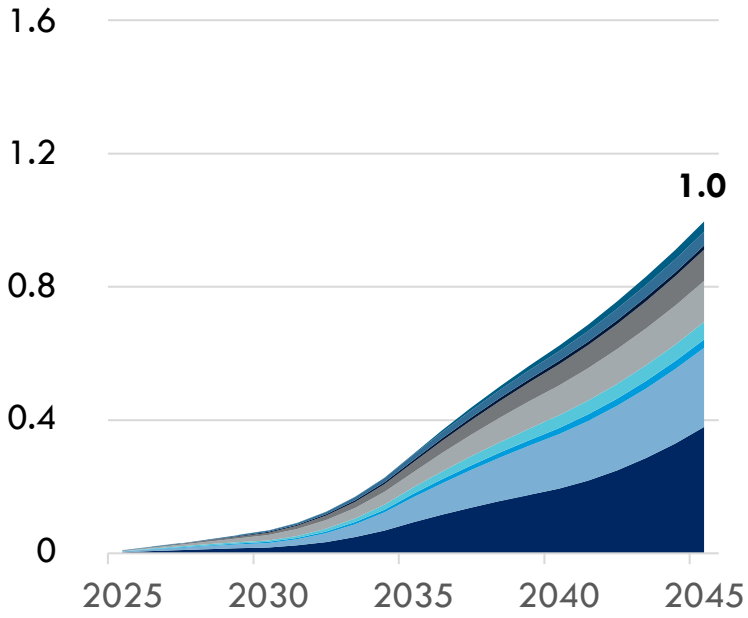
Mobility: Demand Outputs

Potential mobility sector H_2 demand in SoCalGas service territory is projected to be between 1.0-1.7M TPY by 2045

Total Expected Clean Renewable Hydrogen Demand

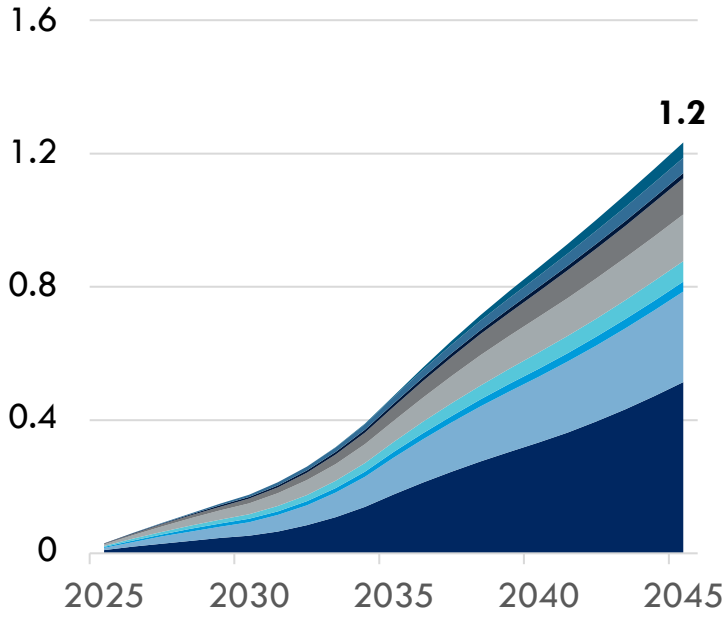
Values in Million TPY | Reflects SoCalGas service territory

Conservative



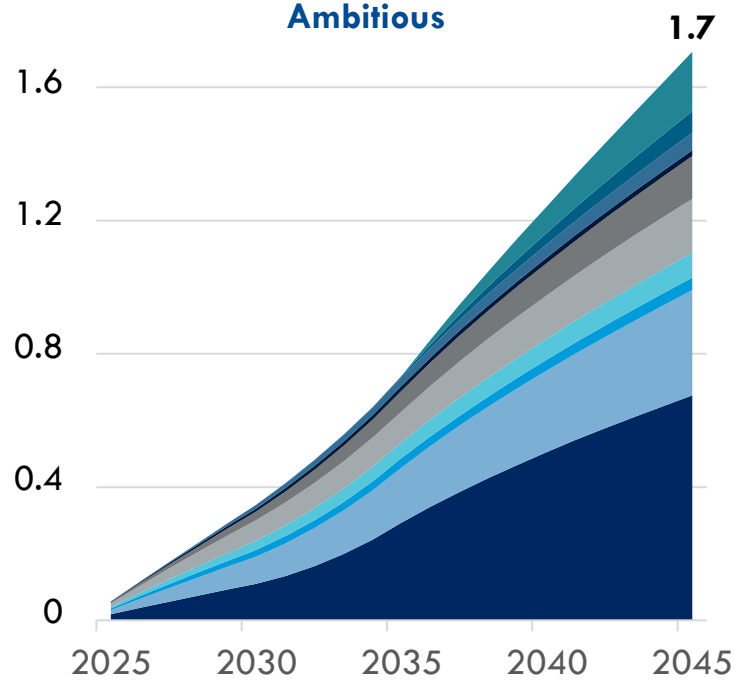
The conservative scenario reflects current legislation and relatively conservative estimates for hydrogen adoption.

Moderate



The moderate scenario reflects current legislation, assumes moderate estimates for hydrogen adoption.

Ambitious



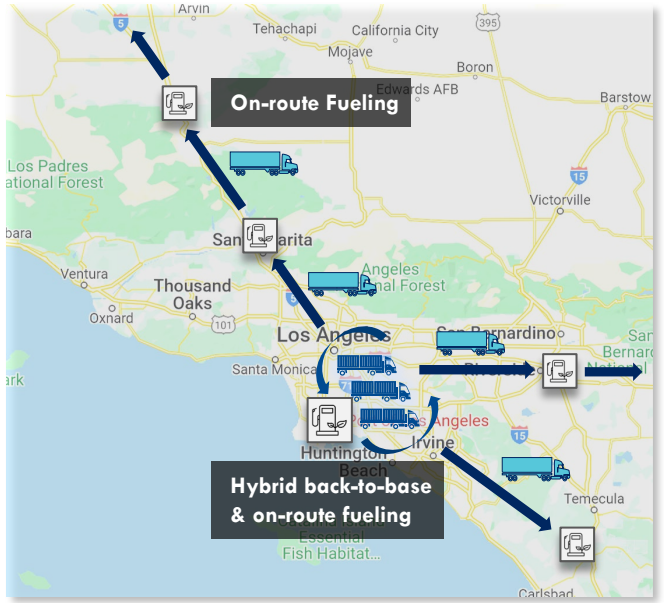
The ambitious scenario builds on the moderate scenario with potential additional ZE legislation and more ambitious estimates for hydrogen adoption.

Class 8 Sleeper Cab Tractor
Class 7-8 Day Cab Tractor
Class 8 Drayage
Class 8 Vocational
Transit Bus / Motor Coach
MDV
Other Buses
Off-Road
Marine
Aviation

Note: MDV is Medium Duty Vehicles, Marine includes Commercial Harbor Craft (CHC) and Ocean Going Vessels (OGV), where OGV values reflect diesel consumption only (does not include main engine heavy fuel).

Sample Use Cases | Drayage Trucks & Sleeper Cabs

Vehicle Fueling Characteristics



Drayage Truck

H2 Demand Forecast

25 - 38k

TPY by 2045

Statistics[1]

Vehicles Today: 18,000
Avg. VMT: 108 miles/day
Avg. Fuel: 16.9 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	6%	6%	31%	31%	31%
Moderate	19%	19%	34%	34%	34%
Ambitious	34%	41%	38%	38%	38%

Adoption rates for new vehicle purchases. Inverse values reflect battery vehicle adoption rate.

Policy Considerations

The Advanced Clean Fleets (ACF) regulation requires that starting 2024 new trucks registering with CARB to conduct drayage activities in California must be 100% ZEV. All drayage trucks entering ports and intermodal railyards must be ZEV by 2035.[3]

Sleeper Cab

H2 Demand Forecast

380 - 675k

TPY by 2045

Statistics[1]

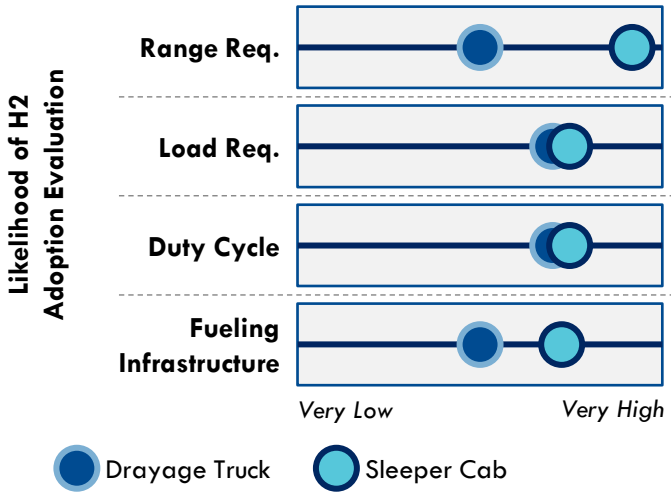
Vehicles Today: 39,300
Avg. VMT: 204 miles/day
Avg. Fuel: 30.2 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	8%	8%	41%	41%	81%
Moderate	24%	24%	67%	67%	89%
Ambitious	45%	54%	98%	98%	98%

Policy Considerations

The Advanced Clean Fleets (ACF) regulation aims to have 100% ZEV sleeper cab tractors in California by 2042.[2]

Technical Feasibility Assessment[1]

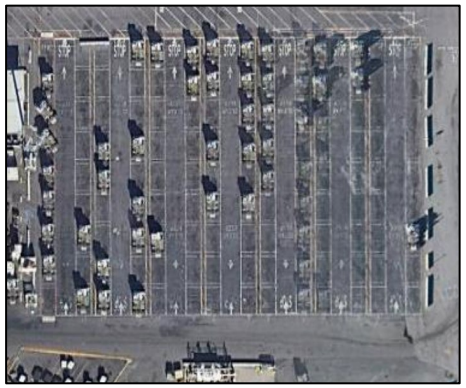


	Drayage Truck	Sleeper Cab
Range Req.	Average 108 miles per day, though range can vary significantly (up to several hundred miles) pending cargo destination.	Currently averages 204 miles per day, though range is often much higher, especially if vehicles have 2+ driver shifts per day.
Load Req.	Class 7-8 requirements due to varied weight of cargo. Battery weight impacts towing capacity, influencing H2 adoption.	Trucks must accommodate a wide range of cargo. Battery weight impacts towing capacity, influencing H2 adoption.
Duty Cycle	Sometimes operate in 2-3 eight-hour shifts. May require fast refueling or multiple refueling cycles per day.	Sleeper cab tractors may operate with a team of drivers working in 8-hour shifts as drivers are generally paid per mile.
Fueling Infrastructure	May fuel at base if back-to-base operations or may fuel at distributed fueling locations, depending on operations.	Highly distributed fueling operations across transit corridors. Typically fuel at truck stops where drivers can also sleep.

References: (1) # Vehicles and Avg. VMT (vehicle miles travelled) reflect 2024 figures from CARB's EMFAC Emissions Inventory database for vehicles in SoCalGas service territory; Avg. Fuel consumption calculated based on equivalence from diesel consumption, (2) ACF

Sample Use Cases | Container Handling Equipment & Terminal Tractors

Vehicle Fueling Characteristics[4]



Terminal Tractor Fueling Lanes at POLA

Container Handling Equip. Fueling at POLA

Container Handling Equipment

H2 Demand Forecast

15 - 18k

TPY by 2045

Statistics[1]

Vehicles Today: 550
Avg. Fuel: 56.3 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	9%	44%	88%	88%	88%
Moderate	26%	66%	96%	96%	96%
Ambitious	48%	100%	100%	100%	100%

Adoption rates for new vehicle purchases. Inverse values reflect battery vehicle adoption rate.

Policy & Strategy Considerations

CAAP sets targets for 100% ZEV CHE by 2030 and POLA/POLB are working closely with terminal operators to achieve this.

Terminal Tractor

H2 Demand Forecast

6 - 8k

TPY by 2045

Statistics[1]

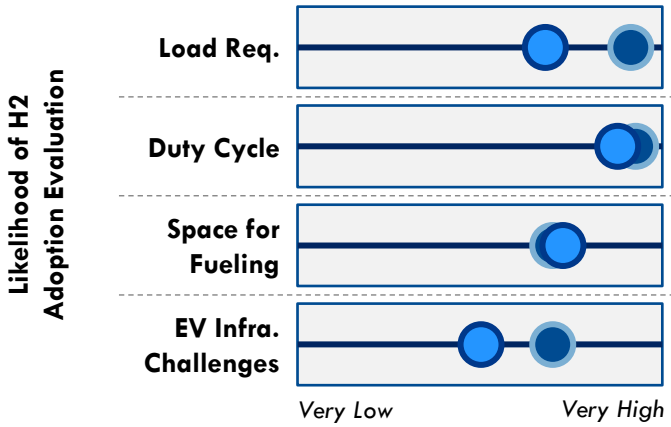
Vehicles Today: 2,150
Avg. Fuel: 8.1 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	7%	34%	34%	69%	69%
Moderate	21%	34%	57%	76%	76%
Ambitious	38%	45%	83%	83%	83%

Policy & Strategy Considerations

"Yard tractors… offer ZE and/or NZE fuel-technology platforms that simultaneously achieve the basic parameters and criteria to be deemed (or approaching) commercially available and technically viable.[2]

Technical Feasibility Assessment



	Container Handling Equipment	Terminal Tractor
Load Req.	Container handling equipment must be capable of lifting containers regardless of contents. CARB assessed load factors of 0.59.[4]	Must be capable, but do not require long duration load carrying requirements. CARB assessed load factors of 0.39.[4]
Duty Cycle	Some are operated for 4,600 annual hours (equivalent to two daily shifts, five-to-six days per week"[2]	Vehicles typically operate in-line with port operations: x2 eight-hour shifts per day on average.
Space for Fueling	Fuel at central depot via mobile fueling trucks before being put back into service. Little room for long-duration EV charging.	Fuel at central depot via mobile fueling trucks before being put back into service. Little room for long-duration EV charging.
EV Infra. Challenges	Installation of power lines (buried or otherwise) at ports to support charging would prove challenging compared to transportable fuel.	Installation of power lines (buried or otherwise) at ports to support charging would prove challenging compared to transportable fuel.

References: (1) # Vehicles and 2024 figures from CARB's EMFAC Emissions Inventory database; Avg. Fuel consumption calculated based on equivalence from diesel consumption, (2) CAAP 2021 Cargo Handling Equipment Feasibility Assessment Report, (3) CARB 2022 Cargo Handling Equipment Emissions Inventory (4) Google Maps

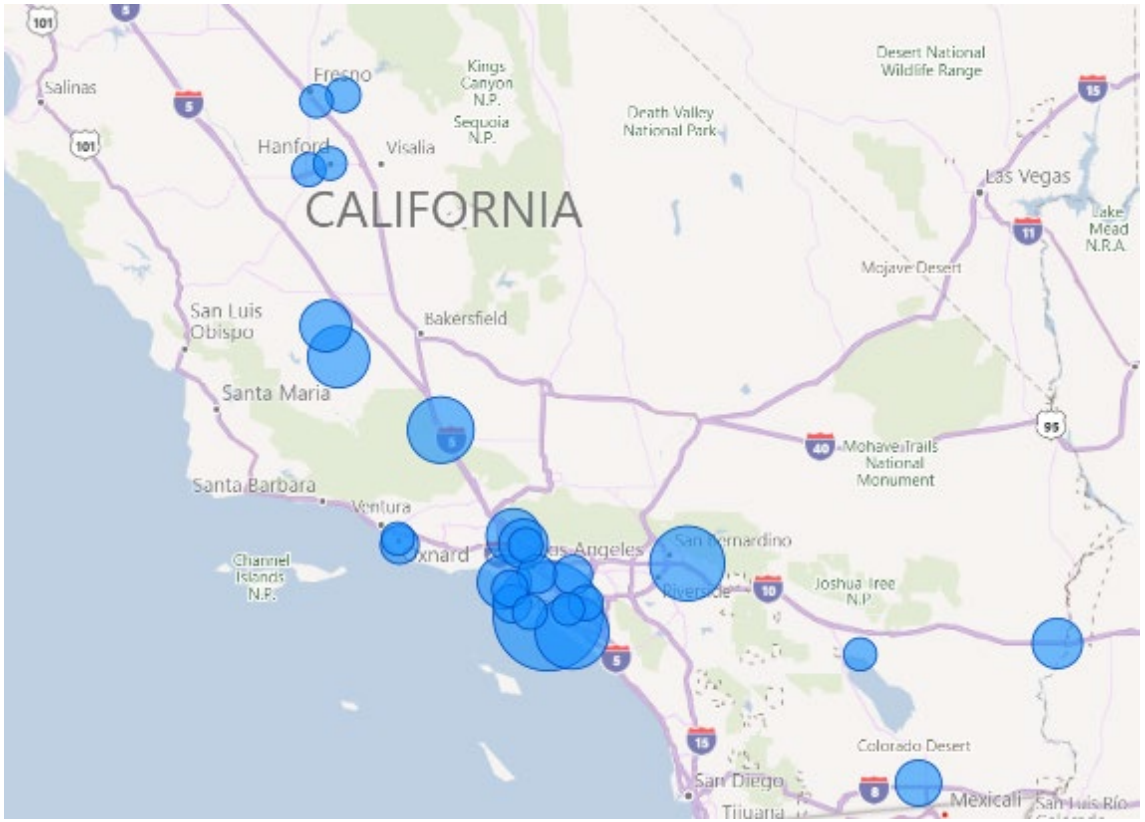
POWER

SoCalGas

Power Generation: Overview

Current natural gas consumption within the power sector is 256 BCF/yr in the SoCalGas service territory, with an opportunity for hydrogen fuel switching across peaker and baseload plants

Current Natural Gas Consumption by Zip Code



Size of Bubble: Natural Gas Consumption for Electricity (MMBTU)
Does not include power generation in SDG&E
Sources: EIA 923 – Generator Data[1]

Power Industry Overview

- The sector currently accounts for 256 BCF of natural gas in SoCalGas territory
- There are 32 power plants in the SoCalGas territory that have been included in the model with a capacity of >1MW. Current baseload and peaker plants are included, with the assumption that the majority of plants will transition to peaker in the future
- Existing natural gas peaker & baseload plants represent ~15GW of total capacity, with peaker and baseload generation of 32.6M MWh annually. [1,2,5]
- We anticipate that the importance of dispatchable generation on the grid will continue due to an increase in intermittent renewables such as wind and solar on the grid, providing a role for hydrogen
- Current power plant data has been used as the base to model fuel switching to hydrogen in SoCalGas territory. The full power market was not modelled
- The baseline for the model is facility-level natural gas consumption data from the EIA and CEC[1, 4]

References: (1) EIA, (2) CEC, (3) CARB, (4) CEC (5) GW capacity represents all power generation in 2021 excluding cogeneration. MWh generation represents generation from peaker and baseload plants

Power Generation: Methodology

H_2 demand for the power sector in SoCalGas service territory is modelled by multiplying the following factors

Facility-Level Fuel Consumption, 2025-2045

Current Plant Data from EIA 923 and EIA 860

Operator, nameplate capacity, historical generation & fuel consumption on an MMBTU basis, turbine type, summer and winter nameplate capacity, and heat rates.

Combined cycle combustion turbine	Combustion turbine
Steam turbine	Combine cycle steam turbine part
Combined cycle single shaft	Internal combustion turbine

H2 consumption is determined by calculating the H2 equivalent of current fuel consumption using the ratios of:

- Heat content of hydrogen on an MMBTU basis
- Hydrogen turbine efficiency

Data is taken from the EIA 923 and EIA 860 databases, which includes current natural gas consumption at the plant and turbine level on an MMBTU basis

Facility data was filtered to include only facilities in SoCalGas territory

NG to H2 Transition Rate

H2 Upgrade Probability X **System-Wide Capacity Factor** = **NG to H2 Transition Rate in 2045**

Probability to switch to H2 in 2045 based on predicted revenues of electricity produced from hydrogen in combustion turbines, as well as those from natural gas compared to CCUS and battery, with all three compared against the cost of purchased power.

2045 "what if" capacity factor range assumptions based on external studies and interviews with market participants (Conservative), external reports that project future system-wide natural gas capacity factors[1] (Moderate), and historical natural gas capacity factors (Ambitious).

Adoption Curve from 2025-2045

Adoption curve from current consumption to 2045 consumption is determined based on **key milestones and associated adoption factors**

Legislation	Technical Feasibility	Business Readiness
*SB100**	*Timeline to 100% H2 turbines*	

References: (1) Glendale, CEC, CARB, (2) EIA

Demand will need to be further mapped to locational areas to assist with other Angeles Link studies

**Although SB100 framework does allow for an emission budget, the analysis conservatively assumed zero emission by 2045 under SB100*

***Capacity factors were not modelled and were instead inputted directly to understand what hydrogen demand could be across a range of different capacity factors.*

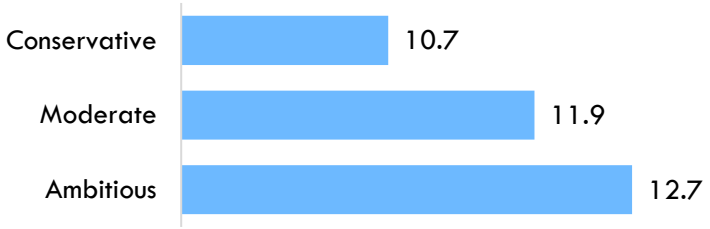
Power Generation: Adoption Rates

Hydrogen demand is driven by cost and commercial availability, regulations and legislation, technical feasibility, business readiness, and projected capacity factors

H2 Upgrade Probability X **System-Wide Capacity Factor** = **NG to H2 Transition Rate in 2045**

Hydrogen upgrade probability : Cost inputs are used to determine the likelihood of turbine-level capacity to choose H2 in 2045 compared to other alternatives (CCUS, battery). This percentage is applied to current capacity to determine 2045 H2 capacity

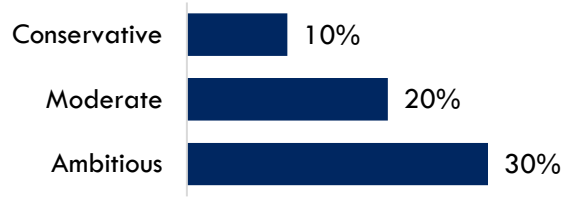
Projected Hydrogen Capacity by 2045, GW



Capacity Factor: A range of "what-if" capacity factor scenarios were evaluated to determine the total power generation from hydrogen in 2045. Capacity factors were not modelled and were instead inputted directly from external sources and reports to understand what the potential demand could be across a range of different capacity factors. The probability of each capacity factor was not evaluated.

Modeling the anticipated electric load increase and grid reliability requirements in future phases may help to determine which capacity factor is most likely

Hydrogen Capacity Factors and Associated MWh



Scenario	"What If" Analysis of Capacity Factors	Source
Conservative (C.F. of 10%)	Decline in future capacity factors due to a large shift from natural gas to other renewables with renewables serving future load growth	Number is based on external studies and feedback from market participants who expect hydrogen capacity factors to be in the range of 5% - 15%
Moderate (C.F. of 20%)	Decline in capacity factor from today, however the capacity factor is larger than in the conservative scenario reflecting increased dispatchability needs.	Number is based on future natural gas capacity factors projected by the CARB scoping plan and CEC reports, which range from 15-25%
Ambitious (C.F. of 30%)	Reflects a potential future where hydrogen capacity factors remain the same as current system-wide natural gas capacity factors	Number is based on historical EIA natural gas capacity factor data

References: Interviews held with power plant owners, OEMs, academia, and governmental and regulatory organizations

Power Generation: Key Assumptions and Data Sources

Modelling assumptions across adoption rate factors were developed and validated through research & interviews

Adoption Factor	Assumptions / Inputs	Data Source
Legislation	Senate Bill 100 (2018) • Requires renewable energy and zero-carbon resources to supply 100% of electric generation by 2045. Model assumes 100% emission reduction by 2045, although SB100 framework allows an emission budget • Provides interim milestone of 60% of electric retail sales to be met by eligible renewable resources by 2030 Senate Bill 1020 (2022) • Requires eligible renewable energy resources and zero-carbon resources supply 90% of all retail sales of electricity by 2035, 95% by 2040, and 100% by 2045	SB100 SB1020 100% carbon free assumption for SB100 adherence based on LADWP SLTRP
Technical Availability	• Current blending percentage is taken at the plant level, with current turbines in SoCalGas territory capable of 5-75% blending with a majority of plants at 30% • Projected 2030 milestone for 100% H2 turbine technical capability	EPRI Analysis, Interviews with OEMs

Commercial Availability	• Hydrogen is at price parity with incumbent fuels
	• Hydrogen upgrade costs are developed at a plant level across various upgrade ranges:
	  • 300MW: $18M-$20M for 30% upgrades, $24M-$31M for 100% upgrades
	  • 100MW: $3.8M for 30% upgrades, $14M-$17M for 100% upgrades
	  • 40MW: $3.2M for 30% upgrades, $14M-$16M for 100% upgrades
	  • >300MW: Up to $570M with increasing costs based on size
	• Hydrogen is compared to alternatives on a cost and profit basis to determine hydrogen upgrade probability using the following inputs:
	  • Battery Install cost: $2M/MWh, CCUS Capital Cost: $1,727/KW, CCUS T&D cost: $3.7/MWh
	  • Peak Demand Power Cost: $0.50/KW, Revenue Power Charge: $0.12/KW
		EPRI analysis, OSTI, Interviews with OEMs

Other:
Capacity Factors
	• Capacity factor is projected across a variety of what-if scenarios:
	  • Conservative (10%): Developed based on interview inputs, with common projections from OEMs and power plant operators ranging from 8-10%
	  • Moderate (20%): Developed based on external reports projecting future natural gas capacity factor around 20%
	  • Ambitious (30%): Developed based on current natural gas capacity factors
	• LADWP stated hydrogen capacity buildout has been maintained for LADWP plants
		LADWP SLTRP, Interviews with OEMs and plant operators

Business Readiness	• Projected that business readiness will take 5-8 years due to business decision making, permitting, construction for new turbines, and retirement rates of current turbines	Interviews with plant operators
Sector Growth	• Model conservatively assumes no new hydrogen power generation capacity	Not applicable

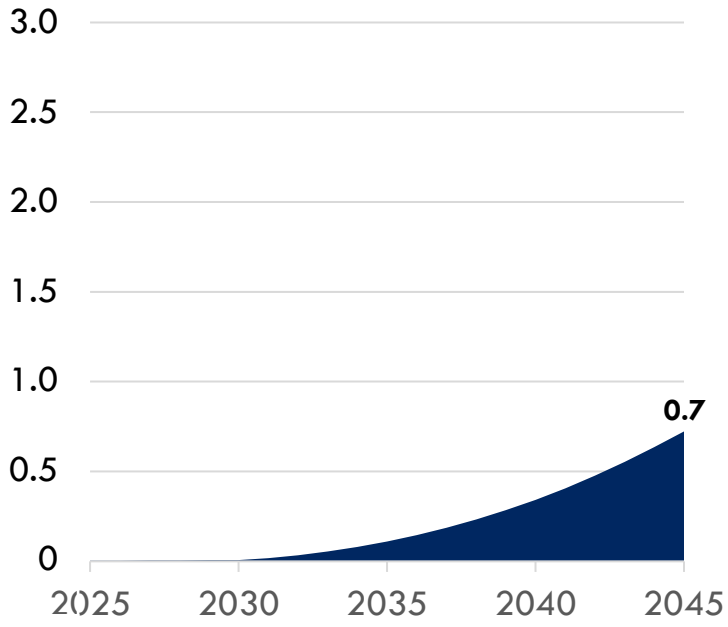
Power: Demand Outputs

Preliminary demand projections range from 0.7M – 2.7M tons of hydrogen/year in 2045, with increasing ramp up over time

Total Expected Clean Renewable Hydrogen Demand

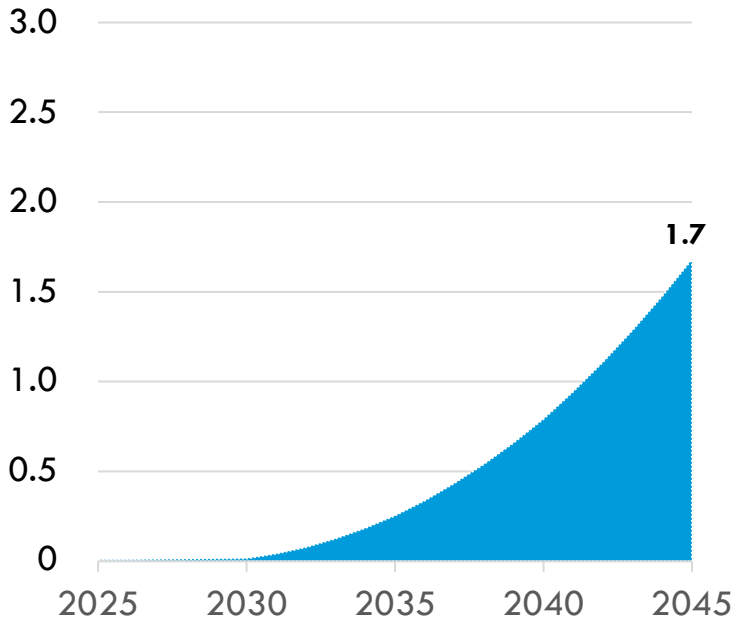
Values in million TPY | Reflects SoCalGas service territory

Conservative



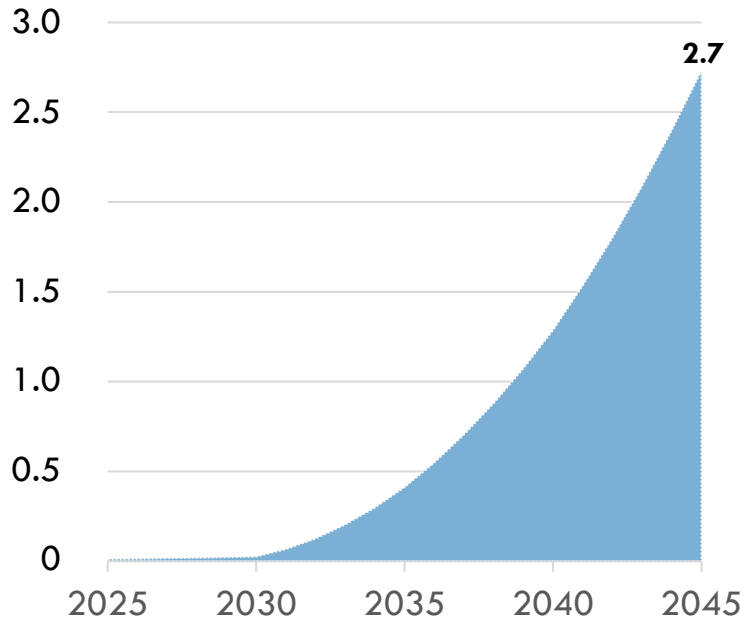
The conservative scenario reflects hydrogen demand under a low capacity factor scenario of 10%, assuming a decline in thermal combustion as other renewables increase and supply future load growth, based on external studies[1,2] and feedback from market participants[6]

Moderate



The moderate scenario reflects hydrogen demand under a capacity factor scenario of 20%, representing continued need for dispatchable generation, although at lower levels than we see today. Capacity factor assumption based on future natural gas capacity factors projected by the CARB scoping plan[3] and CEC reports[4]

Ambitious

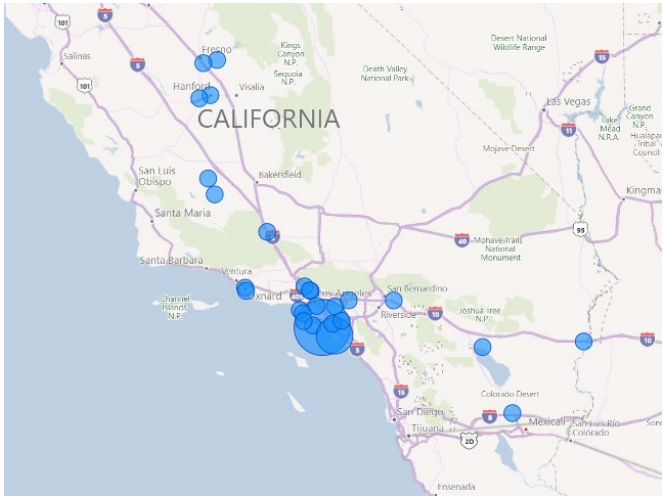


The ambitious scenario determines future hydrogen demand under the assumption that capacity factors continue to follow historical trends (~30%)[5]

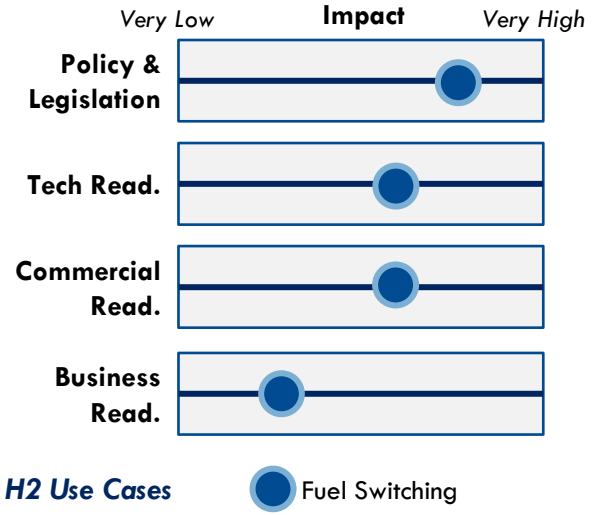
References: (1) LA100 (2) LADWP (3) CARB (4) CEC (5) EIA (6) Interviews held with power plant owners, OEMs, academia, and governmental and regulatory organizations

Sample Use Cases | Baseload & Peaker Plants

Major Southern California Facilities



Size of bubble: Number of facilities in zip code



Baseload & Peaker Plants

H2 Demand Forecast

0.7M – 2.7M

TPY by 2045

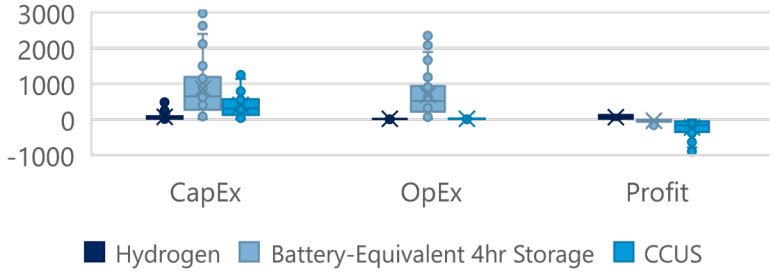
Statistics

Estimated Annual NG Usage: 256M MMBTU

Policy & Regulation Considerations

SB100 mandates 60% renewables for electricity by 2040 and 100% by 2045, which will drive sector decarbonization in the long term

Cost Comparison of Decarbonization Alternatives



CapEx and OpEx costs, revenue, and profit are calculated at the plant level depending on turbine type, current combustion and 2045 scenario capacity factor of given option

Given price parity, hydrogen consistently shows lower costs and higher revenue than modeled alternatives

CA Case Study: Scattergood Hydrogen Transition

LADWP is moving forward with plans to convert its largest baseload-fired power plant, the 830MW Scattergood Generating station, to run on green hydrogen. This transition will start with combustion of 30% hydrogen on day 1, moving to 100% by 2035. Safeguards have been introduced to ensure NOx pollutants will not increase as a result of the switch. (Source)

Case Study: Intermountain Power Project

This project includes the retirement of the existing coal-fueled units at the IPP site; installation of new natural gas-fueled electricity generating units capable of utilizing hydrogen for 840 megawatts net generation output; modernization of IPP's Southern Transmission System linking IPP to Southern California; and the development of hydrogen production and long-term storage capabilities. The new natural gas generating units will be designed to utilize 30 percent hydrogen fuel at start-up, transitioning to 100 percent hydrogen fuel by 2045. (Source)

Operational Characteristics

Plants are projected to be running at higher capacities during periods of peak demand and at lower capacity when demand is low, with system-wide capacity factor ranging from 10%-30%.

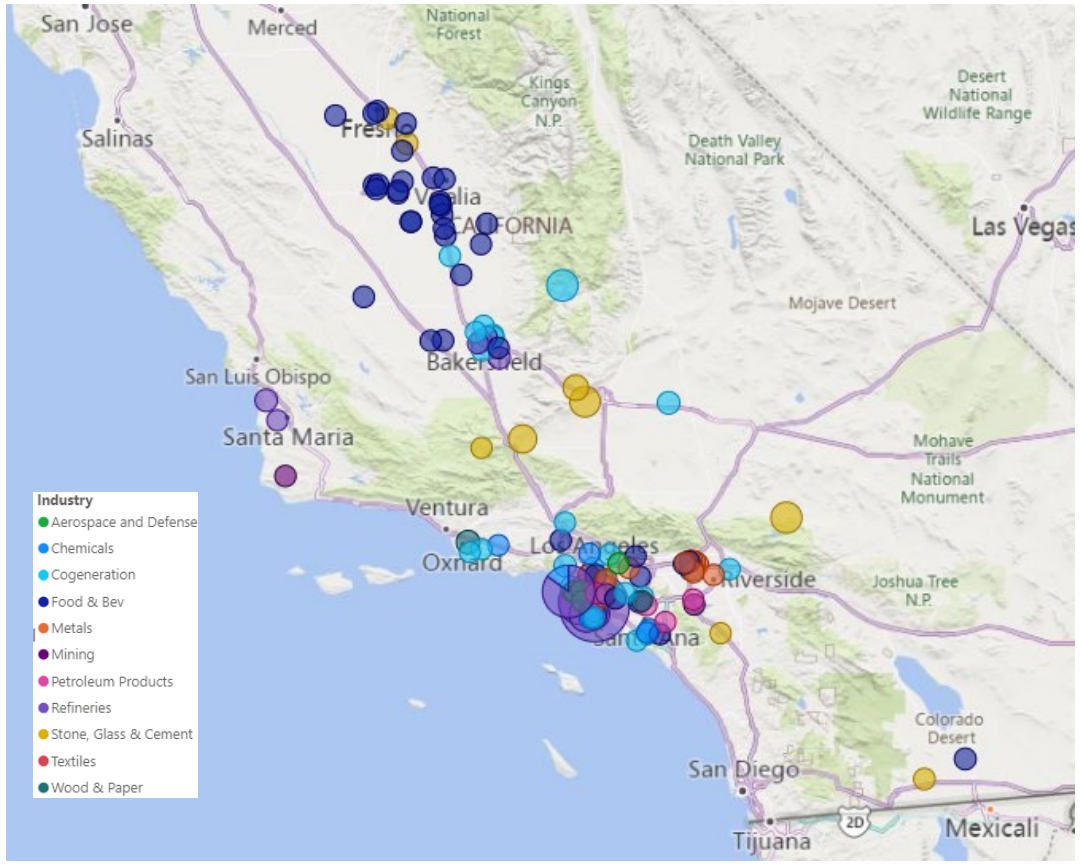
There are current turbines capable of up to ~30% hydrogen blend by volume.

INDUSTRIALS

SoCalGas

Industrials: Overview

Southern California has a diverse industrial base, with multiple industrial sectors across metals, food and beverage, paper, chemicals, and more



Sources: CARB Industrial Facilities Pollution Map, Interviews

- As the largest manufacturing state in the country, California has roughly **25,000 industrial enterprises.**

Key Industrial Sectors in Southern California

- Food and Beverage
- Metals
- Stone, Glass, Cement
- Mining
- Textiles
- Paper
- Chemicals
- Aerospace and Defense
- Refineries
- Petroleum Products

- There is a **significant concentration of industrial activity within Southern California**
- The industrial goods production sector in California currently **employs ~1.3M individuals**

Sub-Sector Opportunity for Clean Hydrogen

Across the industrial sector, there are a multitude of opportunities for hydrogen in different capacities

Cogeneration

CA GHG Emissions[1]	**3.0**	MTCO2e in 2022
Current NG Demand	**110**	BCF in 2021

Sub-Sector Overview

- Largest presence is on oil fields in Kern County and refineries near the Port of Los Angeles
- Locations on additional commercial and industrial facilities

Opportunity for Clean H2

- SB 100 mandates that all retail electricity must come from renewable and zero-carbon resources by 2045
- Fuel switching from natural gas to hydrogen blending and hydrogen turbines

Food & Beverage

CA GHG Emissions[1, 2]	**1.0**	MTCO2e in 2021
Current NG Demand	**18.9**	BCF in 2021

Sub-Sector Overview

- Large number of facilities, primarily concentrated in Central California, near Bakersfield
- Wide variety of food and beverage industries (e.g., dairies, breweries)

Opportunity for Clean H2

- Fuel switching from natural gas for industrial equipment such as heating, cooling, and refrigeration

Stone, Glass, Cement

CA GHG Emissions[1]	**1.7**	MTCO2e in 2021
Current NG Demand	**1.3**	BCF in 2021

Sub-Sector Overview

- Major cement facilities located in Kern County, with smaller glass and cement facilities distributed in the LA Basin
- SB 596: 100% net zero GHG target in cement by 2045

Opportunity for Clean H2

- Short- and medium-term opportunities are for fuel switching for high temperature equipment (e.g. kilns)
- Potential long-term opportunity for synthetic methanol, not currently quantified

Refining

CA GHG Emissions[1]	**10.0**	MTCO2e in 2021
Current NG Demand	**126**	BCF in 2021

Sub-Sector Overview

- Highly concentrated near the Port of Los Angeles and in San Joaquin Valley
- At present, hydrogen used in refineries is produced mainly from natural gas by SMR

Opportunity for Clean H2

- Clean fuel switching from natural gas, and transitioning from grey to clean, renewable hydrogen for refinery direct processes and production of renewable diesel and SAF

Metals

CA GHG Emissions[1]	**0.4**	MTCO2e in 2021
Current NG Demand	**6.8**	BCF in 2021

Sub-Sector Overview

- Primarily concentrated in the Los Angeles Basin
- Large presence of fabricated metal facilities with some high emissions usage primary metals
- No production of raw steel

Opportunity for Clean H2

- Fuel switching from natural gas for high temperature equipment such as boilers and furnaces
- Hydrogen-based direct reduction of iron (DRI) used in raw steel processing (No presence in SoCal)

Pulp & Paper

CA GHG Emissions[1]	**0.7**	MTCO2e in 2021
Current NG Demand	**5.2**	BCF in 2021

Sub-Sector Overview

- Few number of facilities, concentrated in the LA Basin
- Significant cogeneration operations at paper plants and are captured in cogeneration section

Opportunity for Clean H2

- Fuel switching from natural gas for high-temperature industrial equipment such as boilers and kilns

Chemicals

CA GHG Emissions[1]	**1.0**	MTCO2e in 2021
Current NG Demand	**2.6**	BCF in 2021

Sub-Sector Overview

- Few mid-sized chemical facilities, concentrated in LA Basin
- Primary chemicals presence in SoCal is in H2 production, which is not in scope

Opportunity for Clean H2

- Fuel switching from natural gas for industrial equipment such as boilers
- Use as feedstock in chemical processing

Aerospace & Defense

CA GHG Emissions[1]	**0.01**	MTCO2e in 2021
Current NG Demand	**0.8**	BCF in 2021

Sub-Sector Overview

- Large number of businesses in Los Angeles, however, few have sizeable onsite manufacturing
- Many aerospace parts are manufactured in metal fabrication shops, captured in metals category

Opportunity for Clean H2

- Fuel switching from natural gas for industrial equipment such as boilers
- Could serve as an early adopter given the strategic importance of the defense sector

1. Emissions value and current natural gas demand are from large facilities in SoCalGas service territory, 2. Relatively low emissions due to low-intensity processes

Industrials: Methodology – Fuel Switching

Fuel switching H_2 demand within the industrials sector is modelled from the multiplication of the following factors

Total Addressable Natural Gas

Base natural gas demand from eligible large facilities per sub-sector[1]

- CO2e emissions due to natural gas emissions from facilities are brought per sub-sector using the CARB Pollution Map, EPA FLIGHT dataset, and Industry Research
- CO2e emissions are then converted to NG demand

Base natural gas demand is broken out into heating – end use cases. The breakdown of heating – end use case will vary per sub-sector

- Breakdowns, by sub-sector provided by EIA's Manufacturing Energy Consumption Survey
- Breakdown categories related to fuel switching include:
  - Indirect Heat (Boilers)
  - Direct Process Heat (e.g. furnaces, kilns)
  - Indirect Process Heat (e.g., HVAC)

Annual natural gas demand is adjusted to reflect industry growth rates

- Conservative Scenario: No industry growth
- Moderate and Ambitious Scenario: Industry growth is derived EIA's Annual Energy Outlook – Macroeconomic Indicators dataset

Annual natural gas demand is updated to reflect removal of demand that will be electrified

- Electrification is an adoption curve that varies from 2025 – 2045
- Electrification adoption differs per heating end use case

Demand from refineries fuel switching is only included in the ambitious scenario

Natural Gas to Hydrogen Adoption Rate

Adoption rate methodology

1. Adoption factors are assigned impact values and then weighted to develop adoption rates for the short / medium/ horizon terms
2. Short/medium/horizon term adoption rates are translated to annual adoption rates by incorporating a lag parameter that accounts for the percent of the addressable market that can be addressed based on asset lifetime

Key adoption factors used in analysis

1. **Technical Feasibility:** In each sub-sector, the shift in technology feasibility and commercial availability of hydrogen combustion technology (e.g. boilers, kilns) was assessed from 2025 to 2045
2. **Alternatives:** For each heating end-use case, hydrogen technology and availability is compared to the costs and viability of alternatives, namely electrification and CCUS
3. **Business Readiness (Performance Impact & Capital Investment):** Sensitivity of each sub-sector to the capital investments necessary to implement 100% H2 technology and short-term performance impacts from switching to hydrogen
4. **Asset Lifetimes:** In the industrial sector, natural gas assets are expected to be potentially replaced with hydrogen technology near end of life. Depending on the equipment, asset turnover periods can range from 15 – 20 years

1. Eligible facilities are sites located directly in SoCalGas territory or regions where SoCalGas provides wholesale natural gas (e.g. City of Vernon, City of Long Beach)

Industrials: Methodology – Cogeneration

Cogeneration H_2 demand within the industrials sector is modelled from the multiplication of the following factors

Facility-Level Fuel Consumption, 2025-2045

Current Plant Data from EIA 923 and EIA 860

Operator, nameplate capacity, historical generation & fuel consumption on an MMBTU basis, turbine type, summer and winter nameplate capacity, and heat rates.

Cogeneration – Steam Turbines

H2 consumption is determined by calculating the H2 equivalent of current fuel consumption using the ratios of:

- Heat content of hydrogen on an MMBTU basis
- Hydrogen turbine efficiency

Data is taken straight from the EIA 923 and EIA 860 databases, which includes current natural gas consumption at the plant and turbine level on an MMBTU basis

Facility data was filtered to include only facilities in SoCalGas territory

Natural Gas Transition Rate

H2 Upgrade Probability X **System-Wide Capacity Factor** = **Natural gas transitioned in 2045**

Probability for capacity to switch to H2 in 2045 based on commercial availability between H2 and alternatives

- Costs for hydrogen upgrades between various blending levels are calculated at the plant level
- Total profit is determined across H2, CCUS, and battery based on plant capacity, costs, and revenues
- Weighted ratio of profit to comparable power purchase profit across options is used as hydrogen upgrade %

2045 capacity factor based on external studies and interviews, projected future natural gas capacity factors, and current capacity factors, with a range across scenarios

- LADWP projections for hydrogen are used as the starting point, with adjustments based on interviews for the conservative capacity factor
- Capacity factor inputs are updated in moderate and high scenarios based on additional external reports with projected future natural gas capacity factor (Glendale CEC CARB) and current natural gas capacity factor (EIA)

Adoption Curve from 2025-2045

Adoption curve from current consumption to 2045 consumption is determined based on **key milestones and associated adoption factors**

Legislation	Technical Feasibility	Business Readiness
*SB100**	*Timeline to 100% H2 turbines*	

Demand will need to be further mapped to locational areas to assist with other Angeles Link studies

**Ambitious assumption of zero emission at SB100 2045 milestone used, while SB100 framework allows an emission budget*

Industrials: Methodology – Grey to Green Hydrogen Conversion

Grey to Green H_2 conversion demand is included only within the ambitious case, and is modelled by the below factors

Hydrogen Demand – Petroleum Refining

Base Petroleum Refining Demand

- Base production capacity of refinery capacity is pulled from CEC Refinery Inputs and Production report
- Renewable fuels capacity is removed from consideration and refinery utilization rate is identified for each facility to determine total production of petroleum.
- Refinery utilization is identified in CEC Petroleum Watch Report
  - Southern California Utilization – 89%
  - Average California Utilization – 80%

Annual refining demand adjusted to reflect projected decline in petroleum consumption

- 2025: 0%
- 2030: -5%
- 2040: -25%
- 2050: -50%

Hydrogen demand is then identified for petroleum refining

- Assumptions (Industry Research)
  - Sulfur Removal: 0.264kg of H2 per barrel
  - Hydrocracking: 6kg of H2 per barrel

Hydrogen Demand – Renewable Fuels

Currently Announced Production

- Industry research conducted to identify current and future renewable fuel announcement per refinery in SoCalGas territory

Additional production is estimated by evaluating replacement of petroleum refining capacity with renewable fuels production

- As petroleum refining demand decreases, the analysis assumes that a portion of the capacity at utilities will be substituted with production of renewable diesel (RD) and sustainable aviation fuel (SAF)
- Assumptions (SME Input):
  - 25% of petroleum refinement decrease from base capacity will be replaced with RD production
  - 25% of petroleum refinement decrease from base capacity will be replaced with SAF production

- **Hydrogen demand is then identified for renewable fuel production**
  - Assumptions (Industry Research)
    - Renewable Diesel: 1.1 kg of H2 per barrel
    - SAF: 5.3 kg of H2 per barrel

Grey Hydrogen to Green Hydrogen Adoption

Adoption rate assumptions formed using SME input and validated with industry interviews. Adoption rate is scaled linearly in years between assumption points.

2025: 0% of grey hydrogen can be transitioned from grey hydrogen to green hydrogen

2030: 50% of merchant hydrogen can be transitioned from grey hydrogen to green hydrogen; **30% of total refinery hydrogen demand**

2040: 100% of merchant hydrogen can be transitioned from grey hydrogen to green hydrogen; **60% of total refinery hydrogen demand**

2045: 100% of merchant hydrogen can be transitioned from grey hydrogen to green hydrogen and 25% of on-site produced hydrogen can be replaced by green hydrogen; **70% of total refinery hydrogen demand**

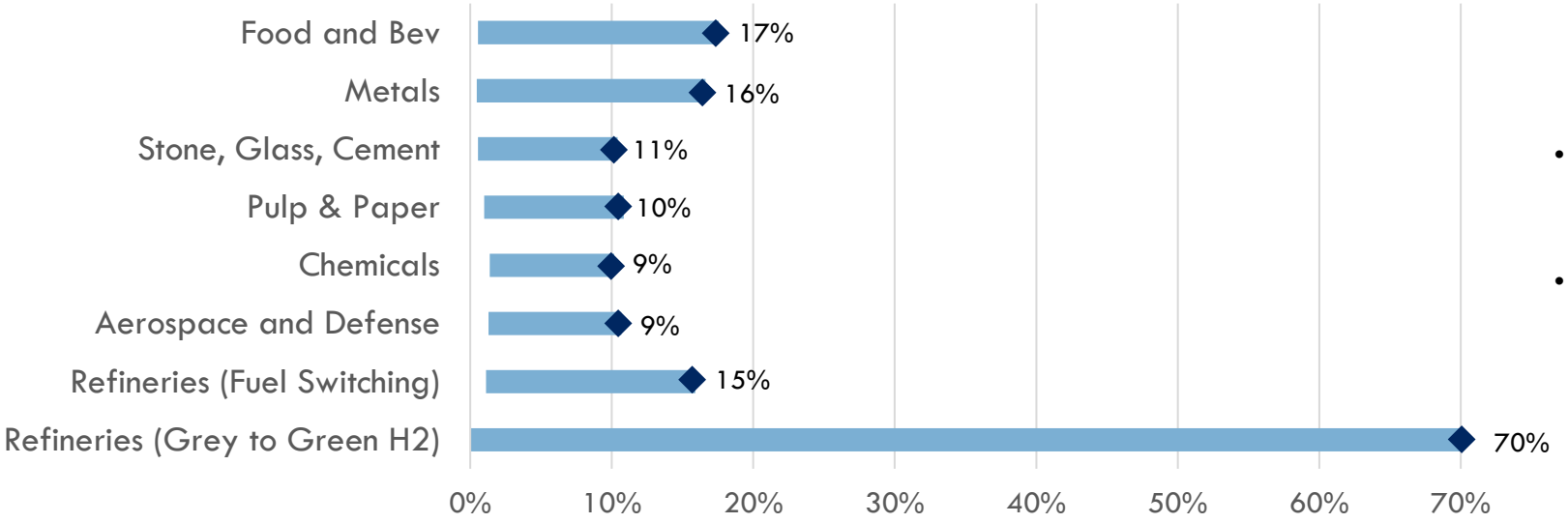
Assumption: 40% of hydrogen used on refineries is produced on site, 60% is merchant hydrogen (commercially procured)

Industrials: Adoption Rates

Fuel switching and green hydrogen demand adoption rates apply to all scenarios whereas cogeneration adoption rates vary per scenario

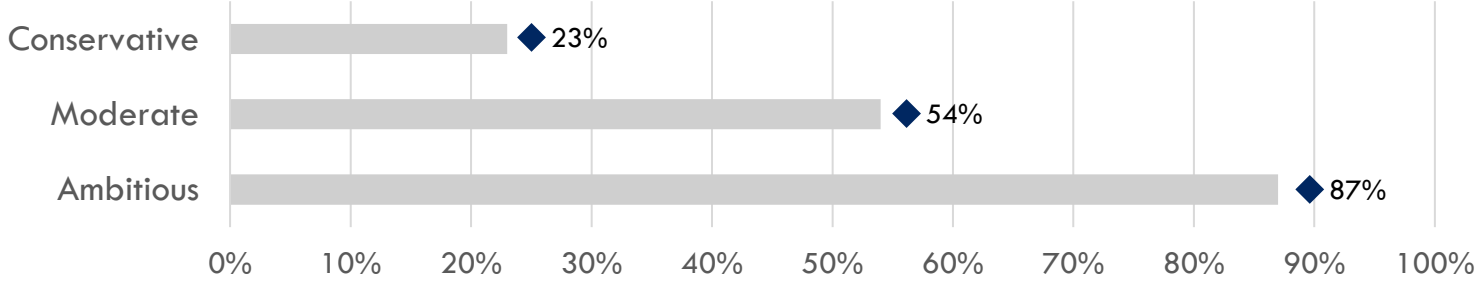
◆ 2045 Adoption Rate

Adoption Rates for Fuel Switching and Grey to Green Hydrogen Demand – All Scenarios



- Higher adoption rates observed in grey to green hydrogen conversion due to high technology readiness and low performance and capital impact, assuming cost parity with existing fuels
- For fuel switching, adoption factors are assigned impact values and then weighted to develop adoption rates for the short / medium / horizon terms
- These short / medium / horizon term adoption rates are translated to annual adoption rates by incorporating a lag parameter that accounts for the percent of the addressable natural gas volume that can be converted to hydrogen based technology based on asset lifetime

Adoption Rates for Cogeneration – Varies Per Scenario



- Transition rate reflects % of plants upgrading to H2 in addition to change from current capacity factors to projected 10-30%
- Key adoption factors used in the analysis include:
  1. Hydrogen Upgrade Probability
  2. Capacity Factor
  3. Policy and Legislation Milestones

Industrials: Assumptions and Considerations

Modelling assumptions and considerations were developed and validated through research & interviews

Model Factor	Assumptions and Considerations	Data Source
Addressable Market	• Only large facilities with significant natural gas emissions were considered for the demand analysis • Facilities that currently produce hydrogen or are jointly developed with companies producing hydrogen were not considered potential end users	CARB Pollution Map, EPA FLIGHT dataset, and Industry Research
Legislation and Regulation	Senate Bill 100 • Requires renewable energy and zero GHG emissions resources to supply 100% of electric generation by 2045 • Provides interim milestone of 60% of electric retail sales to be met by eligible renewable resources by 2030 Senate Bill 596 • Requires cement producers to reduce GHG emissions by 40% by 2030 and sets a target for 100% net-zero GHG emissions by 2045 Senate Bill 32 • Requires CARB to ensure that the state's GHG levels are reduced to 40% of 1990 levels by 2030 Assembly Bill 1279 • Requires CARB to ensure that the state's GHG levels are reduced to 85% of 1990 levels by 2045	SB100 , SB 596, SB 32, AB 1279
Technical Availability	• For most industrial facilities within SoCalGas's territory, the primary opportunity for hydrogen will be fuel switching for process heat, switching from natural gas-based combustion to hydrogen-based combustion technology • An estimated 40% of emissions from the cement industry are from combustion, the remaining emissions are from the production of clinker • Hydrogen adoption for industrial and commercial sited cogeneration turbines is expected to follow the same levels of technical feasibility growth as the other cogeneration turbines described in the Power sector section of this report.	Industry Research, Interviews with Facilities Operations

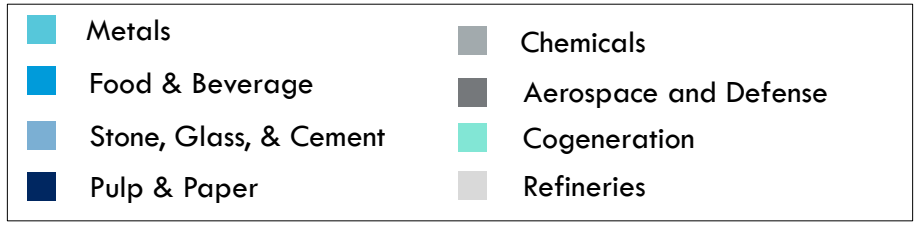
Commercial Availability and Alternatives	• Currently, there is a prohibition on transporting CO2 via pipeline in California for purposes of carbon capture and storage (CCS)
	• Certain heating processes are expected to be electrified and non-addressable for hydrogen uses. These electrification rates begin at 0% and scale to the following values by 2050:
	  • Boilers: 5%
	  • Direct Heating Application: 5% - 20%
	  • Direct Nonprocess uses: 80%
	  • Feedstock: 0%
	• Cogeneration commercial availability parameters are expected to be the same as commercial availability for peaker and baseload plants
		EPRI analysis

Business Readiness	• Facilities will only consider replacement of existing equipment with hydrogen-based technology when existing assets near end of life • Turnover period for boilers and direct process heat equipment is 20 years, turn over period for non-direct process heat equipment is 15 years • Facilities can blend up to 20% hydrogen with minimal increase in technology and cost penalties • Cogeneration business readiness parameters are expected to be the same as commercial availability for peaker and baseload plants	EPRI Analysis, Validated through Interviews
Sector Growth	• In the conservative scenario, industry growth is 0% for all sub-sectors as no additional increase in industrial goods production is expected • In the moderate and high scenario, natural gas usage is expected to increase in-line with increase in industrial goods production per sub-sector • No additional increase in demand at cogeneration facilities across all scenarios	EIA's Annual Energy Outlook Macroeconomic Indicators dataset

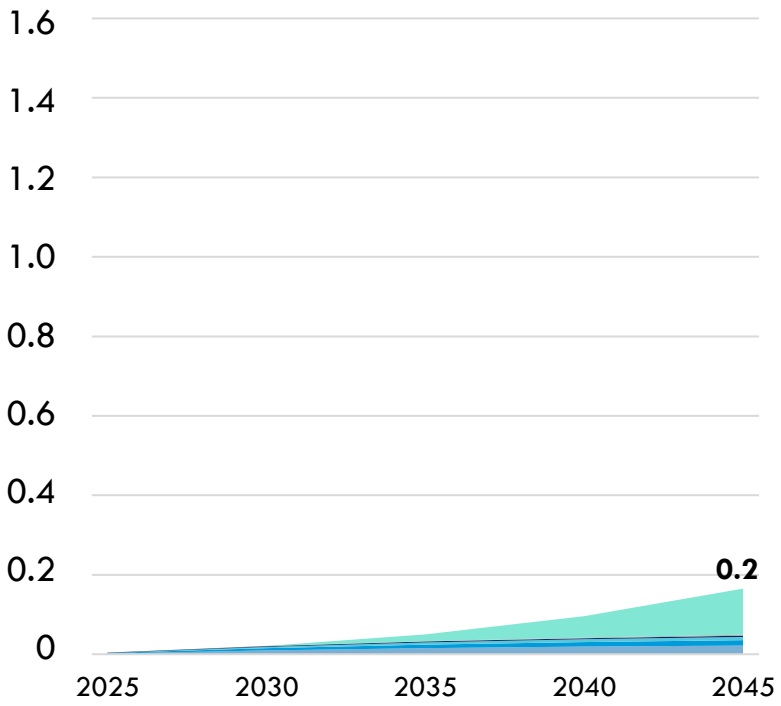
Industrials: Outputs

Total Expected Clean Renewable Hydrogen Demand

Values in million TPY | Reflects SoCalGas service territory only

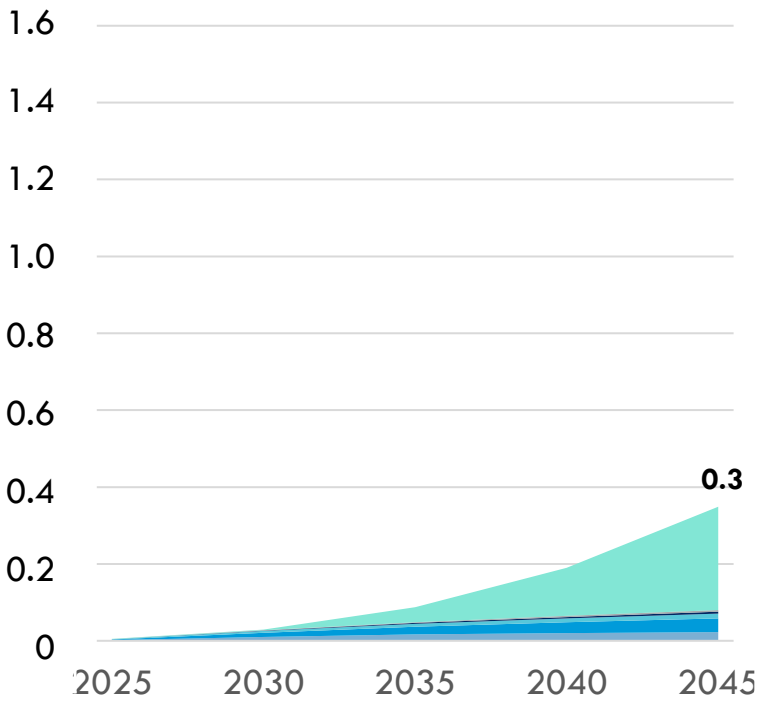


Conservative Case (M TPY)



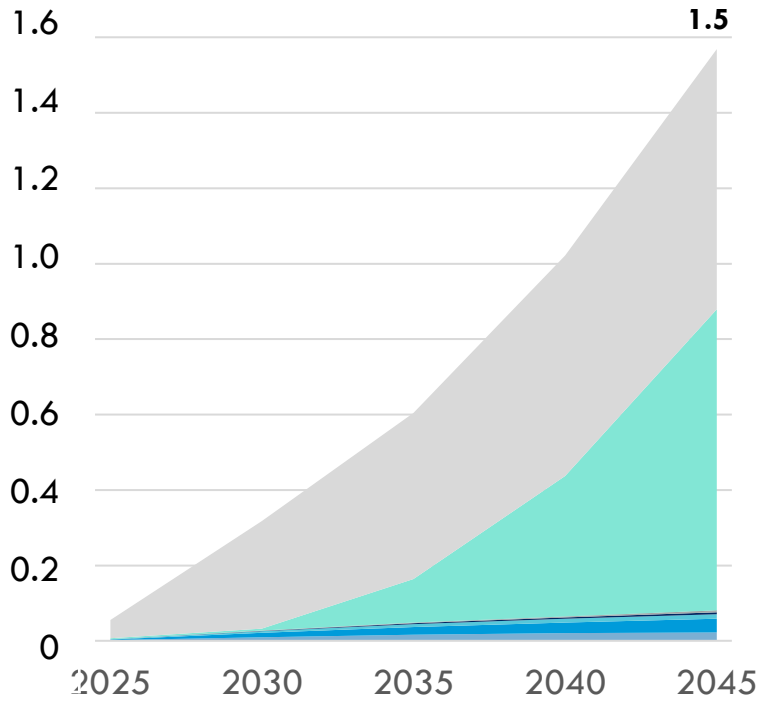
- No production expanse in California for identified industries; facilities will not expand beyond current production capabilities. Increased demand will be satisfied by out of region facilities
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 10%

Moderate Case (M TPY)



- California facilities will expand production in existing or new facilities to match growing market demand
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 20%

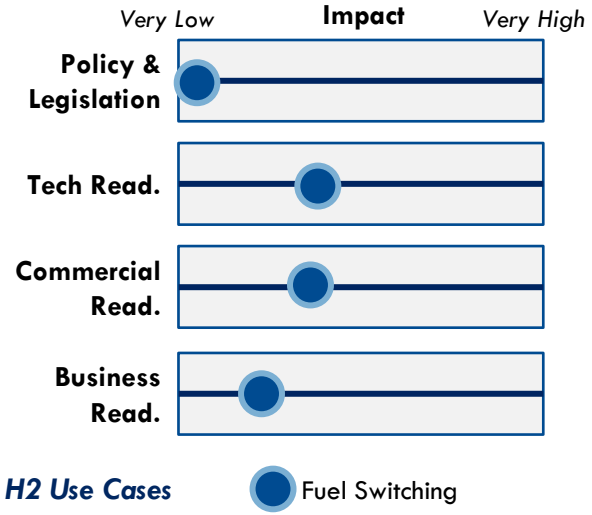
Ambitious Case (M TPY)



- Potential decarbonization legislation or market drivers in the refining industry could lead refineries to gradually transition to green H2
- California facilities will expand production in existing or new facilities to match growing market demand
- Cogeneration – Capacity factor of 30%

Sample Use Cases | Food & Beverage

Major Southern California Facilities



Food & Beverage

H2 Demand Forecast

14k – 36k

TPY by 2045

Statistics

Estimated Annual NG Usage: 18.1 BCF

Policy & Regulation Considerations

Besides Cap-and-Trade, there are no current policy mandates regarding the reduction of greenhouse gases. Notable regulations affecting H2 demand are the NOX limits set forth by the SQAMD.

Industry Characteristics

There are a wide variety of food and beverage industries in Southern California (e.g. dairies, breweries). Decarbonization pathways related to hydrogen adoption are expected to be similar across industries.

Many food & beverage plants are in more remote locations compared to other industries, which makes the availability of energy infrastructure a challenge for any shifts to alternative energy sources

The predominant sources of carbon emissions in this sector are due to heating, cooling, and refrigeration.

Case Study: Budweiser Brewing Group UK&I

Budweiser Brewing Group UK&I collaborates with green energy firm Protium, introducing a large-scale hydrogen generation system in their South Wales brewery, eliminating 15,500 tons of CO2 emissions annually. The existing on-site wind and solar assets will be used to manufacture the green hydrogen at Protium's hydrogen production facility. The facility will also include a hydrogen refueling station for heavy goods vehicles (HGVs) used to transport beer on-site. It will be the first large-scale hydrogen generation system installed at a brewery in the UK. This pioneering move is driven by AB InBev's global commitment to source 100% renewable electricity by 2025. "Hydrogen... could play a crucial role in supporting the transition to a decarbonized global economy," stated the company. (Source)

Operational Characteristics

Food & beverage processing facilities often run 24/7, with few idle periods apart from needed maintenance. Some types of food processing plants will have potential longer idle periods (e.g. tomato processing) due to seasonal agricultural trends

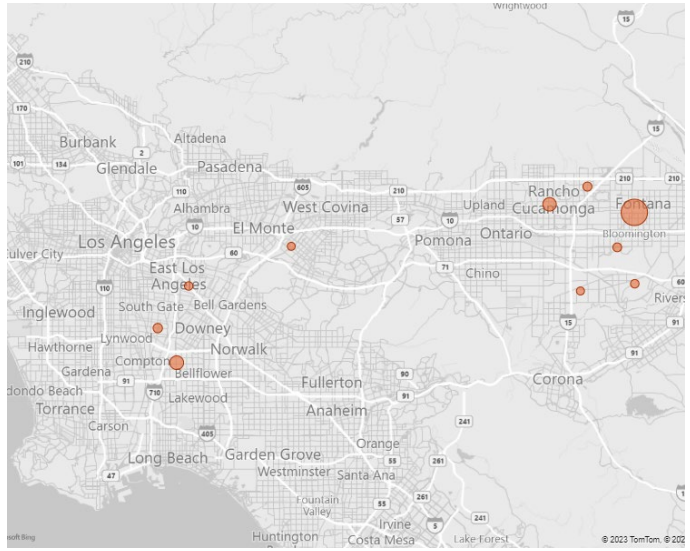
Key equipment (e.g., dryers) can have long lifetimes, lasting 20+ years

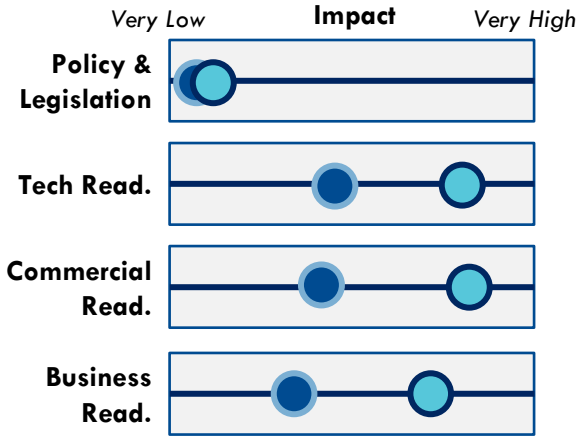
Natural gas usage and supply is integrated across multiple processes and sections within a facility.

Data and insights based on interviews, market research, and Accenture calculations from EPA's Facility Level GHG Emissions database

Sample Use Cases | Primary and Fabricated Metals

Major Southern California Facilities





H2 Use Cases Fuel Switching Direct Reduced Iron

Primary and Fabricated Metals

H2 Demand Forecast

8.1k -12.3k

TPY by 2045

Statistics

Estimated Annual NG Usage: 6.7 BCF

Policy & Regulation Considerations

Besides Cap-and-Trade, there are no current policy mandates regarding the reduction of greenhouse gases. Notable regulations affecting H2 demand are the NOX limits set forth by the SQAMD. New "Buy America" provisions in recent federal infrastructure acts stipulate preferences for domestically manufactured steel, potentially increasing demand

Industry Characteristics

Metals industry serves a wide variety of critical industries in California (e.g., construction, automotives, aerospace & defense)

Southern California metals industry does not consist of raw ore processing, which is the largest potential adopter of hydrogen in the industry through the use of Direct Reduced Iron (DRI).

While decarbonization of the metals industry has been progressing slowly in the US, there have been significant efforts in Europe. The European steel industry has set goals to cut carbon emissions by 55% by 2030 and reach climate neutrality by 2050.

Case Study: Cleveland-Cliffs

Cleveland-Cliffs completed a hydrogen injection trial at its Middletown Works blast furnace in Cleveland, OH during May 2023. This trial was the first H2 injection trial in North America. The hydrogen was delivered via existing pipeline infrastructure in place for the facility's other hydrogen uses, including for its annealing furnaces. Notable quote from Cleveland-Cliffs CEO states ""This achievement proves our ability to use green hydrogen throughout our footprint when it becomes readily and economically available…"

Operational Characteristics

Primary metal facilities often run 24/7, with few idle periods apart from needed maintenance, whereas fabricated metal facilities can have more downtime between operations depending on the end products

Furnaces and other key equipment have long lifetimes, lasting 30+ years in operation

Natural gas usage and supply is integrated across multiple processes and sections within a facility.

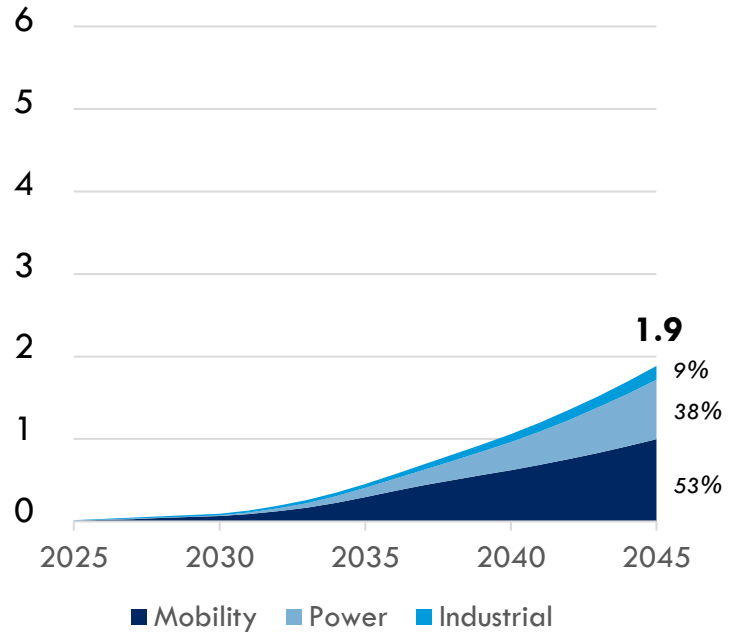
Data and insights based on interviews, market research, and Accenture calculations from EPA's Facility Level GHG Emissions database.

SUMMARY OF PRELIMINARY OUTPUTS

Overview of Preliminary Clean Renewable Hydrogen Demand Outputs

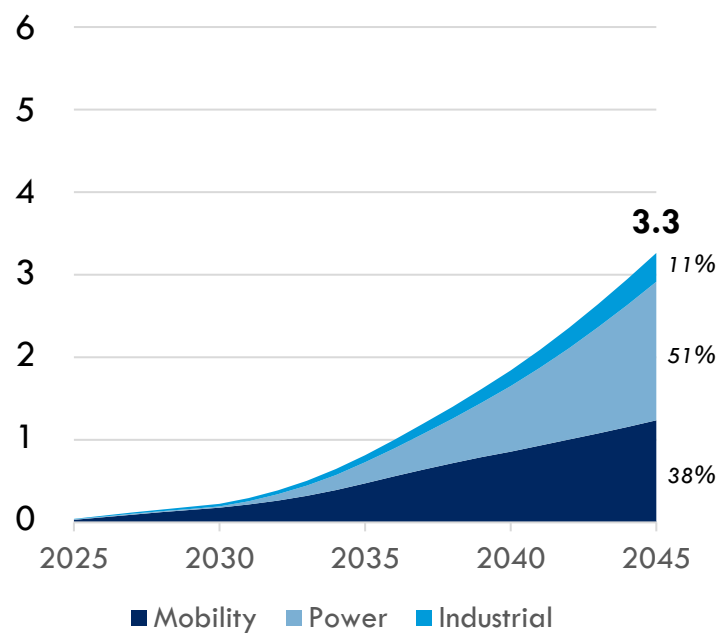
Total Expected Clean Renewable Hydrogen Demand Values in million TPY | Reflects SoCalGas service territory

Conservative



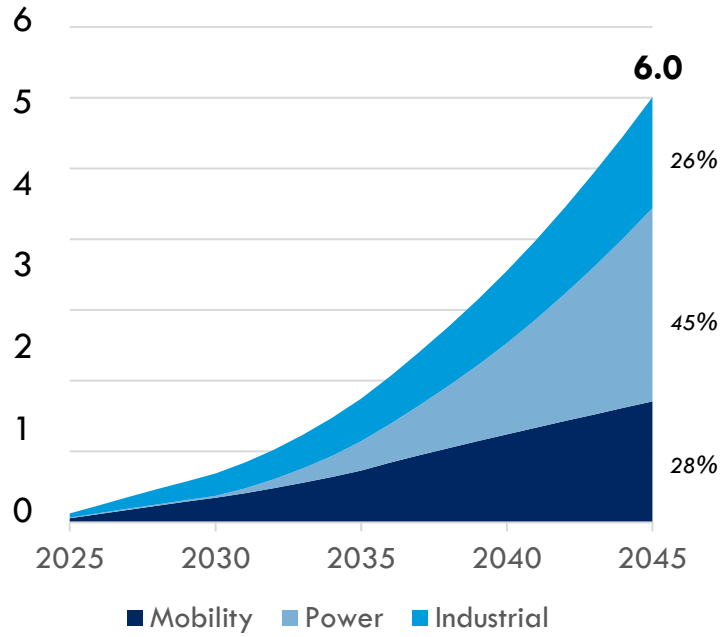
The conservative scenario reflects current legislation and conservative estimates for H_2 adoption factors and/or utilization rates. **Mobility drives majority of demand** in the conservative case

Moderate



The moderate scenario reflects assumptions of higher hydrogen adoption and utilization compared to the conservative case, with **Power taking on a larger share of hydrogen demand**

Ambitious



Significant growth occurs in the power and industrial sectors in the ambitious case, driven by **higher capacity utilization in Power and incorporation of refinery demand in Industrials respectively**

APPENDIX

SoCalGas

Summary of PAG & CBO Feedback

Not Exhaustive

Feedback Topic	Feedback Description	SoCalGas Response
Localized Hub Scenarios	1. A localized hub scenario should assess the availability of the precursors for hydrogen generation and the feasibility of generating hydrogen near the main source of demand. Such a scenario would evaluate both the existing water and energy transmission infrastructure, and the ability to expand such infrastructure to facilitate the development of hydrogen generation near the main source of demand.	1. The Demand Study includes a locational factor, which when integrated with the Production study, will inform the pipeline scenarios, including the localized hydrogen hub.
Alignment with State & Federal Agency initiatives	1. The technical approach for the demand study should clarify collaborative efforts with regulatory agencies such as the air districts and California Air Resources Board (CARB), as well as Original Equipment Manufacturers (OEMs) involved in the hydrogen production. 2. Alignment with the DOE H2 roadmap and any national plans related to hydrogen pipelines should be part of the market validation. 3. The analysis of demand should consider the potential future demand created by federal/state hydrogen hub efforts to ensure the project's long-term viability.	1. The demand study includes market participant interviews and peer review sessions with organizations (e.g. CARB, ARCHES, CEC) to ensure that it is well informed and aligned to the state's hydrogen efforts. 2. The Demand Study takes into account projects that have been publicized and that may be part of hydrogen hub efforts. 3. SoCalGas is collaborating with ARCHES as a part of the statewide hydrogen hub efforts.
Alternatives	1. The Demand Study should include numerous inputs and outputs. Each alternative listed should be analyzed as a component of the demand study. 2. Scattergood is trying to mix biogas with hydrogen fuel cell, interested to know if this will be considered. 3. The demand study should explore new sectors that were not previously served by Compressed Natural Gas (CNG), as hydrogen can serve both combustion and electricity generation purposes.	1. Hydrogen costs, production and supply, and overall alternatives will be covered in other Angeles Link Phase 1 studies. The Demand Study does consider hydrogen alternatives at the end user level across the three sectors modeled: mobility, power generation, and industrials. 2. The Demand Study will be considering end users blending hydrogen at the end use for power generation, but is not assessing what other fuels besides natural gas that the hydrogen will be mixed with. 3. The demand study explores fuel switching which includes both diesel and natural gas in the mobility and power gen sectors, and does not look at sectors with significant CNG use.
Grid Reliability	1. It is important that Phase 1 include assessments of the proposed infrastructure against chronic and acute events that may threaten its operation. As LADWP decarbonizes it's power system with variable energy resources like solar and wind, it will need green-hydrogen-fueled firm power generation to maintain system reliability and resiliency. It is critical that the green hydrogen supply is available when called upon. 2. It is imperative to assess the demand not only for prime power generation but also for clean backup power generation and the support of microgrids.	1. An assessment of chronic and acute events that may threaten operation is not within scope of the Demand Study. 2. The Demand Study takes into account cogeneration needs along with natural gas peaker plants.
Cost of Hydrogen	1. Hydrogen demand forecasts should include more than the total demand by year, it should also include demand by end use by year for at least 5 hydrogen cost levels. The hydrogen cost levels should be (1) current costs (2) the DOE's $1/kg cost goal (plus the cost of all delivery infrastructure required to get the hydrogen to the end customer, SoCalGas profits, financing costs, O&M costs and other costs); (3) three cost points distributed green hydrogen & DOE goal costs 2. Estimated pricing for hydrogen is currently DOE $1/kilogram, but if the cost ends up being higher, the demand might not be the same. Clarify how the demand analysis will approach this.	1. Hydrogen costs, production and supply, and overall alternatives will be covered in other Angeles Link Phase 1 studies. 2. The Phase 1 Demand Study aims to understand potential end users, end uses, and demand with less price constraints. Refer to cost assumptions on page 25. Hydrogen costs will be assessed in the High-Level Economic Analysis & Cost Effectiveness Study.
Storage Facilities	1. Scope of work missing commitment to closing the Aliso Canyon methane gas storage facility and the Playa del Rey methane gas storage facility.	1. Assessing current storage facilities are not within scope of the Demand Study.

Sub-Sector Specific In-Scope Analyses

	Included	Excluded
On-Road	• Heavy Duty Transit, Medium Duty Vehicles, Cargo Handling Equipment	• Light Duty Vehicles
Off-Road	• Cargo Handling Equipment, Ground Support Equipment, Agricultural Equipment, Construction & Mining Vehicles	
Marine	• Commercial Harbor Craft, Ocean Going Vessels	
Aviation	• Hydrogen Fuel Cell Aviation Vehicles	• Sustainable Aviation Fuel (Included in Industrials under Refineries
Baseload Combustion Generators	• Baseload Power Plants in SCG territory	• Any facilities below 1MW • New potential hydrogen power generation capacity
Flexible / Peaker Combustion Generators	• Peaker Power Plants in SCG territory	• Any facilities below 1MW
Food and Beverage Manufacturing	• Large food and beverage processing and manufacturing facilities identified in CARB pollution map or EPA FLIGHT databases	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Primary and Fabricated Metals	• Large primary metal and fabricated metal facilities identified in CARB pollution map or EPA FLIGHT databases • Primary metals includes steel processing and aluminum production facilities	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Stone, Glass, and Cement	• Large stone, glass, and cement manufacturing facilities identified in CARB pollution map or EPA FLIGHT databases • Stone includes both gypsum and clay processing facilities	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Wood and Paper	• Large paper processing facilities identified in CARB pollution map or EPA FLIGHT databases	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Chemicals	• Large chemical production and processing facilities identified in CARB pollution map or EPA FLIGHT databases	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases • Current hydrogen manufacturers
Co-Generation	• All cogeneration facilities identified in EIA 923 and EIA 860 databases	• Any facilities below 1MW
Aerospace and Defense	• Large aerospace and defense manufacturing facilities	• Any aerospace and defense facilities without manufacturing capabilities • Small facilities
Refineries	• Large petroleum refineries	• Facilities producing alternative fuels in direct partnership with existing hydrogen suppliers

ANGELES LINK

Environmental and Environmental Social Justice Analysis

Scope Revision Discussion

August 2023

SoCalGas

Summary of Changes

ANGELES LINK

- We heard your comments at the last PAG/CBOSG meeting regarding the proposed Environmental Social Justice (EJ) analysis
  - We are grateful for the feedback and have incorporated it into our study scope
- Based on your recommendations, we have taken a more outreach focused approach
- The EJ analysis portion of this study will now have two parts:
  - Part 1: EJ analysis using desktop tools developed by public agencies
  - Part 2: A stakeholder engagement plan, which will be developed with your input and implemented in Phase Two of the Angeles Link Project

Summary of Changes

ANGELES LINK

- A stakeholder engagement plan for addressing and mitigating impacts to disadvantaged communities will be drafted with PAG/CBOSG input
  - Development of the plan will be part of Phase One
  - Boots on the ground outreach to communities will occur during Phase Two when Project routing is further defined
- Input is welcome and will be considered for incorporation. Examples of input include:
  - Pertinent EJ Studies
  - Examples of mitigation
  - Relevant work completed by academia and/or agencies

Part 1: EJ Analysis

ANGELES LINK

» Part 1: EJ Analysis Methodology

- Similar mapping exercise as Desktop Environmental Analysis
- Identify disadvantaged communities (DACs) along the planned routes using agency adopted EJ desktop tools
- Analyze potential impacts and benefits to communities along the planned routes
- Include census tract info including socioeconomic, language, race, etc.

SoCalGas

Part 2: Stakeholder Engagement Plan (New)

ANGELES LINK

- The purpose of the stakeholder engagement plan is to establish an approach/strategy for engaging disadvantaged communities in Phase Two that may be impacted by the project
- Stakeholder engagement focused on:
  - Gathering community input
  - Education of hydrogen-related topics and benefits of clean renewable hydrogen
- Identify communities of concern through PAG/CBOSG input and utilization of EJ mapping tools
- Report of engagement activities conducted in Phase One
  - Include Project modifications accepted based on PAG/CBOSG feedback
- Demonstrate how Phase One aligns with the California Public Utilities Commission (CPUC) Environmental and Social Justice Action Plan and Assembly Bill 617

Future Opportunities for Stakeholder Input

- Continue to solicit input on Phase One milestones
  - Prior to finalizing study descriptions
  - Prior to finalizing the technical approaches
  - Following receipt of preliminary data and findings
  - Upon receiving draft reports
- One comment period allocated for each milestone
  - Comment periods typically will be 30 days
- Feedback will be provided through the following repositories:
  - Designated email address
  - Mail
  - Interim and quarterly meetings
  - Online form

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Discussion

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Appendix

CPUC Environmental and Social Justice (ESJ) Action Plan (2022)

- "The ESJ Action Plan is intended to serve as a resource for CPUC staff, intervenors, stakeholders, and the public. The goals and objectives provide the broad vision and steps the CPUC will take to ensure equity in its programs and services."
- https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/news-and-outreach/documents/news-office/key-issues/esj/esj-action-plan-v2jw.pdf

CPUC ESJ Action Plan
Goals 1 and 2

- Goal 1 - Consistently integrate equity and access considerations throughout CPUC regulatory activities
- Goal 2 - Increase investment in clean energy resources to benefit ESJ communities, especially to improve local air quality and public health
  - 2.1 Outreach & Engagement
    - Broaden and deepen outreach and engagement with ESJ communities early in proceedings and processes related to resilient, clean energy
  - 2.2 Research & Analysis to Understand Impact
    - Further research and analytical opportunities to understand impacts in ESJ communities
  - 2.4 Address Impacts in ESJ Communities

CPUC ESJ Action Plan
Goals 4 and 5

- Goal 4: Increase climate resiliency in ESJ communities
  - Emphasize Adaptive Capacity
- Goal 5: Enhance outreach and public participation opportunities for ESJ communities to meaningfully participate in the CPUC's decision-making process and benefit from CPUC programs
  - 5.1 Improve Communication with ESJ Lens
  - 5.2 Continue to Emphasize Engagement with CBOs
  - 5.3 Build Pathways for Public Participation
  - 5.4 Enhance Engagement with Particular ESJ Communities and Individuals

CPUC ESJ Action Plan
Goal 7

- Goal 7: Promote high road career paths and economic opportunity for residents of ESJ communities
  - 7.1 Maximize Authority to Promote High Road Career Paths
  - 7.2 Educate on High Road Careers
  - 7.3 Partner with Utilities and Sister Agencies

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ESJ Action Plan
Other Goals

» What about goals not mentioned?

- Goal 3 refers to metrics for CPUC staff to meet in other industries it regulates (i.e., water, transportation)
- Goal 6 refers to CPUC enforcement actions
- Goal 8 refers to CPUC goals for training its staff on EJS
- Goal 9 refers to CPUC goals for monitoring success of the program

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Assembly Bill 617 Communities

- The California Air Resources Board (CARB) established the Community Air Protection Program (CAPP) to reduce exposure in communities most impacted by air pollution
  - Community members work with local air districts to conduct air monitoring and prepare community emissions reduction programs
  - Strategies to reduce air pollution or exposure at the community level include new regulations, targeted incentive funding, enhanced enforcement, and coordinating efforts with other agencies based on community priorities

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Assembly Bill 617 Communities

» Community Air Protection Program (CAPP)

- In 2018, CARB selected an initial ten communities for community air monitoring and/or community reduction programs under the CAPP
  - Additional communities for inclusion in the program have been selected annually since 2018
- Communities enrolled in the CAPP that may be potentially affected by the Project will be identified in the Desktop Environmental EJS Analysis

August 29, 2023
2 - 4 p.m.

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PLANNING ADVISORY GROUP

DEMAND & ENVIRONMENTAL JUSTICE ANALYSIS WORKSHOP

Warm welcome to our participants!
We will be starting shortly after 2:00 p.m. to make sure everyone is present.

SoCalGas™

HOUSEKEEPING:

This meeting will be recorded (video and audio), and a court reporter will be transcribing the meeting. Please announce yourself before you speak.

Zoom microphones are muted by the host to eliminate background noise. You will need to unmute your microphone when called on to speak.

We encourage you to turn on your cameras so we can better engage with you.

Please feel free to use the Zoom chat to provide input and ask questions throughout the meeting.

If you would like to speak, please use the "Raise Hand" button at the bottom of the Zoom screen.

AGENDA

- Self-Introduction
- Environmental Justice Analysis
  - Member Discussion
  - Zoom Poll
- Demand Study Analysis
  - Member Discussion
- Next Steps

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Self-Introductions

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ENVIRONMENTAL AND ENVIRONMENTAL SOCIAL JUSTICE ANALYSIS

SCOPE REVISION DISCUSSION

AUGUST 2023

SoCalGas™

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Member Discussion

Please announce your name and speak directly into the microphone

Be concise and focus on discussion topics

Verbal comments are not the only way to provide input, feel free to type a chat

We are accepting input after this meeting if we run short on time or you think of things later

ANGELES LINK

Zoom Survey

Survey

How familiar are you with the supplemental Demand materials provided last **week?**

Very familiar

Somewhat familiar

Somewhat unfamiliar

Very unfamiliar

What Demand topics are you most interested in discussing?

Scope & Process

Methodology

Preliminary Outputs: Mobility

Preliminary Outputs: Power

Preliminary Outputs: Industrial

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DEMAND STUDY ANALYSIS - HIGHLIGHTS

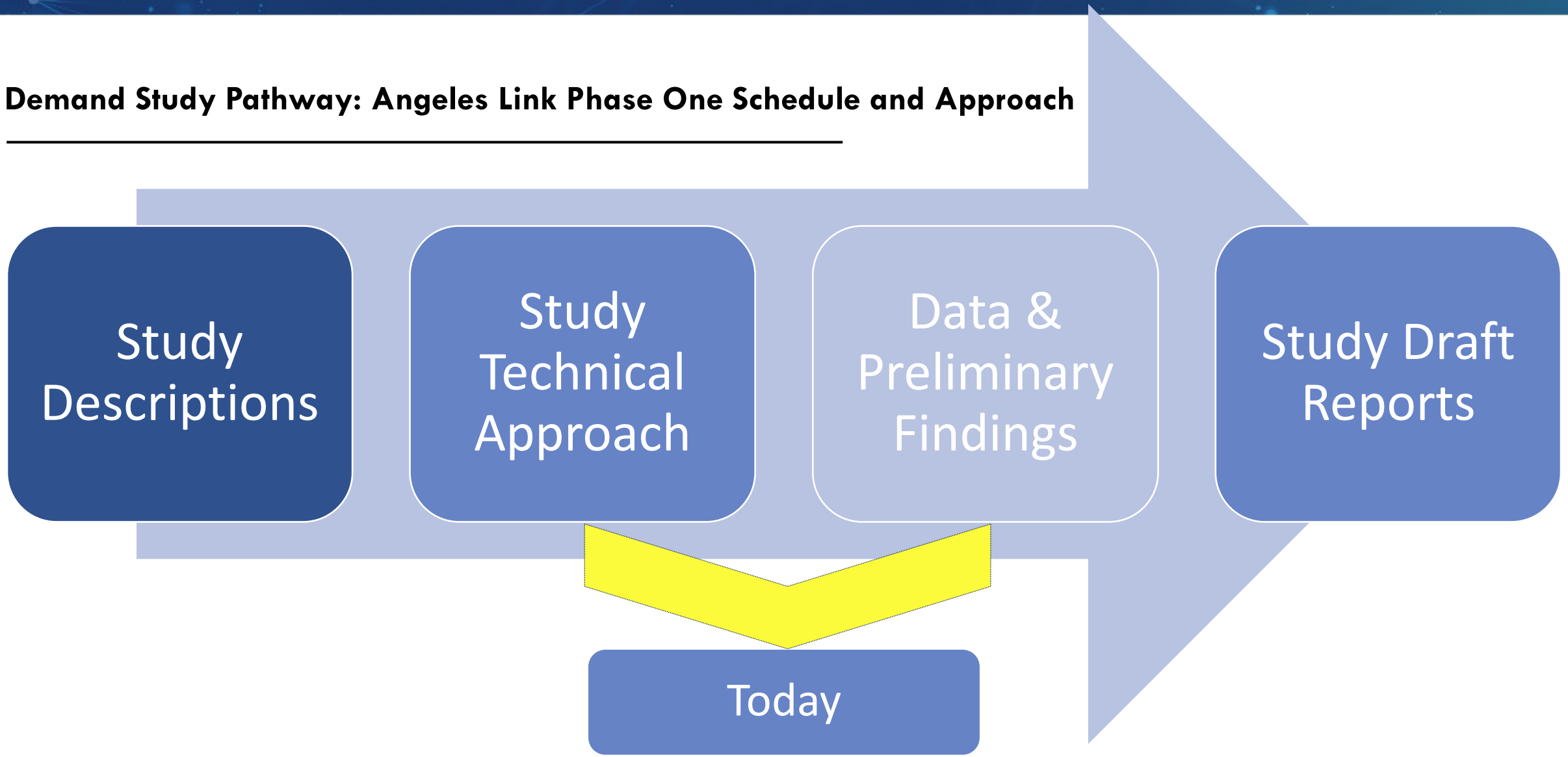
Technical Approach and Preliminary Outputs

August 2023

SoCalGas™

DEMAND STUDY: INTRODUCTION AND AGENDA

Demand Study Pathway: Angeles Link Phase One Schedule and Approach



SCOPE, PROCESS, METHODOLOGY

SoCalGas

DEMAND STUDY: INTRODUCTION AND AGENDA

Recap

- December, 2022: CA Public Utilities Commission (CPUC) approves SoCalGas' request to establish the Angeles Link Memo Account
- **Demand** and **End Uses** for Angeles Link is one of 16 feasibility studies
  - CPUC directs SoCalGas to identify demand and end uses for Angeles Link and make the data, findings, and results available to the public (General Order 66-D)
- The **Demand Study** focuses on investigating the potential hydrogen demand across select sectors in SoCalGas' service territory from 2025 – 2045.

Presentation Objectives

Approach and Methodology

Provide a high-level overview of the model development process

Modeling Assumptions

Share important inputs, assumptions and inputs across modeled sectors

Analysis Outputs

Present a summary view of preliminary model outputs

Key Considerations on Scope and Areas for Further Analysis

- This analysis focuses on a bottom-up assessment of demand potential for clean renewable hydrogen across the Mobility, Power Generation, and Industrial sectors
- To be conservative, the model does *not* account for certain variables that would be expected to increase future demand for hydrogen, such as:
  - Use of hydrogen to facilitate energy system reliability and maintain Loss of Load Expectations against an increasing share of intermittent renewable resources on the grid
  - Potential additions to generation capacity to meet demand growth in 2045, as seen in the projected new resources identified in CARB's Scoping Plan (including approximately 9 GW of hydrogen turbine capacity)
  - Carbon pricing (e.g., LCFS and cap-and-trade) impacts on demand which may be influenced by pending regulatory proceedings
- These variables may be further assessed in future studies

Demand Analysis Approach

An initial model was developed and revised through input from potential end-users and market participants

Model Definition

- Establish a clear set of objectives, scope, and approach for the demand analysis
- Assess academic and market analysis to identify priority sub-sectors and applications for clean hydrogen demand

Model Buildout

- Develop detailed model methodology; identify relevant datasets and inputs
- Quantify total addressable market for clean hydrogen and estimate adoption rates for each sub-sector and application by evaluating alternatives

Model Refinement (In Progress)

- Share preliminary outputs with PAG / CBO members and gather feedback
- Incorporate feedback (where possible) into the model and integrate findings with other Angeles Link Phase One studies

Sector Interviews & Peer Reviews (In Progress)

- Conduct targeted interviews with subject matter experts across industry, academia and government agencies to test model approach, inputs, assumptions and outputs

DEMAND MODEL METHODOLOGY

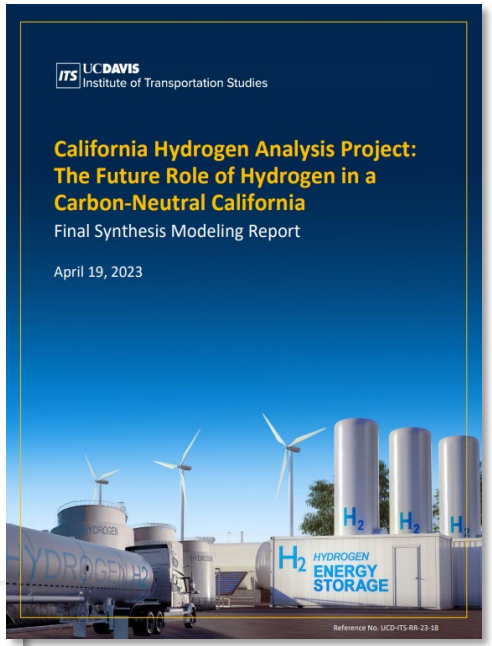
The model methodology projects transition of current fuel to hydrogen for priority sub-sectors, with validation through end user interviews and peer reviews

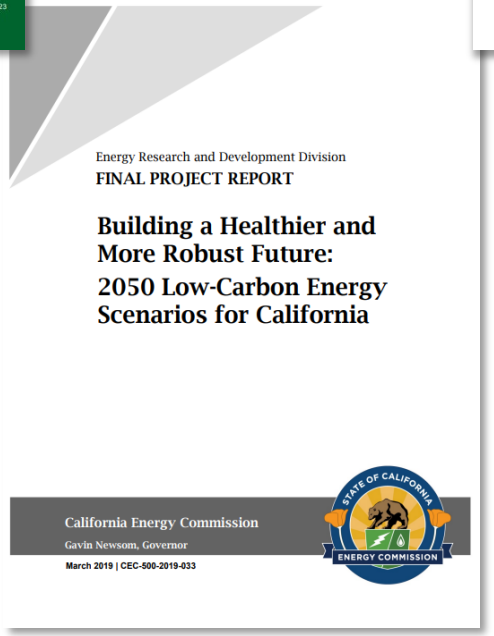
- **Identify** top sub-sectors using historical natural gas, diesel, and gasoline consumption data
- **Align** on key data sets and assess how to close information gaps
- **Test** technical feasibility to help fill information gaps

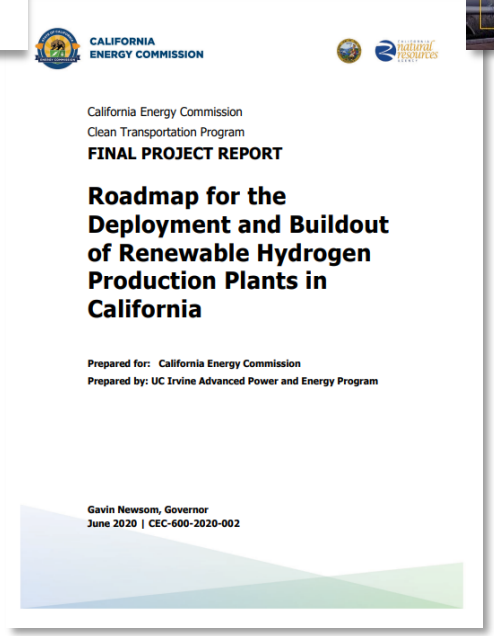
- **Model Total Addressable Market (TAM)** to determine industry growth rates and define industry-specific characteristics
- **Apply Zero-Emission (ZE) and H2 adoption rates to TAM** to forecast net-zero transition broadly and hydrogen specifically using key adoption factors
- **Develop demand scenarios** through qualitative assessment of decarbonization alternatives, technology commercialization, and cost to adopt hydrogen

- **Interview** end-users and conduct peer reviews
- **Engage** Planning Advisory Group (PAG) and Community-Based Organization Stakeholder Group (CBOSG)
- **Incorporate feedback from PAG/CGO** as appropriate

RESEARCH OVERVIEW







SCENARIO AND ADOPTION RATE OVERVIEW

Description of Scenarios

Conservative

- No new legislation but continued progress in hydrogen viability
- Hydrogen is adopted across sectors and sub-sectors where alternatives are considered less viable

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Moderate

- No new legislation but increased hydrogen viability, driving higher adoption rates across sectors and sub-sectors

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload, Cogen

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Ambitious

- More ambitious policies are put in place and businesses are incentivized to support widespread hydrogen adoption

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV,* Aviation

Power: Peaker, Baseload, Cogen

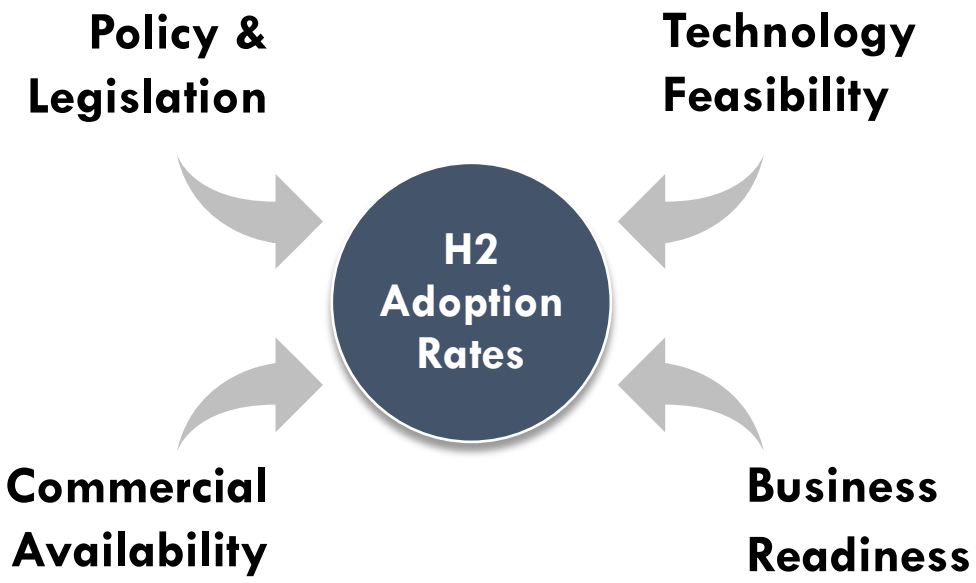
Industrials: Refineries, Cogen, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

*HDV (Heavy Duty Vehicles), MDV (Medium Duty Vehicles), CHE, (Cargo Handling Equipment), GSE (Ground Support Equipment), Ag (Agricultural Equipment), C&M (Construction & Mining Vehicles), CHC (Commercial Harbor Craft), OGV (Ocean Going Vessels; *Diesel consumption only, not main engine heavy fuel)*

Cogeneration in Conservative and Moderate scenarios excludes cogeneration plants at refineries

Base market growth rate approach and assumptions vary per sector and per scenario

Primary Factors Driving Adoption Rates

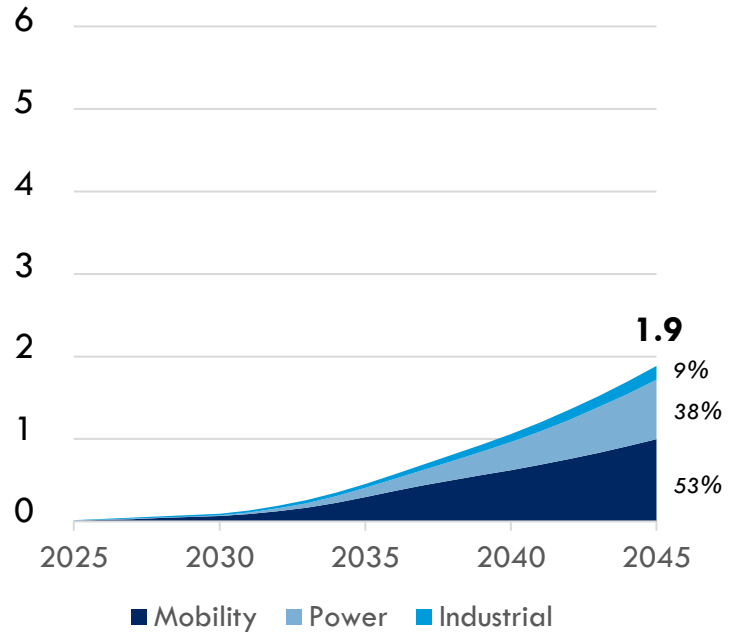


SUMMARY OF PRELIMINARY OUTPUTS

Overview of Preliminary Clean Renewable Hydrogen Demand Outputs

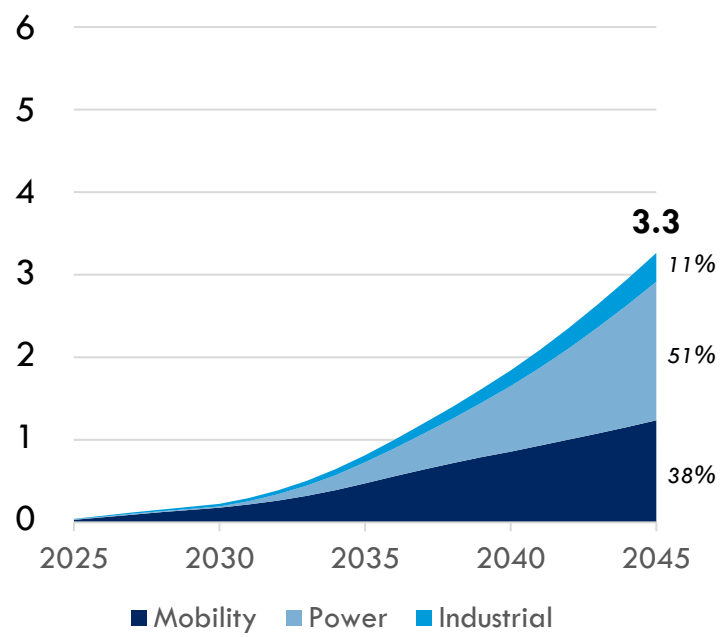
Total Expected Clean Renewable Hydrogen Demand Values in million TPY | Reflects SoCalGas service territory

Conservative



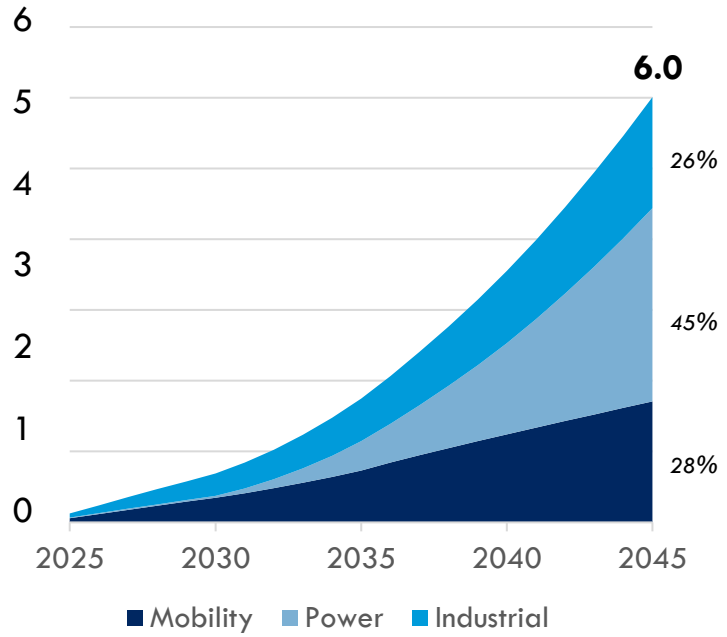
The conservative scenario reflects current legislation and conservative estimates for H_2 adoption factors and/or utilization rates. **Mobility drives majority of demand** in the conservative case

Moderate



The moderate scenario reflects assumptions of higher hydrogen adoption and utilization compared to the conservative case, with **Power taking on a larger share of hydrogen demand**

Ambitious



Significant growth occurs in the power and industrial sectors in the ambitious case, driven by **higher capacity utilization in Power and incorporation of refinery demand in Industrials respectively**

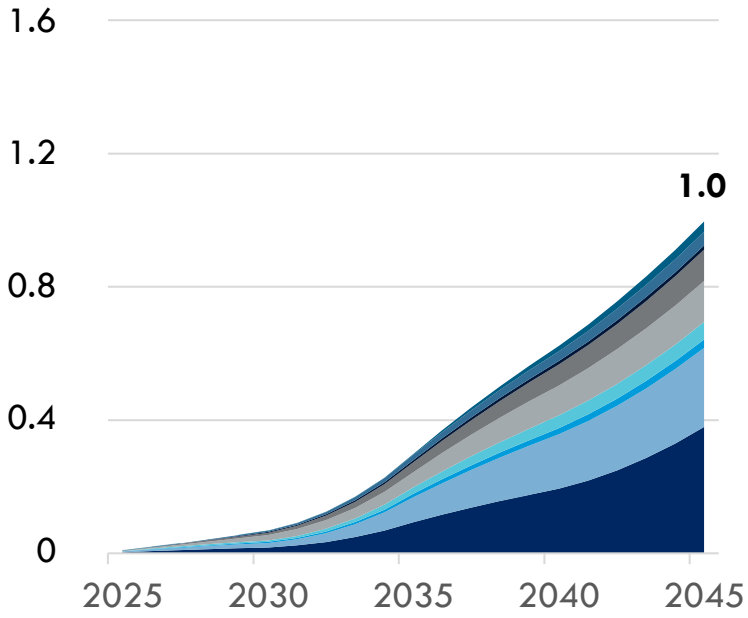
Mobility: Demand Outputs

Potential mobility sector H_2 demand in SoCalGas service territory is projected to be between 1.0-1.7M TPY by 2045

Total Expected Clean Renewable Hydrogen Demand

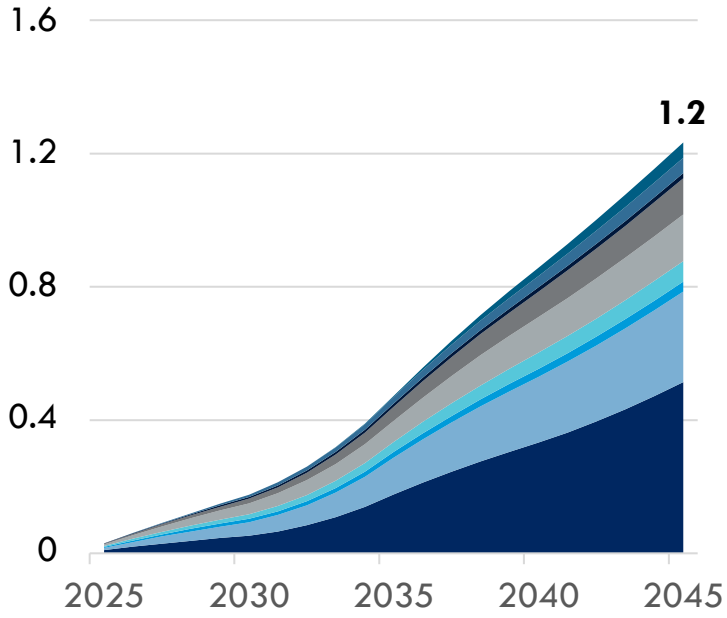
Values in Million TPY | Reflects SoCalGas service territory

Conservative



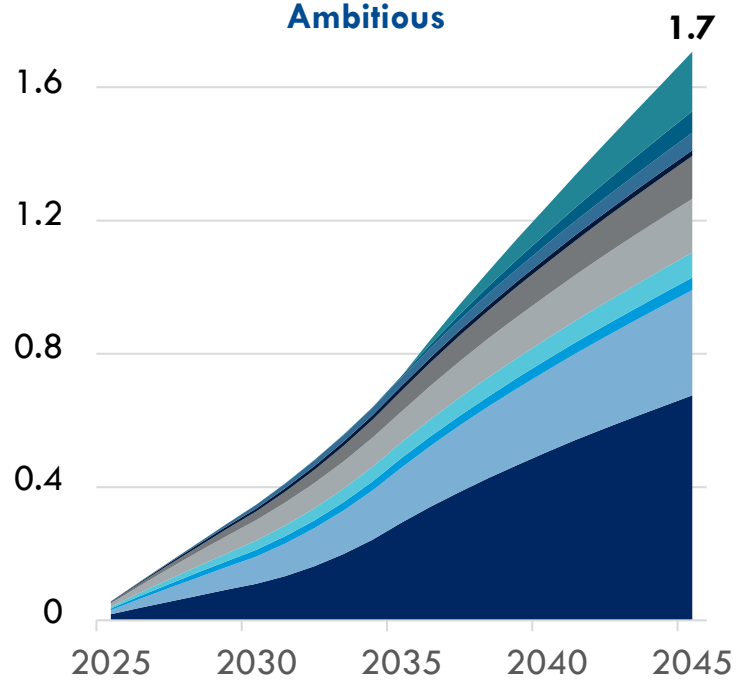
The conservative scenario reflects current legislation and relatively conservative estimates for hydrogen adoption.

Moderate

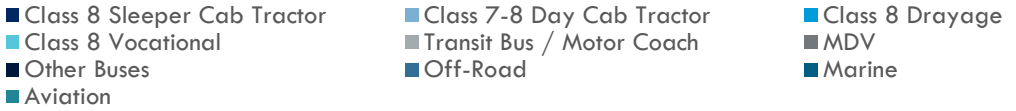


The moderate scenario reflects current legislation, assumes moderate estimates for hydrogen adoption.

Ambitious



The ambitious scenario builds on the moderate scenario with potential additional ZE legislation and more ambitious estimates for hydrogen adoption.



Note: MDV is Medium Duty Vehicles, Marine includes Commercial Harbor Craft (CHC) and Ocean Going Vessels (OGV), where OGV values reflect diesel consumption only (does not include main engine heavy fuel).

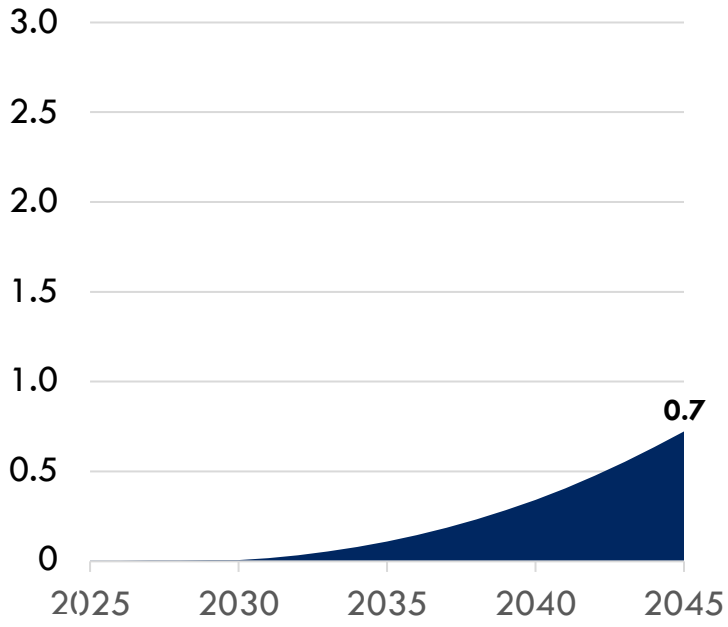
Power: Demand Outputs

Preliminary demand projections range from 0.7M – 2.7M tons of hydrogen/year in 2045, with increasing ramp up over time

Total Expected Clean Renewable Hydrogen Demand

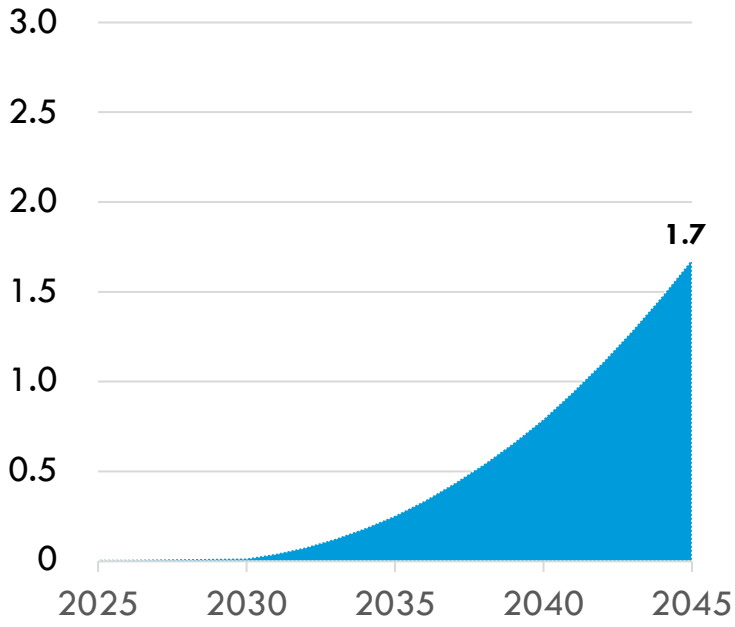
Values in million TPY | Reflects SoCalGas service territory

Conservative



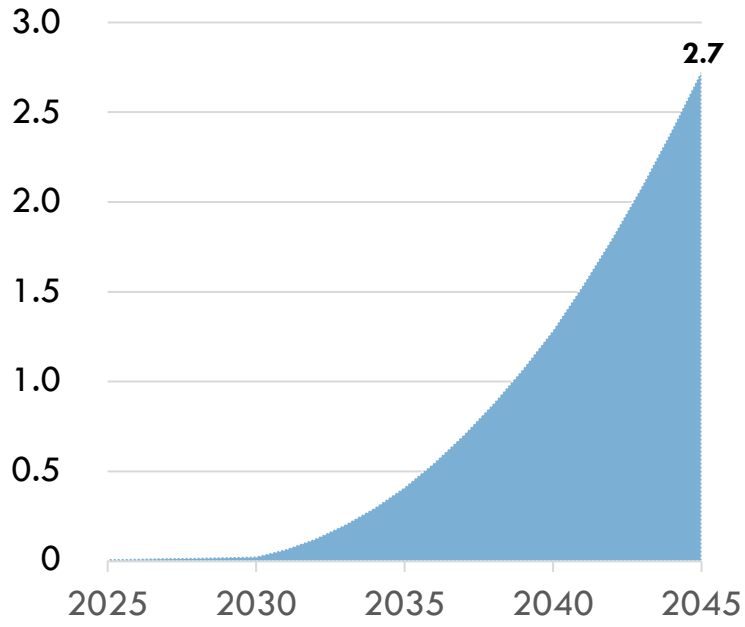
The conservative scenario reflects hydrogen demand under a low capacity factor scenario of 10%, assuming a decline in thermal combustion as other renewables increase and supply future load growth, based on external studies[1,2] and feedback from market participants[6]

Moderate



The moderate scenario reflects hydrogen demand under a capacity factor scenario of 20%, representing continued need for dispatchable generation, although at lower levels than we see today. Capacity factor assumption based on future natural gas capacity factors projected by the CARB scoping plan[3] and CEC reports[4]

Ambitious



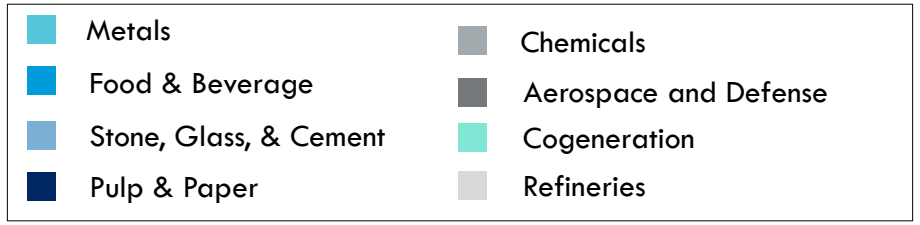
The ambitious scenario determines future hydrogen demand under the assumption that capacity factors continue to follow historical trends (~30%)[5]

References: (1) LA100 (2) LADWP (3) CARB (4) CEC (5) EIA (6) Interviews held with power plant owners, OEMs, academia, and governmental and regulatory organizations

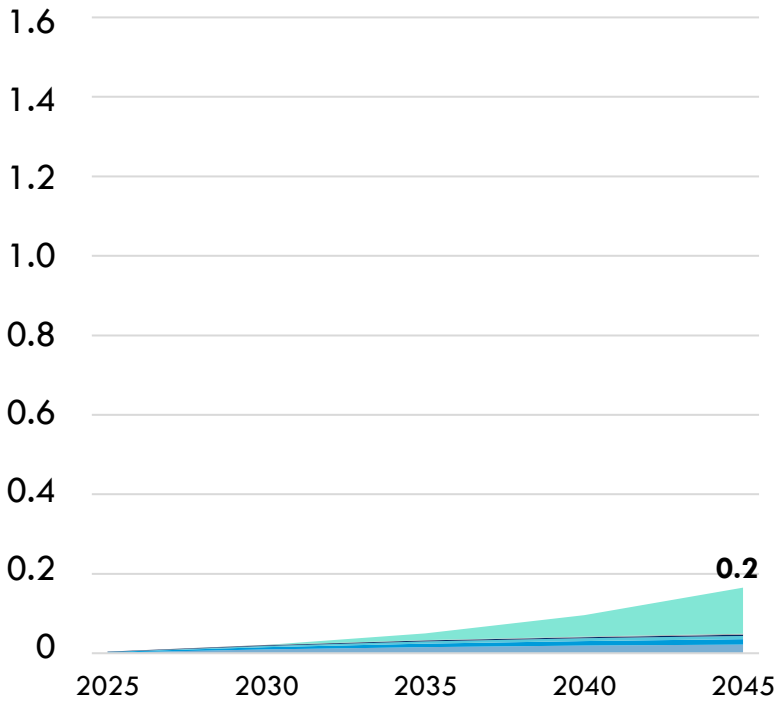
Industrials: Outputs

Total Expected Clean Renewable Hydrogen Demand

Values in million TPY | Reflects SoCalGas service territory only

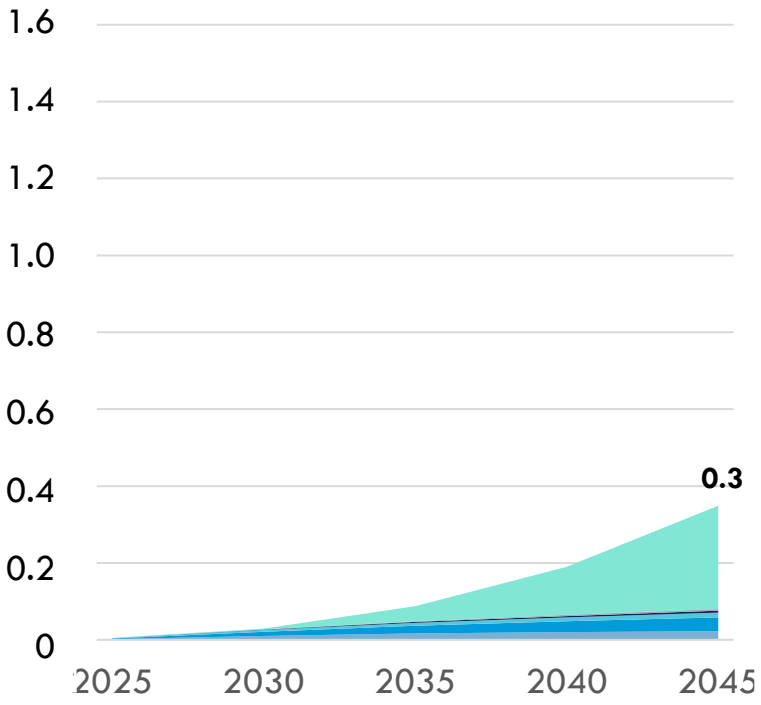


Conservative Case (M TPY)



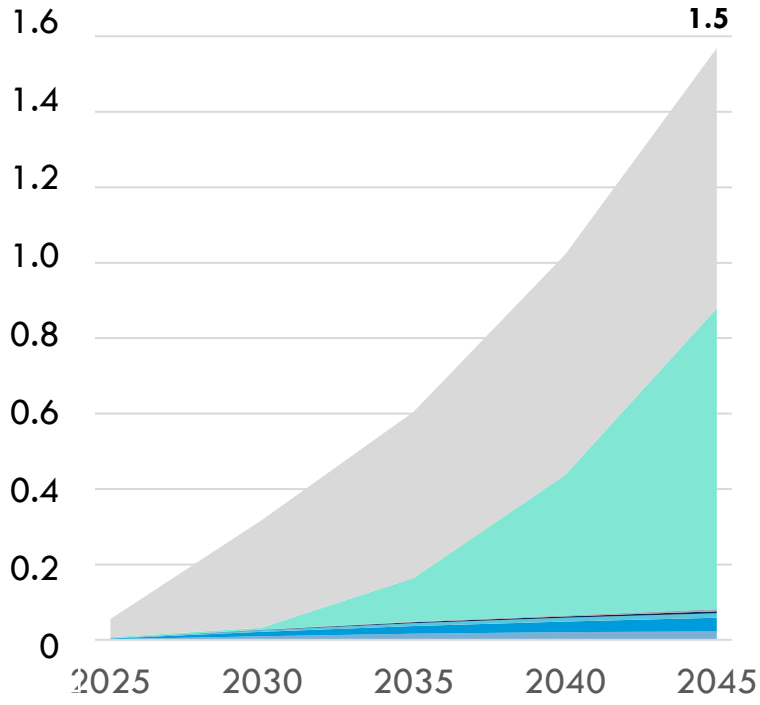
- No production expanse in California for identified industries; facilities will not expand beyond current production capabilities. Increased demand will be satisfied by out of region facilities
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 10%

Moderate Case (M TPY)



- California facilities will expand production in existing or new facilities to match growing market demand
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 20%

Ambitious Case (M TPY)



- Potential decarbonization legislation or market drivers in the refining industry could lead refineries to gradually transition to green H2
- California facilities will expand production in existing or new facilities to match growing market demand
- Cogeneration – Capacity factor of 30%

ANGELES LINK

Discussion

Please announce your name and speak directly into the microphone

Be concise and focus on discussion topics

Verbal comments are not the only way to provide input, feel free to type a chat

We are accepting input on the Demand Study until Tuesday, September 25

NEXT STEPS

- Comments on the Demand Study are due Tuesday, September 25, 2023
- Please send comments to Insignia Environmental at ALP1_Study_PAG_Feedback@insigniaenv.com
- Living Library coming soon
- The Study Technical Approach comment period will open on Tuesday, September 5 and will close on October 13, 2023
- Join us for our next Quarterly Meeting on September 28 at the Energy Resource Center in Downey

SoCalGas

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Thank You

Summary of Changes

ANGELES LINK

- We heard your comments at the last PAG/CBOSG meeting regarding the proposed Environmental Social Justice (EJ) analysis
  - We are grateful for the feedback and have incorporated it into our study scope
- Based on your recommendations, we have taken a more outreach focused approach
- The EJ analysis portion of this study will now have two parts:
  - Part 1: EJ analysis using desktop tools developed by public agencies
  - Part 2: A stakeholder engagement plan, which will be developed with your input and implemented in Phase Two of the Angeles Link Project

Summary of Changes

ANGELES LINK

- A stakeholder engagement plan for addressing and mitigating impacts to disadvantaged communities will be drafted with PAG/CBOSG input
  - Development of the plan will be part of Phase One
  - Boots on the ground outreach to communities will occur during Phase Two when Project routing is further defined
- Input is welcome and will be considered for incorporation. Examples of input include:
  - Pertinent EJ Studies
  - Examples of mitigation
  - Relevant work completed by academia and/or agencies

Part 1: EJ Analysis

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» Part 1: EJ Analysis Methodology
  - Similar mapping exercise as Desktop Environmental Analysis
  - Identify disadvantaged communities (DACs) along the planned routes using agency adopted EJ desktop tools
  - Analyze potential impacts and benefits to communities along the planned routes
  - Include census tract info including socioeconomic, language, race, etc.

Part 2: Stakeholder Engagement Plan (New)

ANGELES LINK

- The purpose of the stakeholder engagement plan is to establish an approach/strategy for engaging disadvantaged communities in Phase Two that may be impacted by the project
- Stakeholder engagement focused on:
  - Gathering community input
  - Education of hydrogen-related topics and benefits of clean renewable hydrogen
- Identify communities of concern through PAG/CBOSG input and utilization of EJ mapping tools
- Report of engagement activities conducted in Phase One
  - Include Project modifications accepted based on PAG/CBOSG feedback
- Demonstrate how Phase One aligns with the California Public Utilities Commission (CPUC) Environmental and Social Justice Action Plan and Assembly Bill 617

Future Opportunities for Stakeholder Input

- Continue to solicit input on Phase One milestones
  - Prior to finalizing study descriptions
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  - Mail
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FULL DEMAND STUDY DECK

SoCalGas

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DEMAND STUDY ANALYSIS

Technical Approach and Preliminary Outputs

August 2023

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Document Contents

Item		Slide	Description
1. Demand Analysis Scope, Timeline & Process		3-7	Share the demand analysis objective and walk through the process followed to estimate potential hydrogen demand, including data sources consulted, interviews, etc.
2. Model Methodology	**2A. Demand Model Methodology**	8-10	Discuss the high-level methodology, starting at current vehicle stock/facilities and applying adoption rates to estimate the demand across the 3 scenarios
	2B. Sector & Scenario Overview	11	Introduce the sectors that are being modeled, and the 3 scenarios evaluated - Conservative, Moderate & Ambitious
3. Sector Deep Dives	**3A. Mobility Deep Dive**	12-20	Mobility overview, methodology and key assumptions, adoption rates, preliminary outputs, and use cases
	3B. Power Deep Dive	21-27	Power overview, methodology and key assumptions, adoption rates, preliminary outputs, and use cases
	3C. Industrial Deep Dive	28-38	Industrials overview, methodology and key assumptions, adoption rates, preliminary outputs, and use cases
4. Overall Preliminary Outputs & Locational Analysis	**4A.Overall Demand Preliminary Outputs**	39-40	Share total preliminary demand outputs across scenarios

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Recap of CPUC Decision and Presentation Objectives

CPUC Decision and Context

- In December 2022, the CPUC approved SoCalGas's request to establish the Angeles Link Memo Account to record the costs of performing Phase One feasibility studies for the Angeles Link Project.
- The CPUC's Decision requires, as part of the Phase One feasibility studies, SoCalGas to identify demand and end uses for Angeles Link and make the data, findings, and results available to the public unless SoCalGas is granted confidentiality of the data in accordance with General Order 66-D.
- Based on these guidelines, this analysis focuses on evaluating the potential hydrogen demand across select sectors in SoCalGas' service territory from 2025 – 2045.

Presentation Objectives

Approach and Methodology

Provide a high-level overview of the model development process

Modeling Assumptions

Share important inputs, assumptions and inputs across modeled sectors

Analysis Outputs

Present a summary view of preliminary model outputs

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- This analysis focuses on a bottom-up assessment of demand potential for clean renewable hydrogen across the Mobility, Power Generation, and Industrial sectors
- To be conservative, the model does *not* account for certain variables that would be expected to increase future demand for hydrogen, such as:
  - Use of hydrogen to facilitate energy system reliability and maintain Loss of Load Expectations against an increasing share of intermittent renewable resources on the grid
  - Potential additions to generation capacity to meet demand growth in 2045, as seen in the projected new resources identified in CARB's Scoping Plan (including approximately 9 GW of hydrogen turbine capacity)
  - Carbon pricing (e.g., LCFS and cap-and-trade) impacts on demand which may be influenced by pending regulatory proceedings
- These variables may be further assessed in future studies

Demand Analysis Scope

The demand analysis focuses on three priority sectors: Mobility, Power Generation & Industrials, with multiple subsectors assessed based on their emissions footprint, current fuel consumption, and hard-to-electrify use cases

Demand Analysis Scope

	Mobility	Power Generation	Industrials
Adoption Drivers	Understand market adoption drivers including legislation and regulations, technical feasibility, commercial availability, and business readiness[1]		
Demand Volume	Create a model quantifying potential future demand by sector		
Decarbonization Alternatives	Understand how hydrogen compares to other decarbonization alternatives across costs, markets, and technical feasibility and how this impacts adoption		
Market Validation	Confirm outcomes and assumptions with market segment experts		

Sectors and Sub-Sectors Assessed for Demand Analysis

Mobility[2]	On-Road (HDV, MDV, Transit)	Off-Road (CHE, GSE, Ag, C&M)	Marine (CHC, OGV)	Aviation	On-Road (LDV)
Power Generation	Baseload Combustion Generators	Flexible / Peaker Combustion Generators	Fuel-cell Power Plants / Microgrids		
Industrials[3]	Food and Beverage Manufac.	Primary and Fabricated Metals	Stone, Glass, and Cement	Wood & Paper	Chemicals
	Co-generation	Aerospace and Defense	Refineries	Petroleum Products	Mining
	Agricultural Dyers	Industrial Launderers	Textiles	Ammonia / Agriculture[4]	

Priority subsector with quantitative analysis

Secondary subsector not addressed in analysis

1. Additional analysis factors considered: Planned hydrogen projects and announcements; CARB's Scoping Plan

2. HDV (Heavy Duty Vehicles), MDV (Medium Duty Vehicles), CHE, (Cargo Handling Equipment), GSE (Ground Support Equipment), Ag (Agricultural Equipment), C&M (Construction & Mining Vehicles), CHC (Commercial Harbor Craft), OGV (Ocean Going Vessels)

3. Potential hydrogen demand from methanol production is not quantified in the current model but will be evaluated in a future phase.

4. Ammonia production for fertilizer manufacturing will also be assessed in a future phase.

Demand Analysis Approach

An initial model was developed and revised through input from potential end-users and market participants

Model Definition

- Establish a clear set of objectives, scope, and approach for the demand analysis
- Assess academic and market analysis to identify priority sub-sectors and applications for clean hydrogen demand

Model Buildout

- Develop detailed model methodology; identify relevant datasets and inputs
- Quantify total addressable market for clean hydrogen and estimate adoption rates for each sub-sector and application by evaluating alternatives

Model Refinement (In Progress)

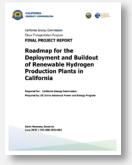
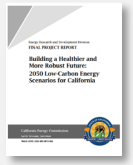
- Share preliminary outputs with PAG / CBO members and gather feedback
- Incorporate feedback (where possible) into the model and integrate findings with other Angeles Link Phase One studies

Sector Interviews & Peer Reviews (In Progress)

- Conduct targeted interviews with subject matter experts across industry, academia and government agencies to test model approach, inputs, assumptions and outputs

Research Overview

Several recent reports that evaluate the potential for hydrogen, both at the state and federal level, have been leveraged as inputs and references

Reference	Analysis Overview	Key Insights
 **DOE Clean Hydrogen Commercial Liftoff Report & U.S. National Clean Hydrogen Strategy and Roadmap** (Source 1, Source 2)	DOE overview of pathways to widespread clean hydrogen adoption throughout the U.S. analyzing various challenges, opportunities, and incentive programs	• 4-8 MMT per year of hydrogen demand expected nationwide in 2050 to supply energy storage and power generation • 5-8 MMT per year of hydrogen demand nationwide in 2050 for the medium and heavy-duty trucking sector • Open access hydrogen transport infrastructure will be key in ensuring long-term, self-sustaining demand growth
 **CARB 2022 Scoping Plan for Achieving Carbon Neutrality** (Source)	Discussions of expected future energy use in CA broken down by source and application. Includes an overview of CA state actions, regulations, and incentives	• The Scoping Plan Scenario models carbon neutrality by 2045 using a broad portfolio of fossil fuel alternatives and clean technologies while aligning with policy direction • 1.4 MMT per year of hydrogen non-LDV mobility energy demand in CA in 2045 under the Scoping Plan Scenario
 **UC Davis California Hydrogen Analysis Project: The Future Role of Hydrogen in a Carbon-Neutral California** (Source)	UC Davis analysis of potential future hydrogen transportation systems, demand across sectors, and sources of supply	• 3.2 MMT per year of hydrogen non-LDV mobility energy demand in CA in 2045 under the High case scenario • 30,654 FCEV long-haul trucks in service in CA in 2045
 **CEC and UC Irvine Roadmap for the Deployment and Buildout of Renewable Hydrogen Production Plants in California** (Source)	CEC and UC Irvine report on roadmaps for statewide clean hydrogen deployment in CA including potential hydrogen demand by sector	• 0.4 MMT per year of hydrogen demand in CA in 2050 for electricity generation • 1.1 MMT per year of hydrogen non-LDV mobility energy demand in CA in 2050 under the High case scenario
 **CEC Building a Healthier and More Robust Future: 2050 Low-Carbon Energy Scenarios for California** (Source)	CEC report with an overview of different future California specific energy mix projections with insight into potential capacity and generation numbers	• 320-490 TWh of electricity demand per year in CA in 2050 • FCEV fuel efficiencies are expected to improve by ~25% from 2020 to 2050

METHODOLOGY

Demand Model Methodology

The model methodology projects transition of current fuel to hydrogen for priority sub-sectors, with validation through end user interviews and peer reviews

Key Activities:

1. Identify top sub-sectors using **historical natural gas, diesel, and gasoline consumption** data
2. Align on key data sets and assess **modeling approach**
3. Test **technical feasibility** (gathering inputs from interviews when possible) to help fill information gaps

2a. **Model Total Addressable Market (TAM) using current fuel usage**

- Determine industry growth rates
- Define industry-specific characteristics (type of equipment used, efficiency rates and fuel consumption)

2b. **Apply Zero-Emission (ZE) and H2 adoption rates to TAM**

- Forecast transition to net-zero broadly and hydrogen specifically using key adoption factors:
  - Legislation and regulations, technical feasibility, commercial availability and business readiness

2d. **Develop demand scenarios**

- Define adoption scenarios through qualitative assessment of decarbonization alternatives, technology commercialization, and cost to adopt hydrogen

- Conduct **interviews with end-users to inform** model assumptions and overall outputs
- **Conduct peer-reviews** to validate approach, assumptions and outputs
- **Incorporate feedback** from interviews with end users and peer-reviews into the model and document appropriately
- **Incorporate feedback from PAG/CGO** as appropriate

Demand Model Methodology

The model considers current energy use assumptions, market growth, zero emission adoption, and hydrogen adoption to develop a quantitative demand projection

2A

Model the total addressable market (TAM)

Energy consumed (P)

Example inputs

- Equipment efficiency rates
- Fuel consumption rates

X

Market size/growth (Q)

Example inputs

- Utilization (ex: fleet size & VMT)
- Industry growth rates

=

2B

Apply ZE adoption rates

X

ZE adoption

Example inputs

- Legislation (State/Fed.)
- Interviews

=

2C

Apply H2 adoption rates

X

Hydrogen adoption

Example inputs

- Market research
- Interviews
- Efficiency gains

=

2D

Develop +/- demand scenarios

X

Demand scenarios

Example factors

- Alternatives
- Tech Availability

=

Total Energy Requirements (ex: MMBtus) → **Base Hydrogen Demand (ex: TPY/TPD)** → **Demand Range**

Note: ZE stands for Zero Emissions. For many sub-sectors, zero emissions legislation exists, such as for 100% of all drayage trucks to be ZE by 2035.

Scenario and Adoption Rate Overview

Three scenarios have been developed reflect a continuum of potential clean hydrogen adoption rates

Description of Scenarios

Conservative

Scenario assumes lower adoption rates for hydrogen across a limited set of use-cases within prioritized sectors and sub-sectors, primarily driven by existing legislation.

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Moderate

Scenario assumes increased hydrogen adoption across an expanded set of use-cases within prioritized sectors and sub-sectors, driven by existing legislation.

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV*

Power: Peaker, Baseload, Cogen

Industrials: Cogen**, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

Ambitious

Scenario assumes more ambitious policies are put in place and businesses are incentivized to support widespread hydrogen adoption within prioritized sectors and sub-sectors.

Mobility: HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV,* Aviation

Power: Peaker, Baseload, Cogen

Industrials: Refineries, Cogen, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense

*HDV (Heavy Duty Vehicles), MDV (Medium Duty Vehicles), CHE, (Cargo Handling Equipment), GSE (Ground Support Equipment), Ag (Agricultural Equipment), C&M (Construction & Mining Vehicles), CHC (Commercial Harbor Craft), OGV (Ocean Going Vessels; *Diesel consumption only, not main engine heavy fuel)*

Cogeneration in Conservative and Moderate scenarios excludes cogeneration plants at refineries

Base market growth rate approach and assumptions vary per sector and per scenario

Primary Factors Driving Adoption Rates

Policy & Legislation
Is there a legislative or policy mandate that accelerates the transition to hydrogen? Are there incentives in place?

Technology Feasibility
Is hydrogen technically and/or operationally feasible? How does this compare against alternatives?

Commercial Availability
Is hydrogen commercially available? How does this compare against alternatives?

Business Readiness
Is the industry or sub-sector ready to adopt the technology?

MOBILITY

SoCalGas

Mobility: Scope of Applications Modelled

175+ vehicle classes have been modelled across the various mobility sub-sectors within the SoCalGas territory

On-Road Vehicles

Vehicle Class Type	# Vehicles in SCG territory (2024)
Class 8 Sleeper Cab Tractor	39,300
Class 7-8 Day Cab Tractor	76,300
Class 8 Vocational	36,600
Class 8 Drayage	18,100
Transit Bus / Motor Coach	8,300
Other Buses[1]	25,800
Class 8 - Other	11,200
Class 7 - Other	30,500
Class 6 - Other	85,400
Class 5 - Other	11,100
Class 4 - Other	54,200
Class 2b-3	565,800
Motor Home	63,400

1,026,000+ on-road vehicles across 50+ on-road applications are modelled[2]

Off-Road Vehicles, Marine Vessels, and Aircraft[3]

Vehicle Application Type	# Vehicles in SCG territory (2024)
Cargo Handling Equipment	4,100
Ground Support Equipment	5,400
Other Off-Road (Agricultural, Construction & Mining)	169,700
Marine Vessels (Ocean Going Vessels, Commercial Harbor Craft)	~149M gallons/yr diesel consumption
Aircraft	~1.6B gallons/yr jet fuel consumption[4]

180,000+ off-road vehicles across 100+ applications are modelled

25+ Marine vessel types are modelled*. Ocean going vessels includes auto carrier, bulk ,container, cruise, general cargo, reefer, RoRo, tanker, and vessel

Aviation is modelled as a single category**

# of vehicles based on data from CARB EMFAC Database; OGV diesel consumption from EMFAC; Aviation jet fuel consumption from EIA

1. Other buses includes a wide variety of vehicles that carry many passengers including school buses, shuttle buses, double decker buses
2. Model accounts for adjustments in vehicle counts for future years when determining hydrogen volumes
3. Rail applications may be considered in future analysis
4. Includes international travel

*Marine vessels have main engines and auxiliary engines. the model only accounts for replacing current diesel consumption by OGVs. Bunker fuel replacement (e.g. the main engine's typical fuel) is not considered

**Aircraft are modelled as a single category rather than by type or application of aircraft

Mobility: Methodology

H_2 demand for the mobility sector in SoCalGas service territory is modelled by multiplying the following factors

of Total vehicles & Fuel Consumption, 2025-2045

# of vehicles by class/application, fuel type, by county

On-Road	50+ vehicle applications (HDV, MDV, Bus: GVWR Class 2b-8 and buses)
Off-Road	15+ Port Cargo Handling Equipment (CHE) 30+ Airport Ground Support Equipment (GSE) 50+ Other Off-Road (agricultural, construction & mining equipment)
Marine	15+ Commercial Harbor Craft (CHC) 10+ Ocean Going Vessels (OGV)
Aviation	Aircraft

H2 consumption is determined by calculating the H2 equivalent of current fuel consumption using the ratios of:

- Ratio of energy density (btu per kg of H2, per gallon of diesel, etc)
- Ratio of engine efficiency

Data is taken straight from the CARB EMFAC Database which includes vehicle fleet size forecasts through 2050, as well as fuel consumption forecasts for all on-road and off-road vehicles and marine vessels.

Aviation is included in the ambitious scenario only, reflecting ambition in the 2022 CARB Scoping Plan, and fuel consumption data from EIA.

% of vehicles converted to ZE

Zero Emission adoption rates are applied to reflect current legislation or policies

The plans reflected in the model are:

- **Advanced Clean Fleets (ACF):** Conversion of 'priority fleets' by 2024 and all fleets by 2035
- **Innovative Clean Transit (ICT):** transit agency defined targets, generally 2030
- **Clean Shipping Act of 2023:** requires 100% clean shipping fuels by 2040
- **Clean Air Action Plan (CAAP):** POLA and POLB set targets for 100% ZEV CHE by 2030
- **Executive Order N-79-20:** sets targets for 100% ZEV by 2045 or earlier by application

Regulations support initiatives to achieve California Net Zero targets by 2045. New regulation is regularly coming out. Regulations modelled reflect those above, announced before July 1st, 2023.

ZE adoption rates

% of ZE vehicles that are FCEV (vs Alternatives)

Within ZE, the % of new vehicle or vessel purchases that are FCEV vs alternatives is based on assessment of 4 factors:

1. **Policy & Legislation:** held constant in Conservative and Moderate scenarios
2. **Technology Feasibility:** assessed across a serios of factors specific to application type. This is held constant across scenarios.
3. **Commercial Availability:** assessed by evaluating non-fuel costs to determine when price parity of FCEV vs alternatives is achieved (if ever). Price parity is used in initial phase of analysis, and will be integrated and updated depending on outputs of supply and engineering studies
4. **Business Readiness:** assessed to reflect company net zero targets in moderate and ambitious scenarios

The adoption factors were determined using third party research and interviews where possible, including assessments by the DOE (H2 Roadmap and Liftoff Report), as well as TCO analysis leveraging ANL's BEAN model, and more.

H_2 adoption rates

Mobility: Methodology (Example)

Sleeper cabs and drayage trucks are shown as examples for how hydrogen demand is calculated by vehicle class

# of Total vehicles & Fuel Consumption, 2025-2045 × **% of vehicles converted to ZE** × **% of ZE vehicles that are FCEV (vs Alternatives)**

Class 8 Sleeper Cab Tractor

2024 Total # of Vehicles[1]	Avg. Miles Travelled /day[1]	Avg. kg H2/Day
39,300	204.0	30.2

% of Vehicles ACF Applies To[2]	ZEV Adoption Rate (2045) [3]
67%	100%

The Advanced Clean Fleets (ACF) regulation requires 100% of sleeper cab sales to be ZE starting 2035, attempting for all to be 100% ZEV by 2042.

% 2045 H2 Adopt. Rate (new sales)	2045 # H2 Vehicles (conservative)	2045 H2 Demand (conservative, '000 TPY)
81-98%	34,542	380

- **Technical feasibility:** High to Very High likelihood of H2 adoption across technical requirements
- **Commercial availability:** At cost parity 2035-2045 by scenario
- **Business Readiness:** Market driven to fast follower by scenario
- **Legislation:** Considers existing ACF legislation only in Conservative and Moderate scenarios

Class 8 Drayage

2024 Total # of Vehicles[1]	Avg. Miles Travelled /day[1]	Avg. kg H2/Day
18,100	107.8	16.9

% of Vehicles ACF Applies To[2]	ZEV Adoption Rate (2045)[3]
100%	100%

The Advanced Clean Fleets (ACF) regulation requires 100% of drayage truck sales to be ZE starting 2024 and 100% of drayage trucks to be ZE by 2035 (in order to be allowed into enter seaports or intermodal railyards).

% 2045 H2 Adopt. Rate (new sales)	2045 # H2 Vehicles (conservative)	2045 H2 Demand (conservative, '000 TPY)
31-38%	4,074	25

- **Technical feasibility:** Medium-high across technical requirements
- **Commercial availability:** Close to parity 2025-2035 by scenario (never achieves cost parity with alternatives)
- **Business Readiness:** Market driven to fast follower by scenario
- **Legislation:** Considers existing ACF legislation only in Conservative and Moderate scenarios

1. Based on CARB EMFAC Database for SoCalGas service territory
2. Based on CARB assessment (see ACF)
3. Based on ACF regulation

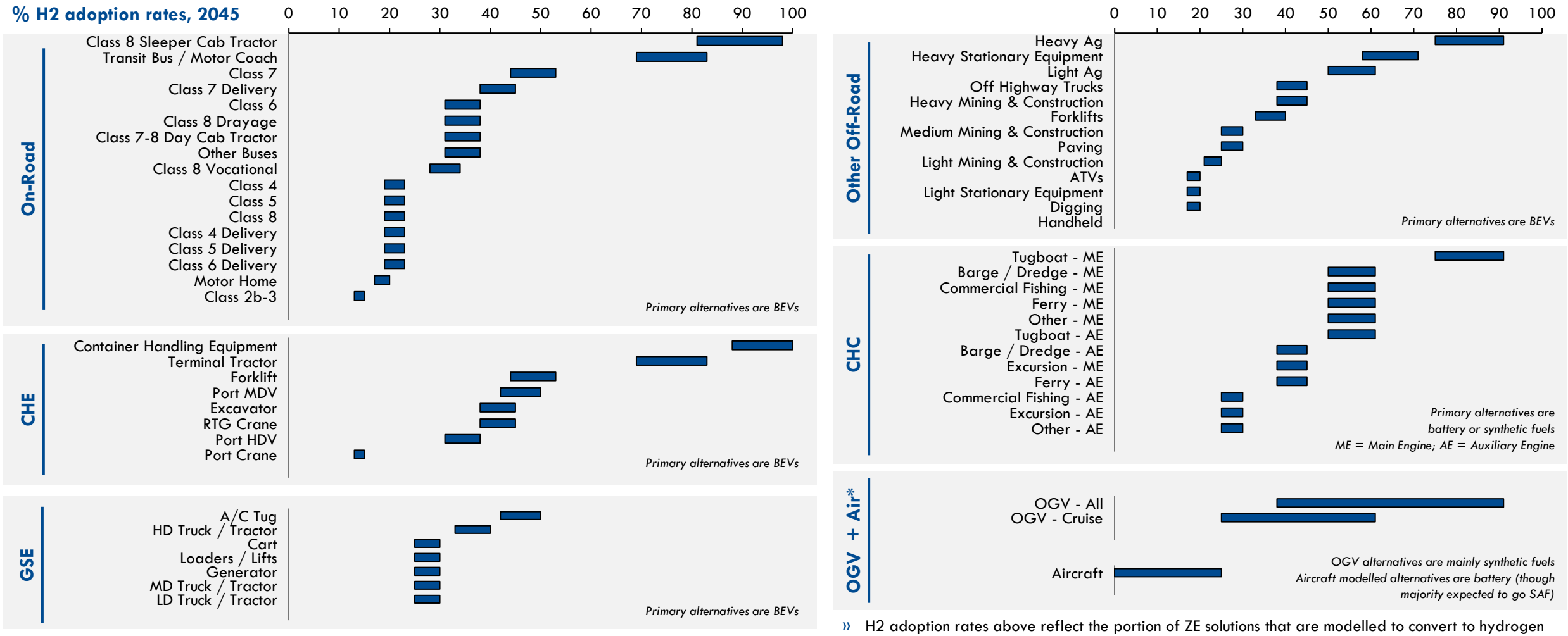
Mobility: Key Assumptions and Data Sources

Modelling assumptions across adoption rate factors were developed and validated through research & interviews

Adoption Factor	Assumptions / Inputs	Data Source
Vehicle / Vessel Operational Characteristics	**Fleet Sizes and Growth Rates** • Vary by application but are taken to exactly match the CARB EMFAC Database forecasts for SoCalGas service territory **Vehicle Lifespans and Retirement Rates** • On-Road: 17 years for MDV, 16 years for HDV, 12 years for Buses • Off-Road: Varies based on equipment type and associated research, generally 10-20 years for CHE, 10-20 years for GSE, 5-15 years for Agricultural, Construction & Mining equipment • Marine: 15-years for Commercial Harbor Craft **Fuel Consumption Rates** • Fuel consumption rate is calculated based on current diesel or gasoline consumption today (from CARB EMFAC Database), using energy density ratios and fuel cell vs combustion engine efficiency ratios • 0.5% increase in fuel cell efficiency and diesel engine efficiency per year	CARB EMFAC Database 2022 CARB Scoping Plan SCAQMD CAAP GSE Industry research Agriculture, Construction & Mining Industry Research DOE: H_2, diesel, and gasoline efficiency rates
Legislation and ZEV Adoption	**Advanced Clean Fleets Regulation** • Vehicle will retire using the Model Year Schedule, not the ZEV Milestones Option defined by ACF • % of vehicles estimated to be subject to ACF: 67% of Class 7-8 Tractors, 52% of Class 4-8 Vocational, 12% of Class 2b-3 • Vehicles subject to ACF will buy 100% ZEVs starting 2024 (per regulation, assuming no exceptions). Other vehicles will buy 100% ZEV starting 2035 ramped linearly from ~0% today, to 25% by 2030, to 100% by 2035. **Clean Air Action Plan (CAAP)** • 100% ZEV CHE by 2030 **Executive Order N-79-20** • Reflects 100% ZEV sales for GSE by 2035; by 2045 for other off-road equipment (where specific regulation doesn't otherwise exist) **Marine & Aircraft** • CHC sales 100% ZEV by 2035; OGV stocks 25% ZE by 2045; Aircraft fuel 20% battery or fuel cell by 2045	Advanced Clean Fleets CAAP EO-N-79-20 ZEAT 2022 ARB Scoping Plan
Commercial Readiness	• Assessed by modelling TCO assuming cost parity with incumbent fuel for on-road using ANL's BEAN model, and market research for non-on-road applications	ANL BEAN model

Mobility: H_2 Adoption Rates vs ZE Alternatives

H_2 fuel cell adoption rates in 2045 vary by application and scenario



Note: Left of bar is the 2045 Conservative scenario adoption rate; right of bar is the Ambitious scenario adoption rate.

- H2 adoption rates above reflect the portion of ZE solutions that are modelled to convert to hydrogen fuel cell technology (generally new sales). The inverse of the H_2 adoption rates shown reflects the modelled adoption rate of alternative ZE solutions
- Adoption rates are low in early years generally due to the assessed impact of commercial availability.

**H2 adoption rates reflect those for new sales only (not stocks), except for OGV and Aircraft which reflect stocks (of ZE). *Marine vessels have main engines and auxiliary engines. The model only accounts for replacing current diesel consumption by OGVs. Bunker fuel replacement (e.g. the main engine's typical fuel) is not considered*

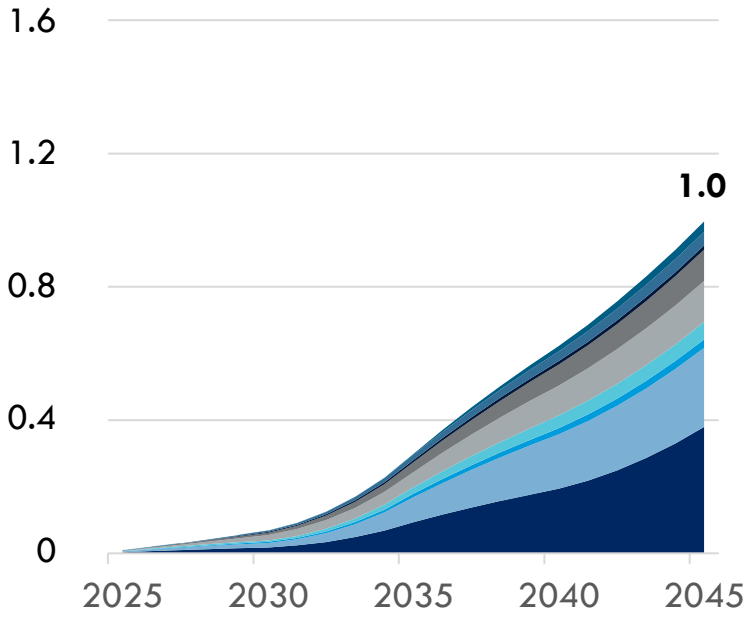
Mobility: Demand Outputs

Potential mobility sector H_2 demand in SoCalGas service territory is projected to be between 1.0-1.7M TPY by 2045

Total Expected Clean Renewable Hydrogen Demand

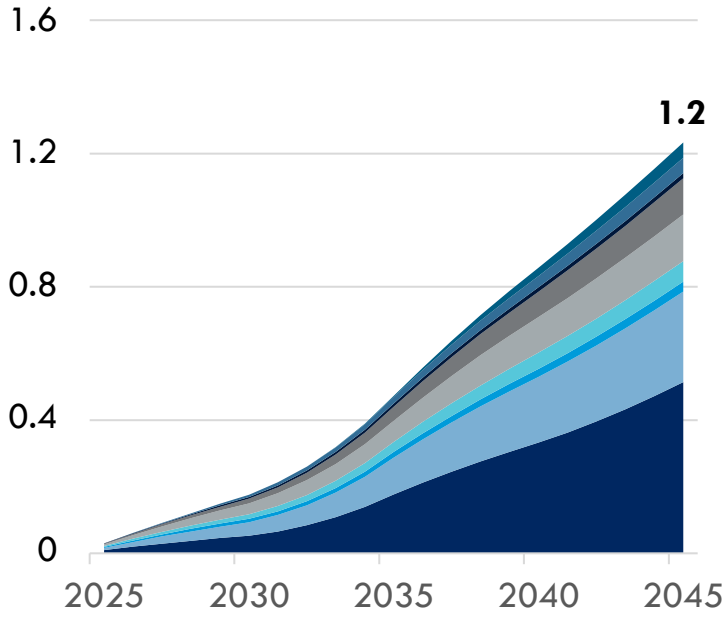
Values in Million TPY | Reflects SoCalGas service territory

Conservative



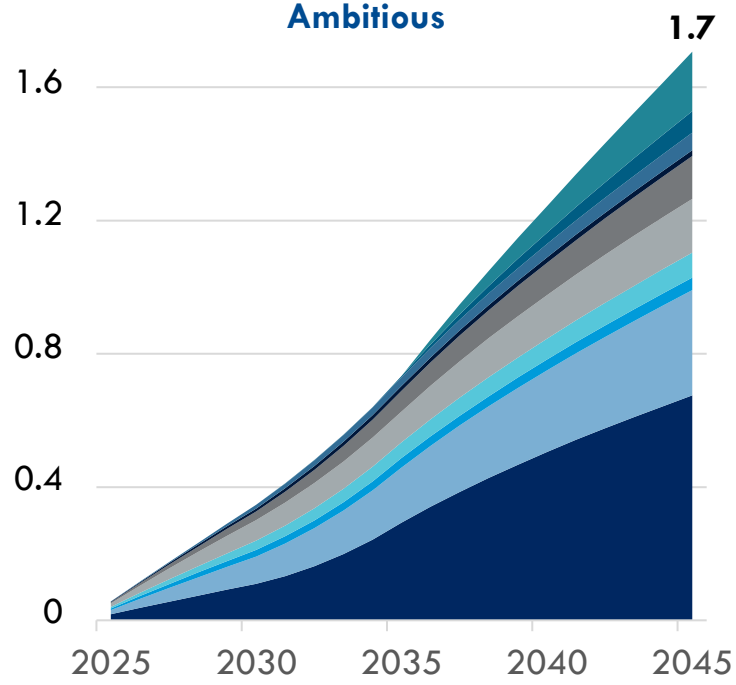
The conservative scenario reflects current legislation and relatively conservative estimates for hydrogen adoption.

Moderate

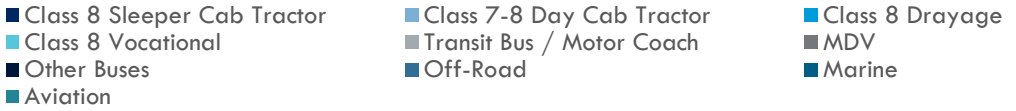


The moderate scenario reflects current legislation, assumes moderate estimates for hydrogen adoption.

Ambitious



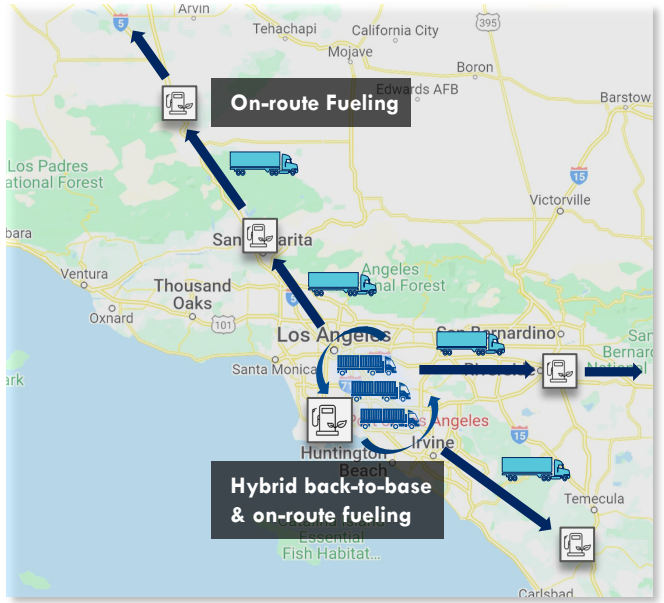
The ambitious scenario builds on the moderate scenario with potential additional ZE legislation and more ambitious estimates for hydrogen adoption.



Note: MDV is Medium Duty Vehicles, Marine includes Commercial Harbor Craft (CHC) and Ocean Going Vessels (OGV), where OGV values reflect diesel consumption only (does not include main engine heavy fuel).

Sample Use Cases | Drayage Trucks & Sleeper Cabs

Vehicle Fueling Characteristics



Drayage Truck

H2 Demand Forecast

25 - 38k

TPY by 2045

Statistics[1]

Vehicles Today: 18,000
Avg. VMT: 108 miles/day
Avg. Fuel: 16.9 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	6%	6%	31%	31%	31%
Moderate	19%	19%	34%	34%	34%
Ambitious	34%	41%	38%	38%	38%

Adoption rates for new vehicle purchases. Inverse values reflect battery vehicle adoption rate.

Policy Considerations

The Advanced Clean Fleets (ACF) regulation requires that starting 2024 new trucks registering with CARB to conduct drayage activities in California must be 100% ZEV. All drayage trucks entering ports and intermodal railyards must be ZEV by 2035.[3]

Sleeper Cab

H2 Demand Forecast

380 - 675k

TPY by 2045

Statistics[1]

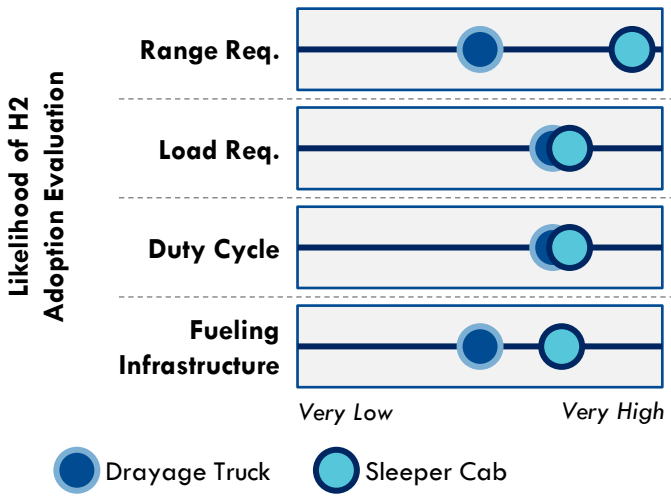
Vehicles Today: 39,300
Avg. VMT: 204 miles/day
Avg. Fuel: 30.2 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	8%	8%	41%	41%	81%
Moderate	24%	24%	67%	67%	89%
Ambitious	45%	54%	98%	98%	98%

Policy Considerations

The Advanced Clean Fleets (ACF) regulation aims to have 100% ZEV sleeper cab tractors in California by 2042.[2]

Technical Feasibility Assessment[1]

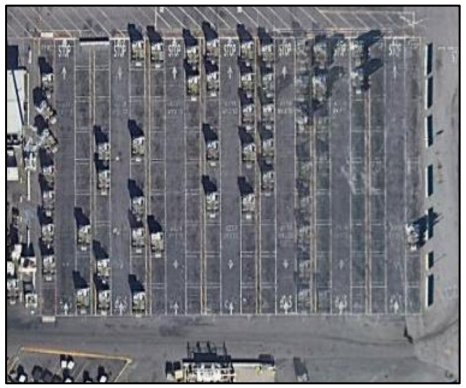


	Drayage Truck	Sleeper Cab
Range Req.	Average 108 miles per day, though range can vary significantly (up to several hundred miles) pending cargo destination.	Currently averages 204 miles per day, though range is often much higher, especially if vehicles have 2+ driver shifts per day.
Load Req.	Class 7-8 requirements due to varied weight of cargo. Battery weight impacts towing capacity, influencing H2 adoption.	Trucks must accommodate a wide range of cargo. Battery weight impacts towing capacity, influencing H2 adoption.
Duty Cycle	Sometimes operate in 2-3 eight-hour shifts. May require fast refueling or multiple refueling cycles per day.	Sleeper cab tractors may operate with a team of drivers working in 8-hour shifts as drivers are generally paid per mile.
Fueling Infrastructure	May fuel at base if back-to-base operations or may fuel at distributed fueling locations, depending on operations.	Highly distributed fueling operations across transit corridors. Typically fuel at truck stops where drivers can also sleep.

References: (1) # Vehicles and Avg. VMT (vehicle miles travelled) reflect 2024 figures from CARB's EMFAC Emissions Inventory database for vehicles in SoCalGas service territory; Avg. Fuel consumption calculated based on equivalence from diesel consumption, (2) ACF

Sample Use Cases | Container Handling Equipment & Terminal Tractors

Vehicle Fueling Characteristics[4]



Terminal Tractor Fueling Lanes at POLA

Container Handling Equip. Fueling at POLA

Container Handling Equipment

H2 Demand Forecast

15 - 18k

TPY by 2045

Statistics[1]

Vehicles Today: 550
Avg. Fuel: 56.3 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	9%	44%	88%	88%	88%
Moderate	26%	66%	96%	96%	96%
Ambitious	48%	100%	100%	100%	100%

Adoption rates for new vehicle purchases. Inverse values reflect battery vehicle adoption rate.

Policy & Strategy Considerations

CAAP sets targets for 100% ZEV CHE by 2030 and POLA/POLB are working closely with terminal operators to achieve this.

Terminal Tractor

H2 Demand Forecast

6 - 8k

TPY by 2045

Statistics[1]

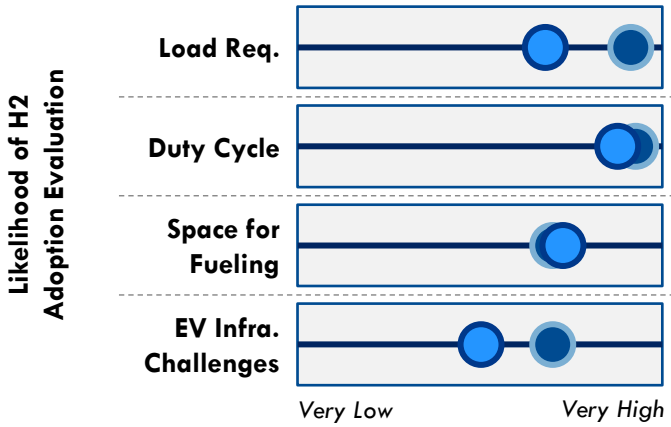
Vehicles Today: 2,150
Avg. Fuel: 8.1 kg H2/day

H2 Adopt. Rates	2025	2030	2035	2040	2045
Conservative	7%	34%	34%	69%	69%
Moderate	21%	34%	57%	76%	76%
Ambitious	38%	45%	83%	83%	83%

Policy & Strategy Considerations

"Yard tractors… offer ZE and/or NZE fuel-technology platforms that simultaneously achieve the basic parameters and criteria to be deemed (or approaching) commercially available and technically viable.[2]

Technical Feasibility Assessment



	Container Handling Equipment	Terminal Tractor
Load Req.	Container handling equipment must be capable of lifting containers regardless of contents. CARB assessed load factors of 0.59.[4]	Must be capable, but do not require long duration load carrying requirements. CARB assessed load factors of 0.39.[4]
Duty Cycle	Some are operated for 4,600 annual hours (equivalent to two daily shifts, five-to-six days per week"[2]	Vehicles typically operate in-line with port operations: x2 eight-hour shifts per day on average.
Space for Fueling	Fuel at central depot via mobile fueling trucks before being put back into service. Little room for long-duration EV charging.	Fuel at central depot via mobile fueling trucks before being put back into service. Little room for long-duration EV charging.
EV Infra. Challenges	Installation of power lines (buried or otherwise) at ports to support charging would prove challenging compared to transportable fuel.	Installation of power lines (buried or otherwise) at ports to support charging would prove challenging compared to transportable fuel.

References: (1) # Vehicles and 2024 figures from CARB's EMFAC Emissions Inventory database; Avg. Fuel consumption calculated based on equivalence from diesel consumption, (2) CAAP 2021 Cargo Handling Equipment Feasibility Assessment Report, (3) CARB 2022 Cargo Handling Equipment Emissions Inventory (4) Google Maps

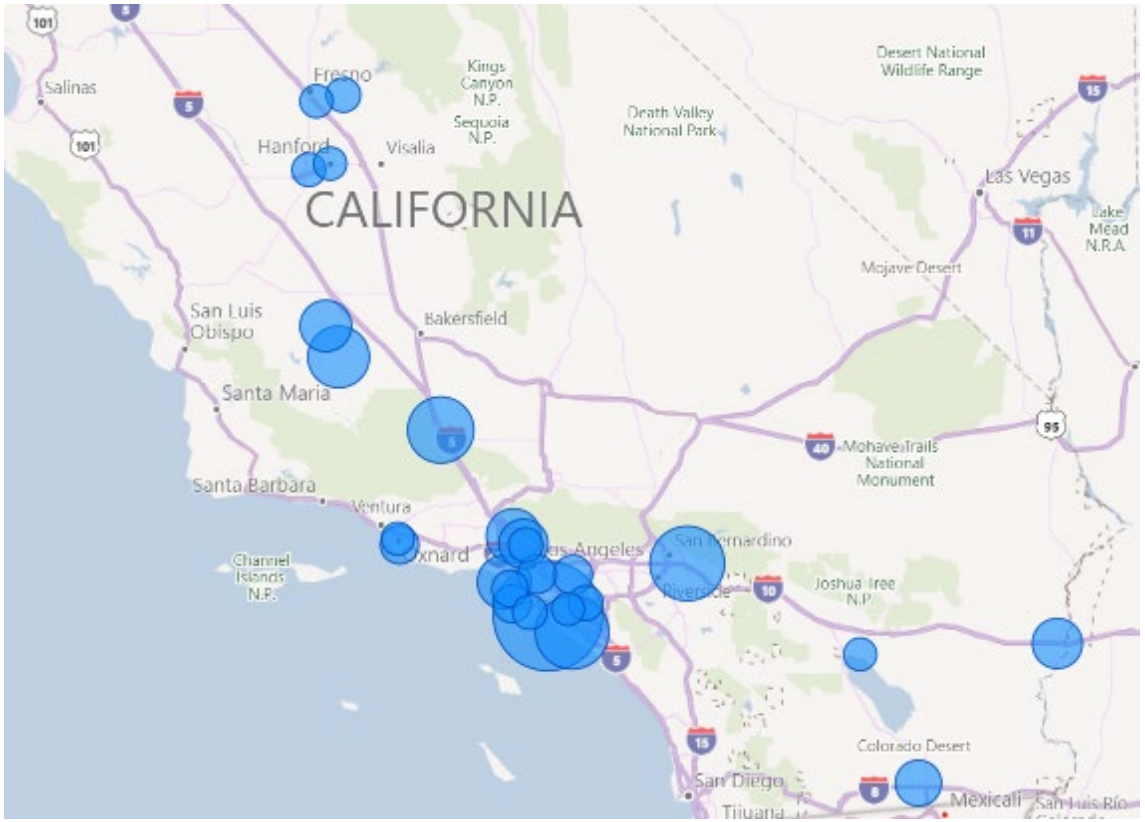
POWER

SoCalGas

Power Generation: Overview

Current natural gas consumption within the power sector is 256 BCF/yr in the SoCalGas service territory, with an opportunity for hydrogen fuel switching across peaker and baseload plants

Current Natural Gas Consumption by Zip Code



Size of Bubble: Natural Gas Consumption for Electricity (MMBTU)
Does not include power generation in SDG&E
Sources: EIA 923 – Generator Data[1]

Power Industry Overview

- The sector currently accounts for 256 BCF of natural gas in SoCalGas territory
- There are 32 power plants in the SoCalGas territory that have been included in the model with a capacity of >1MW. Current baseload and peaker plants are included, with the assumption that the majority of plants will transition to peaker in the future
- Existing natural gas peaker & baseload plants represent ~15GW of total capacity, with peaker and baseload generation of 32.6M MWh annually. [1,2,5]
- We anticipate that the importance of dispatchable generation on the grid will continue due to an increase in intermittent renewables such as wind and solar on the grid, providing a role for hydrogen
- Current power plant data has been used as the base to model fuel switching to hydrogen in SoCalGas territory. The full power market was not modelled
- The baseline for the model is facility-level natural gas consumption data from the EIA and CEC[1, 4]

References: (1) EIA, (2) CEC, (3) CARB, (4) CEC (5) GW capacity represents all power generation in 2021 excluding cogeneration. MWh generation represents generation from peaker and baseload plants

Power Generation: Methodology

H_2 demand for the power sector in SoCalGas service territory is modelled by multiplying the following factors

Facility-Level Fuel Consumption, 2025-2045

Current Plant Data from EIA 923 and EIA 860

Operator, nameplate capacity, historical generation & fuel consumption on an MMBTU basis, turbine type, summer and winter nameplate capacity, and heat rates.

Combined cycle combustion turbine	Combustion turbine
Steam turbine	Combine cycle steam turbine part
Combined cycle single shaft	Internal combustion turbine

H2 consumption is determined by calculating the H2 equivalent of current fuel consumption using the ratios of:

- Heat content of hydrogen on an MMBTU basis
- Hydrogen turbine efficiency

Data is taken from the EIA 923 and EIA 860 databases, which includes current natural gas consumption at the plant and turbine level on an MMBTU basis

Facility data was filtered to include only facilities in SoCalGas territory

NG to H2 Transition Rate

H2 Upgrade Probability X **System-Wide Capacity Factor** = **NG to H2 Transition Rate in 2045**

Probability to switch to H2 in 2045 based on predicted revenues of electricity produced from hydrogen in combustion turbines, as well as those from natural gas compared to CCUS and battery, with all three compared against the cost of purchased power.

2045 "what if" capacity factor range assumptions based on external studies and interviews with market participants (Conservative), external reports that project future system-wide natural gas capacity factors[1] (Moderate), and historical natural gas capacity factors (Ambitious).

Adoption Curve from 2025-2045

Adoption curve from current consumption to 2045 consumption is determined based on **key milestones and associated adoption factors**

Legislation	Technical Feasibility	Business Readiness
*SB100**	*Timeline to 100% H2 turbines*	

References: (1) Glendale, CEC, CARB, (2) EIA

Demand will need to be further mapped to locational areas to assist with other Angeles Link studies

**Although SB100 framework does allow for an emission budget, the analysis conservatively assumed zero emission by 2045 under SB100*

***Capacity factors were not modelled and were instead inputted directly to understand what hydrogen demand could be across a range of different capacity factors.*

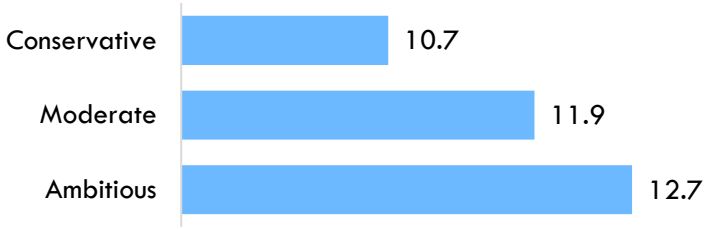
Power Generation: Adoption Rates

Hydrogen demand is driven by cost and commercial availability, regulations and legislation, technical feasibility, business readiness, and projected capacity factors

H2 Upgrade Probability X **System-Wide Capacity Factor** = **NG to H2 Transition Rate in 2045**

Hydrogen upgrade probability : Cost inputs are used to determine the likelihood of turbine-level capacity to choose H2 in 2045 compared to other alternatives (CCUS, battery). This percentage is applied to current capacity to determine 2045 H2 capacity

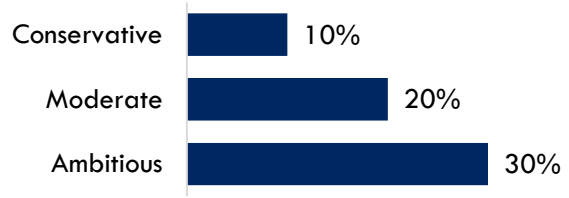
Projected Hydrogen Capacity by 2045, GW



Capacity Factor: A range of "what-if" capacity factor scenarios were evaluated to determine the total power generation from hydrogen in 2045. Capacity factors were not modelled and were instead inputted directly from external sources and reports to understand what the potential demand could be across a range of different capacity factors. The probability of each capacity factor was not evaluated.

Modeling the anticipated electric load increase and grid reliability requirements in future phases may help to determine which capacity factor is most likely

Hydrogen Capacity Factors and Associated MWh



Scenario	"What If" Analysis of Capacity Factors	Source
Conservative (C.F. of 10%)	Decline in future capacity factors due to a large shift from natural gas to other renewables with renewables serving future load growth	Number is based on external studies and feedback from market participants who expect hydrogen capacity factors to be in the range of 5% - 15%
Moderate (C.F. of 20%)	Decline in capacity factor from today, however the capacity factor is larger than in the conservative scenario reflecting increased dispatchability needs.	Number is based on future natural gas capacity factors projected by the CARB scoping plan and CEC reports, which range from 15-25%
Ambitious (C.F. of 30%)	Reflects a potential future where hydrogen capacity factors remain the same as current system-wide natural gas capacity factors	Number is based on historical EIA natural gas capacity factor data

References: Interviews held with power plant owners, OEMs, academia, and governmental and regulatory organizations

Power Generation: Key Assumptions and Data Sources

Modelling assumptions across adoption rate factors were developed and validated through research & interviews

Adoption Factor	Assumptions / Inputs	Data Source
Legislation	Senate Bill 100 (2018) • Requires renewable energy and zero-carbon resources to supply 100% of electric generation by 2045. Model assumes 100% emission reduction by 2045, although SB100 framework allows an emission budget • Provides interim milestone of 60% of electric retail sales to be met by eligible renewable resources by 2030 Senate Bill 1020 (2022) • Requires eligible renewable energy resources and zero-carbon resources supply 90% of all retail sales of electricity by 2035, 95% by 2040, and 100% by 2045	SB100 SB1020 100% carbon free assumption for SB100 adherence based on LADWP SLTRP
Technical Availability	• Current blending percentage is taken at the plant level, with current turbines in SoCalGas territory capable of 5-75% blending with a majority of plants at 30% • Projected 2030 milestone for 100% H2 turbine technical capability	EPRI Analysis, Interviews with OEMs

Commercial Availability	• Hydrogen is at price parity with incumbent fuels
	• Hydrogen upgrade costs are developed at a plant level across various upgrade ranges:
	  • 300MW: $18M-$20M for 30% upgrades, $24M-$31M for 100% upgrades
	  • 100MW: $3.8M for 30% upgrades, $14M-$17M for 100% upgrades
	  • 40MW: $3.2M for 30% upgrades, $14M-$16M for 100% upgrades
	  • >300MW: Up to $570M with increasing costs based on size
	• Hydrogen is compared to alternatives on a cost and profit basis to determine hydrogen upgrade probability using the following inputs:
	  • Battery Install cost: $2M/MWh, CCUS Capital Cost: $1,727/KW, CCUS T&D cost: $3.7/MWh
	  • Peak Demand Power Cost: $0.50/KW, Revenue Power Charge: $0.12/KW
		EPRI analysis, OSTI, Interviews with OEMs

Other:
Capacity Factors
	• Capacity factor is projected across a variety of what-if scenarios:
	  • Conservative (10%): Developed based on interview inputs, with common projections from OEMs and power plant operators ranging from 8-10%
	  • Moderate (20%): Developed based on external reports projecting future natural gas capacity factor around 20%
	  • Ambitious (30%): Developed based on current natural gas capacity factors
	• LADWP stated hydrogen capacity buildout has been maintained for LADWP plants
		LADWP SLTRP, Interviews with OEMs and plant operators

Business Readiness	• Projected that business readiness will take 5-8 years due to business decision making, permitting, construction for new turbines, and retirement rates of current turbines	Interviews with plant operators
Sector Growth	• Model conservatively assumes no new hydrogen power generation capacity	Not applicable

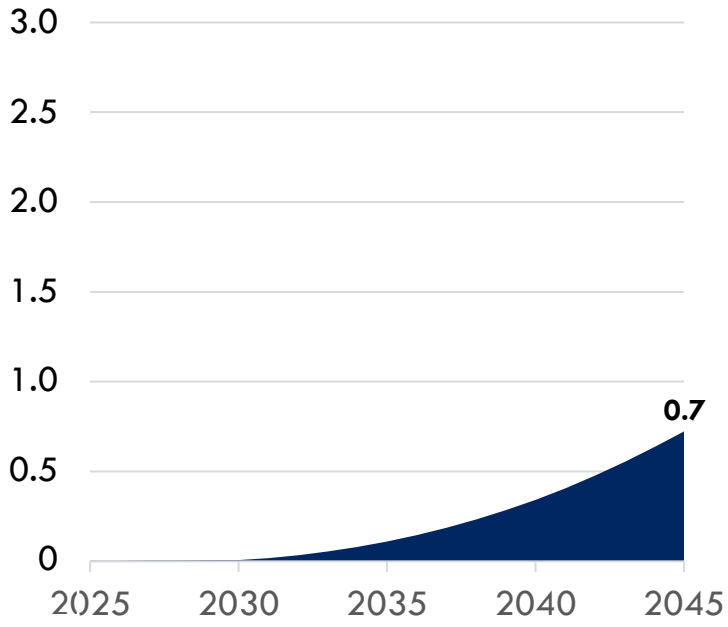
Power: Demand Outputs

Preliminary demand projections range from 0.7M – 2.7M tons of hydrogen/year in 2045, with increasing ramp up over time

Total Expected Clean Renewable Hydrogen Demand

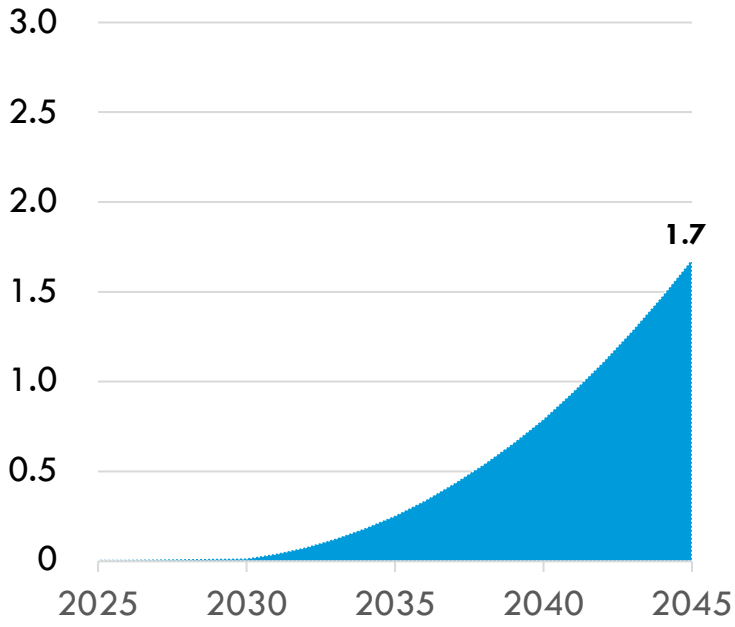
Values in million TPY | Reflects SoCalGas service territory

Conservative



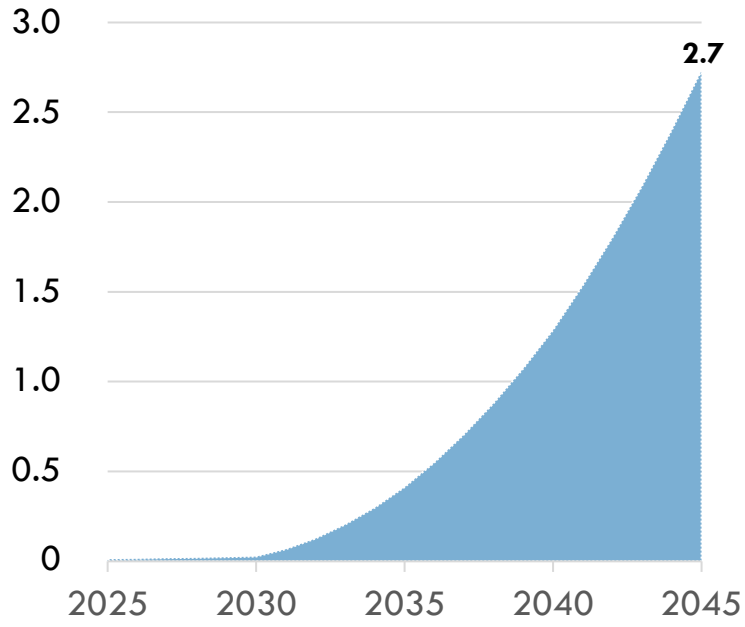
The conservative scenario reflects hydrogen demand under a low capacity factor scenario of 10%, assuming a decline in thermal combustion as other renewables increase and supply future load growth, based on external studies[1,2] and feedback from market participants[6]

Moderate



The moderate scenario reflects hydrogen demand under a capacity factor scenario of 20%, representing continued need for dispatchable generation, although at lower levels than we see today. Capacity factor assumption based on future natural gas capacity factors projected by the CARB scoping plan[3] and CEC reports[4]

Ambitious

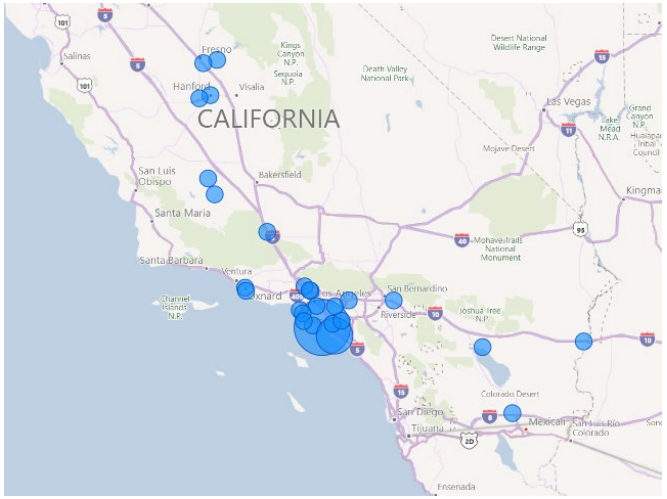


The ambitious scenario determines future hydrogen demand under the assumption that capacity factors continue to follow historical trends (~30%)[5]

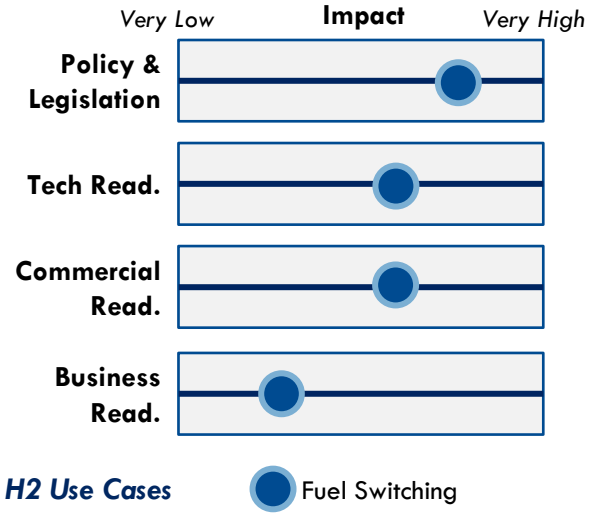
References: (1) LA100 (2) LADWP (3) CARB (4) CEC (5) EIA (6) Interviews held with power plant owners, OEMs, academia, and governmental and regulatory organizations

Sample Use Cases | Baseload & Peaker Plants

Major Southern California Facilities



Size of bubble: Number of facilities in zip code



Baseload & Peaker Plants

H2 Demand Forecast

0.7M – 2.7M

TPY by 2045

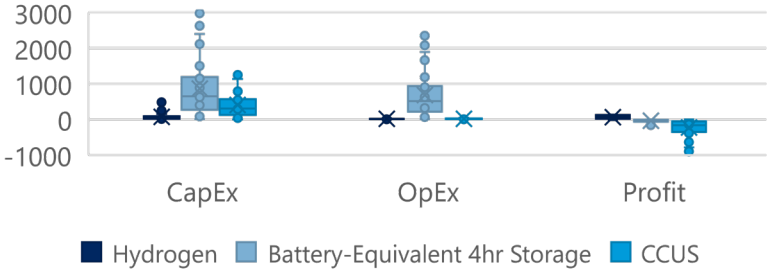
Statistics

Estimated Annual NG Usage: 256M MMBTU

Policy & Regulation Considerations

SB100 mandates 60% renewables for electricity by 2040 and 100% by 2045, which will drive sector decarbonization in the long term

Cost Comparison of Decarbonization Alternatives



CapEx and OpEx costs, revenue, and profit are calculated at the plant level depending on turbine type, current combustion and 2045 scenario capacity factor of given option

Given price parity, hydrogen consistently shows lower costs and higher revenue than modeled alternatives

CA Case Study: Scattergood Hydrogen Transition

LADWP is moving forward with plans to convert its largest baseload-fired power plant, the 830MW Scattergood Generating station, to run on green hydrogen. This transition will start with combustion of 30% hydrogen on day 1, moving to 100% by 2035. Safeguards have been introduced to ensure NOx pollutants will not increase as a result of the switch. (Source)

Case Study: Intermountain Power Project

This project includes the retirement of the existing coal-fueled units at the IPP site; installation of new natural gas-fueled electricity generating units capable of utilizing hydrogen for 840 megawatts net generation output; modernization of IPP's Southern Transmission System linking IPP to Southern California; and the development of hydrogen production and long-term storage capabilities. The new natural gas generating units will be designed to utilize 30 percent hydrogen fuel at start-up, transitioning to 100 percent hydrogen fuel by 2045. (Source)

Operational Characteristics

Plants are projected to be running at higher capacities during periods of peak demand and at lower capacity when demand is low, with system-wide capacity factor ranging from 10%-30%.

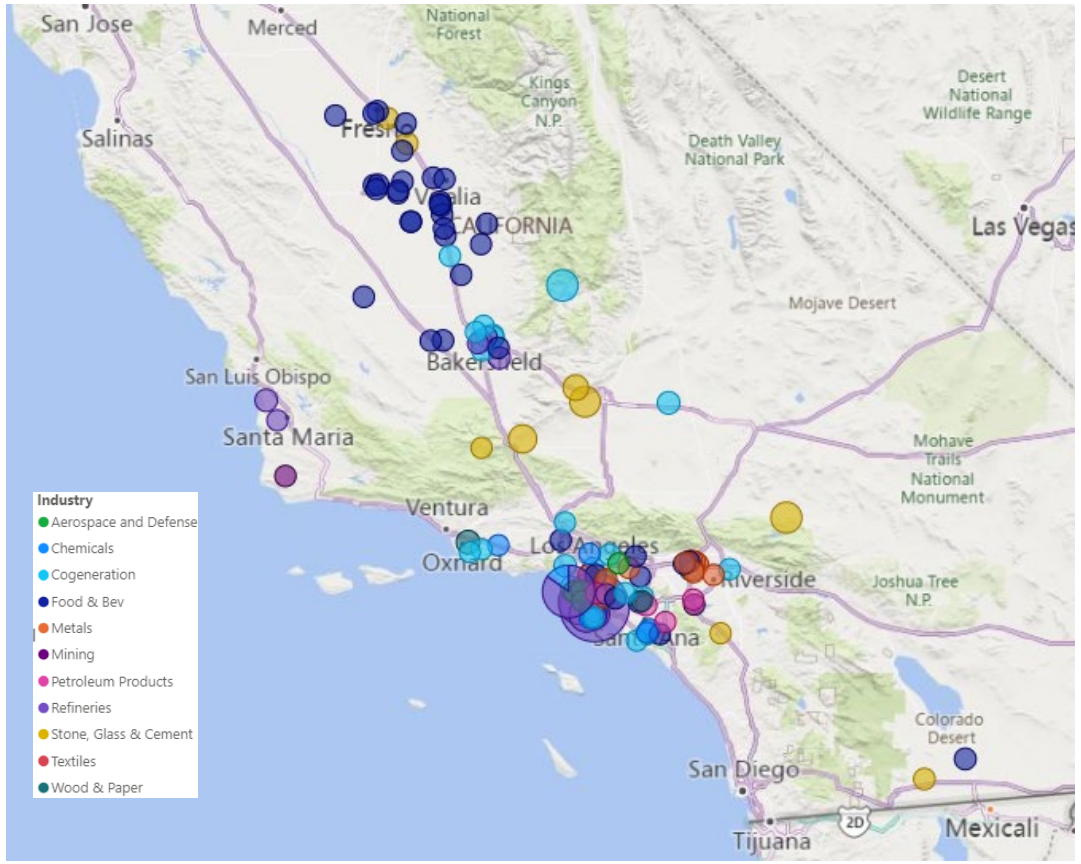
There are current turbines capable of up to ~30% hydrogen blend by volume.

INDUSTRIALS

SoCalGas

Industrials: Overview

Southern California has a diverse industrial base, with multiple industrial sectors across metals, food and beverage, paper, chemicals, and more



Sources: CARB Industrial Facilities Pollution Map, Interviews

- As the largest manufacturing state in the country, California has roughly **25,000 industrial enterprises.**

Key Industrial Sectors in Southern California

- Food and Beverage
- Metals
- Stone, Glass, Cement
- Mining
- Textiles
- Paper
- Chemicals
- Aerospace and Defense
- Refineries
- Petroleum Products

- There is a **significant concentration of industrial activity within Southern California**
- The industrial goods production sector in California currently **employs ~1.3M individuals**

Sub-Sector Opportunity for Clean Hydrogen

Across the industrial sector, there are a multitude of opportunities for hydrogen in different capacities

Cogeneration

CA GHG Emissions[1]	**3.0**	MTCO2e in 2022
Current NG Demand	**110**	BCF in 2021

Sub-Sector Overview

- Largest presence is on oil fields in Kern County and refineries near the Port of Los Angeles
- Locations on additional commercial and industrial facilities

Opportunity for Clean H2

- SB 100 mandates that all retail electricity must come from renewable and zero-carbon resources by 2045
- Fuel switching from natural gas to hydrogen blending and hydrogen turbines

Food & Beverage

CA GHG Emissions[1, 2]	**1.0**	MTCO2e in 2021
Current NG Demand	**18.9**	BCF in 2021

Sub-Sector Overview

- Large number of facilities, primarily concentrated in Central California, near Bakersfield
- Wide variety of food and beverage industries (e.g., dairies, breweries)

Opportunity for Clean H2

- Fuel switching from natural gas for industrial equipment such as heating, cooling, and refrigeration

Stone, Glass, Cement

CA GHG Emissions[1]	**1.7**	MTCO2e in 2021
Current NG Demand	**1.3**	BCF in 2021

Sub-Sector Overview

- Major cement facilities located in Kern County, with smaller glass and cement facilities distributed in the LA Basin
- SB 596: 100% net zero GHG target in cement by 2045

Opportunity for Clean H2

- Short- and medium-term opportunities are for fuel switching for high temperature equipment (e.g. kilns)
- Potential long-term opportunity for synthetic methanol, not currently quantified

Refining

CA GHG Emissions[1]	**10.0**	MTCO2e in 2021
Current NG Demand	**126**	BCF in 2021

Sub-Sector Overview

- Highly concentrated near the Port of Los Angeles and in San Joaquin Valley
- At present, hydrogen used in refineries is produced mainly from natural gas by SMR

Opportunity for Clean H2

- Clean fuel switching from natural gas, and transitioning from grey to clean, renewable hydrogen for refinery direct processes and production of renewable diesel and SAF

Metals

CA GHG Emissions[1]	**0.4**	MTCO2e in 2021
Current NG Demand	**6.8**	BCF in 2021

Sub-Sector Overview

- Primarily concentrated in the Los Angeles Basin
- Large presence of fabricated metal facilities with some high emissions usage primary metals
- No production of raw steel

Opportunity for Clean H2

- Fuel switching from natural gas for high temperature equipment such as boilers and furnaces
- Hydrogen-based direct reduction of iron (DRI) used in raw steel processing (No presence in SoCal)

Pulp & Paper

CA GHG Emissions[1]	**0.7**	MTCO2e in 2021
Current NG Demand	**5.2**	BCF in 2021

Sub-Sector Overview

- Few number of facilities, concentrated in the LA Basin
- Significant cogeneration operations at paper plants and are captured in cogeneration section

Opportunity for Clean H2

- Fuel switching from natural gas for high-temperature industrial equipment such as boilers and kilns

Chemicals

CA GHG Emissions[1]	**1.0**	MTCO2e in 2021
Current NG Demand	**2.6**	BCF in 2021

Sub-Sector Overview

- Few mid-sized chemical facilities, concentrated in LA Basin
- Primary chemicals presence in SoCal is in H2 production, which is not in scope

Opportunity for Clean H2

- Fuel switching from natural gas for industrial equipment such as boilers
- Use as feedstock in chemical processing

Aerospace & Defense

CA GHG Emissions[1]	**0.01**	MTCO2e in 2021
Current NG Demand	**0.8**	BCF in 2021

Sub-Sector Overview

- Large number of businesses in Los Angeles, however, few have sizeable onsite manufacturing
- Many aerospace parts are manufactured in metal fabrication shops, captured in metals category

Opportunity for Clean H2

- Fuel switching from natural gas for industrial equipment such as boilers
- Could serve as an early adopter given the strategic importance of the defense sector

1. Emissions value and current natural gas demand are from large facilities in SoCalGas service territory, 2. Relatively low emissions due to low-intensity processes

Industrials: Methodology – Fuel Switching

Fuel switching H_2 demand within the industrials sector is modelled from the multiplication of the following factors

Total Addressable Natural Gas

Base natural gas demand from eligible large facilities per sub-sector[1]

- CO2e emissions due to natural gas emissions from facilities are brought per sub-sector using the CARB Pollution Map, EPA FLIGHT dataset, and Industry Research
- CO2e emissions are then converted to NG demand

Base natural gas demand is broken out into heating – end use cases. The breakdown of heating – end use case will vary per sub-sector

- Breakdowns, by sub-sector provided by EIA's Manufacturing Energy Consumption Survey
- Breakdown categories related to fuel switching include:
  - Indirect Heat (Boilers)
  - Direct Process Heat (e.g. furnaces, kilns)
  - Indirect Process Heat (e.g., HVAC)

Annual natural gas demand is adjusted to reflect industry growth rates

- Conservative Scenario: No industry growth
- Moderate and Ambitious Scenario: Industry growth is derived EIA's Annual Energy Outlook – Macroeconomic Indicators dataset

Annual natural gas demand is updated to reflect removal of demand that will be electrified

- Electrification is an adoption curve that varies from 2025 – 2045
- Electrification adoption differs per heating end use case

Demand from refineries fuel switching is only included in the ambitious scenario

Natural Gas to Hydrogen Adoption Rate

Adoption rate methodology

1. Adoption factors are assigned impact values and then weighted to develop adoption rates for the short / medium/ horizon terms
2. Short/medium/horizon term adoption rates are translated to annual adoption rates by incorporating a lag parameter that accounts for the percent of the addressable market that can be addressed based on asset lifetime

Key adoption factors used in analysis

1. **Technical Feasibility:** In each sub-sector, the shift in technology feasibility and commercial availability of hydrogen combustion technology (e.g. boilers, kilns) was assessed from 2025 to 2045
2. **Alternatives:** For each heating end-use case, hydrogen technology and availability is compared to the costs and viability of alternatives, namely electrification and CCUS
3. **Business Readiness (Performance Impact & Capital Investment):** Sensitivity of each sub-sector to the capital investments necessary to implement 100% H2 technology and short-term performance impacts from switching to hydrogen
4. **Asset Lifetimes:** In the industrial sector, natural gas assets are expected to be potentially replaced with hydrogen technology near end of life. Depending on the equipment, asset turnover periods can range from 15 – 20 years

1. Eligible facilities are sites located directly in SoCalGas territory or regions where SoCalGas provides wholesale natural gas (e.g. City of Vernon, City of Long Beach)

Industrials: Methodology – Cogeneration

Cogeneration H_2 demand within the industrials sector is modelled from the multiplication of the following factors

Facility-Level Fuel Consumption, 2025-2045

Current Plant Data from EIA 923 and EIA 860

Operator, nameplate capacity, historical generation & fuel consumption on an MMBTU basis, turbine type, summer and winter nameplate capacity, and heat rates.

Cogeneration – Steam Turbines

H2 consumption is determined by calculating the H2 equivalent of current fuel consumption using the ratios of:

- Heat content of hydrogen on an MMBTU basis
- Hydrogen turbine efficiency

Data is taken straight from the EIA 923 and EIA 860 databases, which includes current natural gas consumption at the plant and turbine level on an MMBTU basis

Facility data was filtered to include only facilities in SoCalGas territory

Natural Gas Transition Rate

H2 Upgrade Probability X **System-Wide Capacity Factor** = **Natural gas transitioned in 2045**

Probability for capacity to switch to H2 in 2045 based on commercial availability between H2 and alternatives

- Costs for hydrogen upgrades between various blending levels are calculated at the plant level
- Total profit is determined across H2, CCUS, and battery based on plant capacity, costs, and revenues
- Weighted ratio of profit to comparable power purchase profit across options is used as hydrogen upgrade %

2045 capacity factor based on external studies and interviews, projected future natural gas capacity factors, and current capacity factors, with a range across scenarios

- LADWP projections for hydrogen are used as the starting point, with adjustments based on interviews for the conservative capacity factor
- Capacity factor inputs are updated in moderate and high scenarios based on additional external reports with projected future natural gas capacity factor (Glendale CEC CARB) and current natural gas capacity factor (EIA)

Adoption Curve from 2025-2045

Adoption curve from current consumption to 2045 consumption is determined based on **key milestones and associated adoption factors**

Legislation *SB100**	**Technical Feasibility** *Timeline to 100% H2 turbines*	**Business Readiness**

Demand will need to be further mapped to locational areas to assist with other Angeles Link studies

**Ambitious assumption of zero emission at SB100 2045 milestone used, while SB100 framework allows an emission budget*

Industrials: Methodology – Grey to Green Hydrogen Conversion

Grey to Green H_2 conversion demand is included only within the ambitious case, and is modelled by the below factors

Hydrogen Demand – Petroleum Refining

Base Petroleum Refining Demand

- Base production capacity of refinery capacity is pulled from CEC Refinery Inputs and Production report
- Renewable fuels capacity is removed from consideration and refinery utilization rate is identified for each facility to determine total production of petroleum.
- Refinery utilization is identified in CEC Petroleum Watch Report
  - Southern California Utilization – 89%
  - Average California Utilization – 80%

Annual refining demand adjusted to reflect projected decline in petroleum consumption

- 2025: 0%
- 2030: -5%
- 2040: -25%
- 2050: -50%

Hydrogen demand is then identified for petroleum refining

- Assumptions (Industry Research)
  - Sulfur Removal: 0.264kg of H2 per barrel
  - Hydrocracking: 6kg of H2 per barrel

Hydrogen Demand – Renewable Fuels

Currently Announced Production

- Industry research conducted to identify current and future renewable fuel announcement per refinery in SoCalGas territory

Additional production is estimated by evaluating replacement of petroleum refining capacity with renewable fuels production

- As petroleum refining demand decreases, the analysis assumes that a portion of the capacity at utilities will be substituted with production of renewable diesel (RD) and sustainable aviation fuel (SAF)
- Assumptions (SME Input):
  - 25% of petroleum refinement decrease from base capacity will be replaced with RD production
  - 25% of petroleum refinement decrease from base capacity will be replaced with SAF production

- **Hydrogen demand is then identified for renewable fuel production**
  - Assumptions (Industry Research)
    - Renewable Diesel: 1.1 kg of H2 per barrel
    - SAF: 5.3 kg of H2 per barrel

Grey Hydrogen to Green Hydrogen Adoption

Adoption rate assumptions formed using SME input and validated with industry interviews. Adoption rate is scaled linearly in years between assumption points.

2025: 0% of grey hydrogen can be transitioned from grey hydrogen to green hydrogen

2030: 50% of merchant hydrogen can be transitioned from grey hydrogen to green hydrogen; **30% of total refinery hydrogen demand**

2040: 100% of merchant hydrogen can be transitioned from grey hydrogen to green hydrogen; **60% of total refinery hydrogen demand**

2045: 100% of merchant hydrogen can be transitioned from grey hydrogen to green hydrogen and 25% of on-site produced hydrogen can be replaced by green hydrogen; **70% of total refinery hydrogen demand**

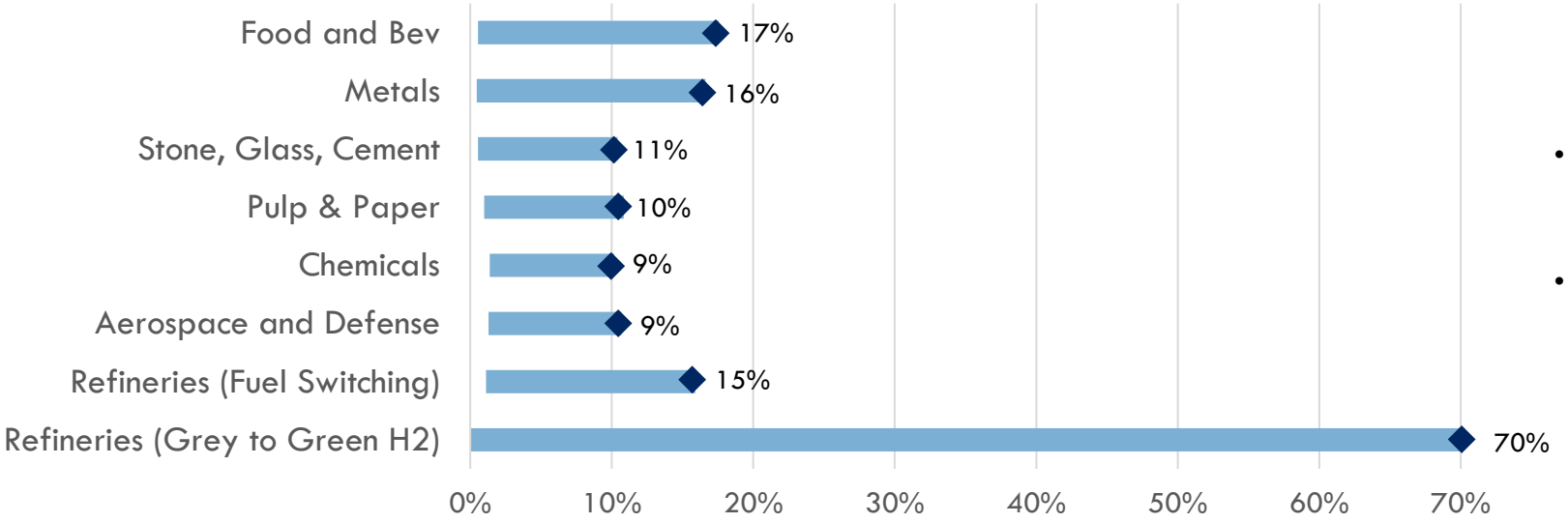
Assumption: 40% of hydrogen used on refineries is produced on site, 60% is merchant hydrogen (commercially procured)

Industrials: Adoption Rates

Fuel switching and green hydrogen demand adoption rates apply to all scenarios whereas cogeneration adoption rates vary per scenario

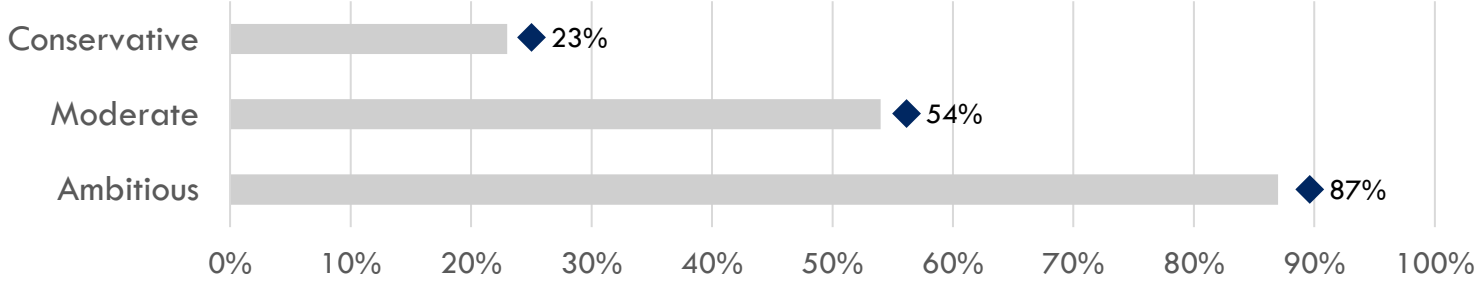
◆ 2045 Adoption Rate

Adoption Rates for Fuel Switching and Grey to Green Hydrogen Demand – All Scenarios



- Higher adoption rates observed in grey to green hydrogen conversion due to high technology readiness and low performance and capital impact, assuming cost parity with existing fuels
- For fuel switching, adoption factors are assigned impact values and then weighted to develop adoption rates for the short / medium / horizon terms
- These short / medium / horizon term adoption rates are translated to annual adoption rates by incorporating a lag parameter that accounts for the percent of the addressable natural gas volume that can be converted to hydrogen based technology based on asset lifetime

Adoption Rates for Cogeneration – Varies Per Scenario



- Transition rate reflects % of plants upgrading to H2 in addition to change from current capacity factors to projected 10-30%
- Key adoption factors used in the analysis include:
  1. Hydrogen Upgrade Probability
  2. Capacity Factor
  3. Policy and Legislation Milestones

Industrials: Assumptions and Considerations

Modelling assumptions and considerations were developed and validated through research & interviews

Model Factor	Assumptions and Considerations	Data Source
Addressable Market	• Only large facilities with significant natural gas emissions were considered for the demand analysis • Facilities that currently produce hydrogen or are jointly developed with companies producing hydrogen were not considered potential end users	CARB Pollution Map, EPA FLIGHT dataset, and Industry Research
Legislation and Regulation	Senate Bill 100 • Requires renewable energy and zero GHG emissions resources to supply 100% of electric generation by 2045 • Provides interim milestone of 60% of electric retail sales to be met by eligible renewable resources by 2030 Senate Bill 596 • Requires cement producers to reduce GHG emissions by 40% by 2030 and sets a target for 100% net-zero GHG emissions by 2045 Senate Bill 32 • Requires CARB to ensure that the state's GHG levels are reduced to 40% of 1990 levels by 2030 Assembly Bill 1279 • Requires CARB to ensure that the state's GHG levels are reduced to 85% of 1990 levels by 2045	SB100 , SB 596, SB 32, AB 1279
Technical Availability	• For most industrial facilities within SoCalGas's territory, the primary opportunity for hydrogen will be fuel switching for process heat, switching from natural gas-based combustion to hydrogen-based combustion technology • An estimated 40% of emissions from the cement industry are from combustion, the remaining emissions are from the production of clinker • Hydrogen adoption for industrial and commercial sited cogeneration turbines is expected to follow the same levels of technical feasibility growth as the other cogeneration turbines described in the Power sector section of this report.	Industry Research, Interviews with Facilities Operations

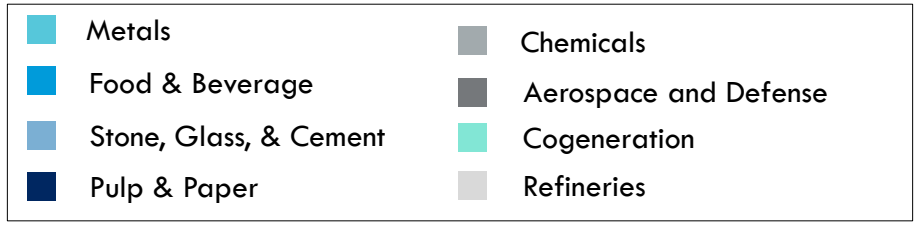
Commercial Availability and Alternatives	• Currently, there is a prohibition on transporting CO2 via pipeline in California for purposes of carbon capture and storage (CCS)
	• Certain heating processes are expected to be electrified and non-addressable for hydrogen uses. These electrification rates begin at 0% and scale to the following values by 2050:
	  • Boilers: 5%
	  • Direct Heating Application: 5% - 20%
	  • Direct Nonprocess uses: 80%
	  • Feedstock: 0%
	• Cogeneration commercial availability parameters are expected to be the same as commercial availability for peaker and baseload plants
		EPRI analysis

Business Readiness	• Facilities will only consider replacement of existing equipment with hydrogen-based technology when existing assets near end of life • Turnover period for boilers and direct process heat equipment is 20 years, turn over period for non-direct process heat equipment is 15 years • Facilities can blend up to 20% hydrogen with minimal increase in technology and cost penalties • Cogeneration business readiness parameters are expected to be the same as commercial availability for peaker and baseload plants	EPRI Analysis, Validated through Interviews
Sector Growth	• In the conservative scenario, industry growth is 0% for all sub-sectors as no additional increase in industrial goods production is expected • In the moderate and high scenario, natural gas usage is expected to increase in-line with increase in industrial goods production per sub-sector • No additional increase in demand at cogeneration facilities across all scenarios	EIA's Annual Energy Outlook Macroeconomic Indicators dataset

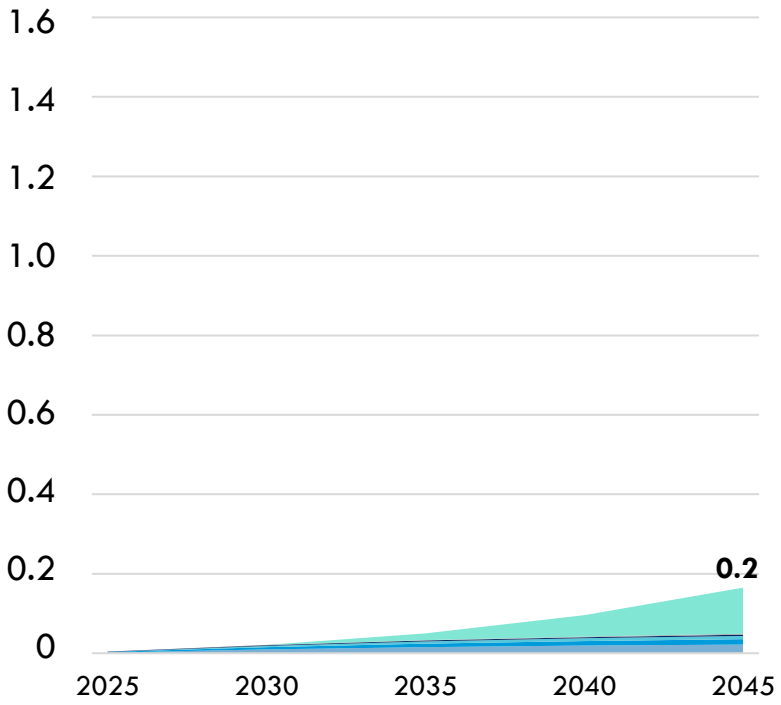
Industrials: Outputs

Total Expected Clean Renewable Hydrogen Demand

Values in million TPY | Reflects SoCalGas service territory only

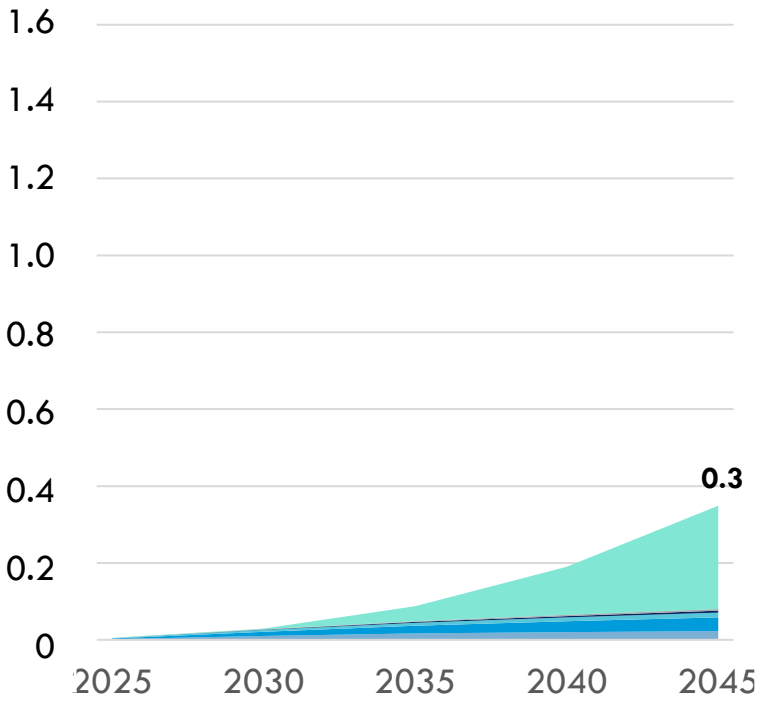


Conservative Case (M TPY)



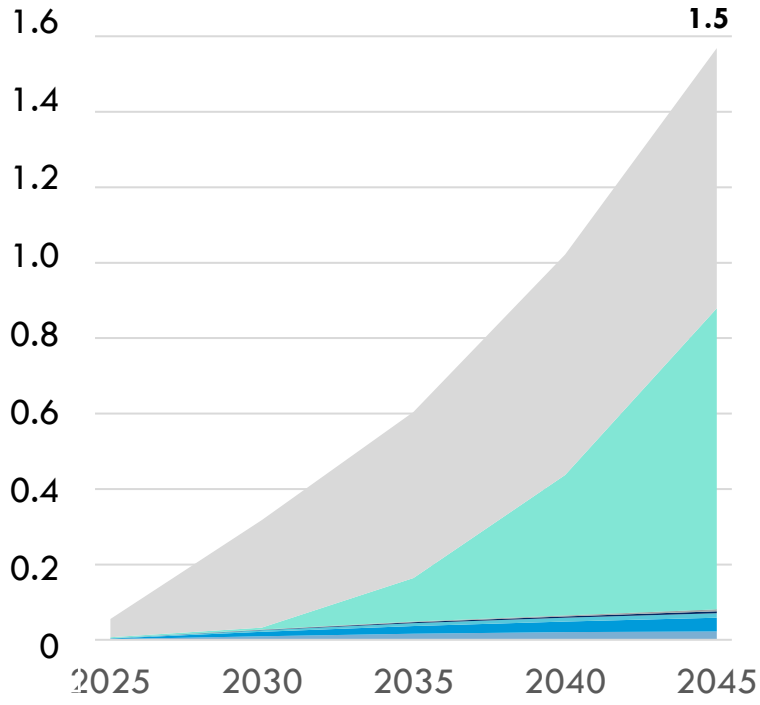
- No production expanse in California for identified industries; facilities will not expand beyond current production capabilities. Increased demand will be satisfied by out of region facilities
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 10%

Moderate Case (M TPY)



- California facilities will expand production in existing or new facilities to match growing market demand
- No refineries (Petroleum, Renewable Diesel, SAF, & Cogeneration)
- Cogeneration – Capacity factor of 20%

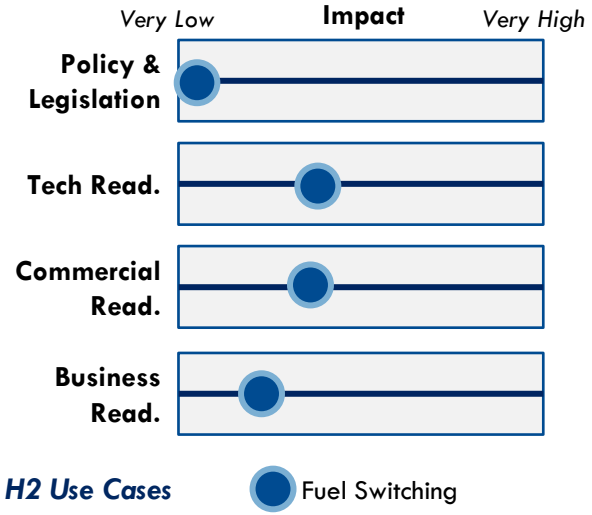
Ambitious Case (M TPY)



- Potential decarbonization legislation or market drivers in the refining industry could lead refineries to gradually transition to green H2
- California facilities will expand production in existing or new facilities to match growing market demand
- Cogeneration – Capacity factor of 30%

Sample Use Cases | Food & Beverage

Major Southern California Facilities



Food & Beverage

H2 Demand Forecast

14k – 36k

TPY by 2045

Statistics

Estimated Annual NG Usage: 18.1 BCF

Policy & Regulation Considerations

Besides Cap-and-Trade, there are no current policy mandates regarding the reduction of greenhouse gases. Notable regulations affecting H2 demand are the NOX limits set forth by the SQAMD.

Industry Characteristics

There are a wide variety of food and beverage industries in Southern California (e.g. dairies, breweries). Decarbonization pathways related to hydrogen adoption are expected to be similar across industries.

Many food & beverage plants are in more remote locations compared to other industries, which makes the availability of energy infrastructure a challenge for any shifts to alternative energy sources

The predominant sources of carbon emissions in this sector are due to heating, cooling, and refrigeration.

Case Study: Budweiser Brewing Group UK&I

Budweiser Brewing Group UK&I collaborates with green energy firm Protium, introducing a large-scale hydrogen generation system in their South Wales brewery, eliminating 15,500 tons of CO2 emissions annually. The existing on-site wind and solar assets will be used to manufacture the green hydrogen at Protium's hydrogen production facility. The facility will also include a hydrogen refueling station for heavy goods vehicles (HGVs) used to transport beer on-site. It will be the first large-scale hydrogen generation system installed at a brewery in the UK. This pioneering move is driven by AB InBev's global commitment to source 100% renewable electricity by 2025. "Hydrogen... could play a crucial role in supporting the transition to a decarbonized global economy," stated the company. (Source)

Operational Characteristics

Food & beverage processing facilities often run 24/7, with few idle periods apart from needed maintenance. Some types of food processing plants will have potential longer idle periods (e.g. tomato processing) due to seasonal agricultural trends

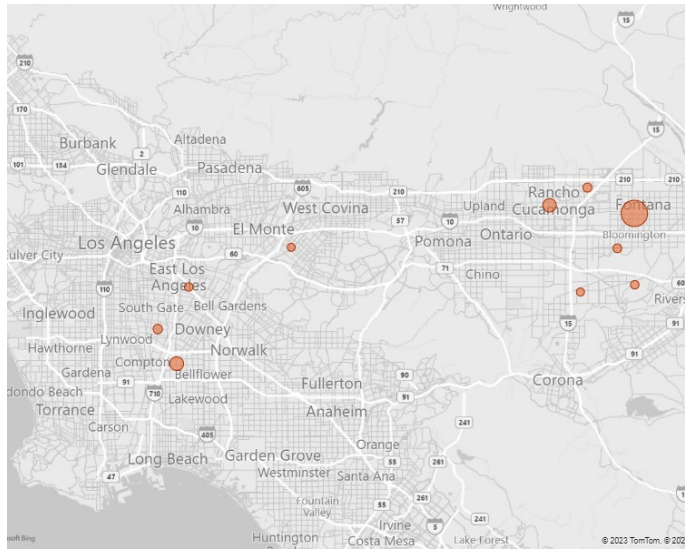
Key equipment (e.g., dryers) can have long lifetimes, lasting 20+ years

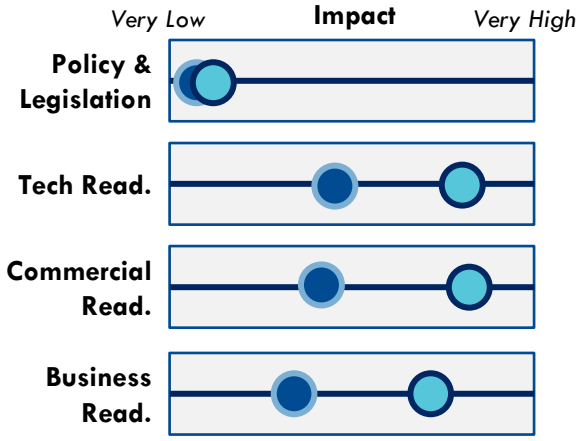
Natural gas usage and supply is integrated across multiple processes and sections within a facility.

Data and insights based on interviews, market research, and Accenture calculations from EPA's Facility Level GHG Emissions database

Sample Use Cases | Primary and Fabricated Metals

Major Southern California Facilities





H2 Use Cases Fuel Switching Direct Reduced Iron

Primary and Fabricated Metals

H2 Demand Forecast

8.1k -12.3k

TPY by 2045

Statistics

Estimated Annual NG Usage: 6.7 BCF

Policy & Regulation Considerations

Besides Cap-and-Trade, there are no current policy mandates regarding the reduction of greenhouse gases. Notable regulations affecting H2 demand are the NOX limits set forth by the SQAMD. New "Buy America" provisions in recent federal infrastructure acts stipulate preferences for domestically manufactured steel, potentially increasing demand

Industry Characteristics

Metals industry serves a wide variety of critical industries in California (e.g., construction, automotives, aerospace & defense)

Southern California metals industry does not consist of raw ore processing, which is the largest potential adopter of hydrogen in the industry through the use of Direct Reduced Iron (DRI).

While decarbonization of the metals industry has been progressing slowly in the US, there have been significant efforts in Europe. The European steel industry has set goals to cut carbon emissions by 55% by 2030 and reach climate neutrality by 2050.

Case Study: Cleveland-Cliffs

Cleveland-Cliffs completed a hydrogen injection trial at its Middletown Works blast furnace in Cleveland, OH during May 2023. This trial was the first H2 injection trial in North America. The hydrogen was delivered via existing pipeline infrastructure in place for the facility's other hydrogen uses, including for its annealing furnaces. Notable quote from Cleveland-Cliffs CEO states ""This achievement proves our ability to use green hydrogen throughout our footprint when it becomes readily and economically available…"

Operational Characteristics

Primary metal facilities often run 24/7, with few idle periods apart from needed maintenance, whereas fabricated metal facilities can have more downtime between operations depending on the end products

Furnaces and other key equipment have long lifetimes, lasting 30+ years in operation

Natural gas usage and supply is integrated across multiple processes and sections within a facility.

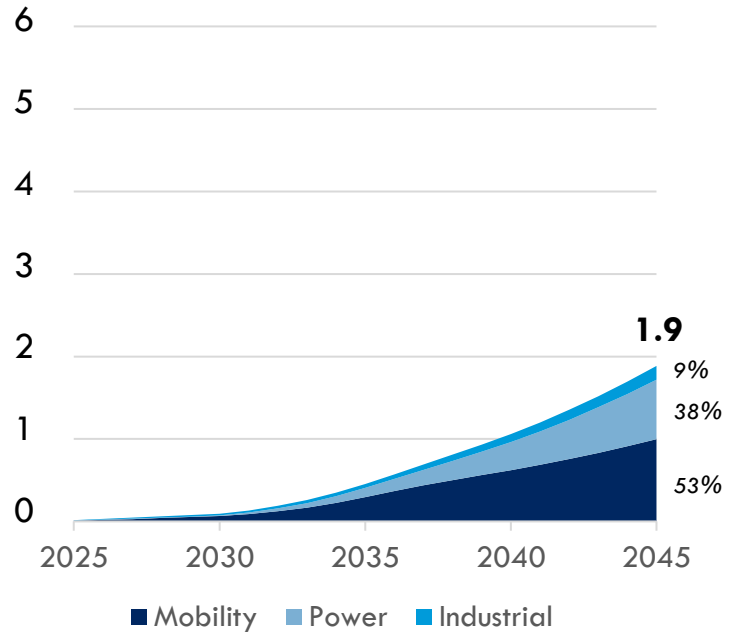
Data and insights based on interviews, market research, and Accenture calculations from EPA's Facility Level GHG Emissions database.

SUMMARY OF PRELIMINARY OUTPUTS

Overview of Preliminary Clean Renewable Hydrogen Demand Outputs

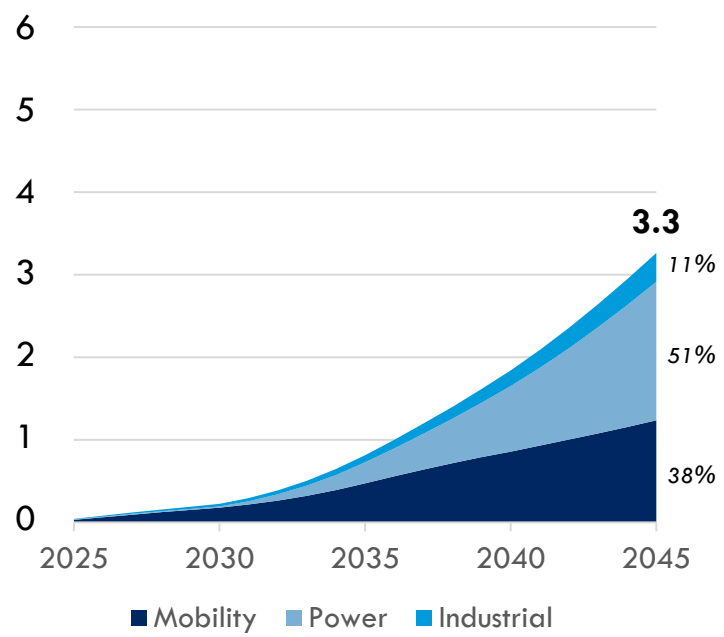
Total Expected Clean Renewable Hydrogen Demand Values in million TPY | Reflects SoCalGas service territory

Conservative



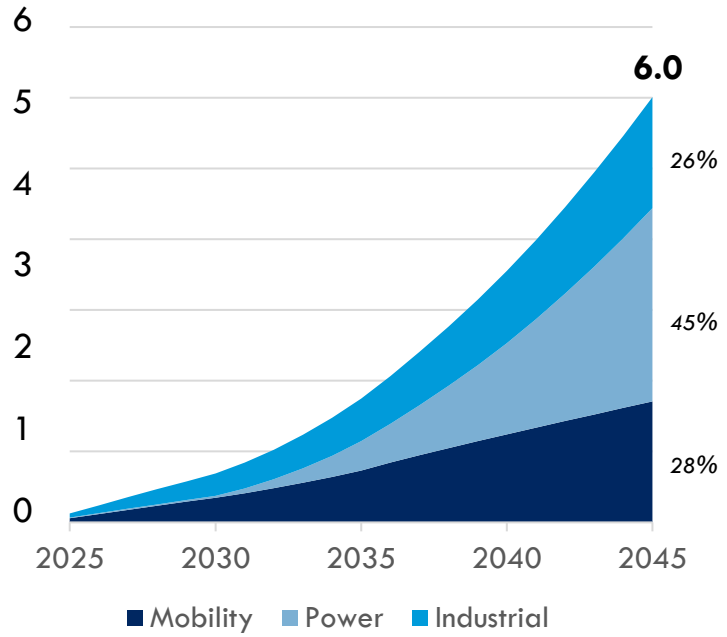
The conservative scenario reflects current legislation and conservative estimates for H_2 adoption factors and/or utilization rates. **Mobility drives majority of demand** in the conservative case

Moderate



The moderate scenario reflects assumptions of higher hydrogen adoption and utilization compared to the conservative case, with **Power taking on a larger share of hydrogen demand**

Ambitious



Significant growth occurs in the power and industrial sectors in the ambitious case, driven by **higher capacity utilization in Power and incorporation of refinery demand in Industrials respectively**

APPENDIX

SoCalGas

Summary of PAG & CBO Feedback

Not Exhaustive

Feedback Topic	Feedback Description	SoCalGas Response
Localized Hub Scenarios	1. A localized hub scenario should assess the availability of the precursors for hydrogen generation and the feasibility of generating hydrogen near the main source of demand. Such a scenario would evaluate both the existing water and energy transmission infrastructure, and the ability to expand such infrastructure to facilitate the development of hydrogen generation near the main source of demand.	1. The Demand Study includes a locational factor, which when integrated with the Production study, will inform the pipeline scenarios, including the localized hydrogen hub.
Alignment with State & Federal Agency initiatives	1. The technical approach for the demand study should clarify collaborative efforts with regulatory agencies such as the air districts and California Air Resources Board (CARB), as well as Original Equipment Manufacturers (OEMs) involved in the hydrogen production. 2. Alignment with the DOE H2 roadmap and any national plans related to hydrogen pipelines should be part of the market validation. 3. The analysis of demand should consider the potential future demand created by federal/state hydrogen hub efforts to ensure the project's long-term viability.	1. The demand study includes market participant interviews and peer review sessions with organizations (e.g. CARB, ARCHES, CEC) to ensure that it is well informed and aligned to the state's hydrogen efforts. 2. The Demand Study takes into account projects that have been publicized and that may be part of hydrogen hub efforts. 3. SoCalGas is collaborating with ARCHES as a part of the statewide hydrogen hub efforts.
Alternatives	1. The Demand Study should include numerous inputs and outputs. Each alternative listed should be analyzed as a component of the demand study. 2. Scattergood is trying to mix biogas with hydrogen fuel cell, interested to know if this will be considered. 3. The demand study should explore new sectors that were not previously served by Compressed Natural Gas (CNG), as hydrogen can serve both combustion and electricity generation purposes.	1. Hydrogen costs, production and supply, and overall alternatives will be covered in other Angeles Link Phase 1 studies. The Demand Study does consider hydrogen alternatives at the end user level across the three sectors modeled: mobility, power generation, and industrials. 2. The Demand Study will be considering end users blending hydrogen at the end use for power generation, but is not assessing what other fuels besides natural gas that the hydrogen will be mixed with. 3. The demand study explores fuel switching which includes both diesel and natural gas in the mobility and power gen sectors, and does not look at sectors with significant CNG use.
Grid Reliability	1. It is important that Phase 1 include assessments of the proposed infrastructure against chronic and acute events that may threaten its operation. As LADWP decarbonizes it's power system with variable energy resources like solar and wind, it will need green-hydrogen-fueled firm power generation to maintain system reliability and resiliency. It is critical that the green hydrogen supply is available when called upon. 2. It is imperative to assess the demand not only for prime power generation but also for clean backup power generation and the support of microgrids.	1. An assessment of chronic and acute events that may threaten operation is not within scope of the Demand Study. 2. The Demand Study takes into account cogeneration needs along with natural gas peaker plants.
Cost of Hydrogen	1. Hydrogen demand forecasts should include more than the total demand by year, it should also include demand by end use by year for at least 5 hydrogen cost levels. The hydrogen cost levels should be (1) current costs (2) the DOE's $1/kg cost goal (plus the cost of all delivery infrastructure required to get the hydrogen to the end customer, SoCalGas profits, financing costs, O&M costs and other costs); (3) three cost points distributed green hydrogen & DOE goal costs 2. Estimated pricing for hydrogen is currently DOE $1/kilogram, but if the cost ends up being higher, the demand might not be the same. Clarify how the demand analysis will approach this.	1. Hydrogen costs, production and supply, and overall alternatives will be covered in other Angeles Link Phase 1 studies. 2. The Phase 1 Demand Study aims to understand potential end users, end uses, and demand with less price constraints. Refer to cost assumptions on page 25. Hydrogen costs will be assessed in the High-Level Economic Analysis & Cost Effectiveness Study.
Storage Facilities	1. Scope of work missing commitment to closing the Aliso Canyon methane gas storage facility and the Playa del Rey methane gas storage facility.	1. Assessing current storage facilities are not within scope of the Demand Study.

Sub-Sector Specific In-Scope Analyses

	Included	Excluded
On-Road	• Heavy Duty Transit, Medium Duty Vehicles, Cargo Handling Equipment	• Light Duty Vehicles
Off-Road	• Cargo Handling Equipment, Ground Support Equipment, Agricultural Equipment, Construction & Mining Vehicles	
Marine	• Commercial Harbor Craft, Ocean Going Vessels	
Aviation	• Hydrogen Fuel Cell Aviation Vehicles	• Sustainable Aviation Fuel (Included in Industrials under Refineries
Baseload Combustion Generators	• Baseload Power Plants in SCG territory	• Any facilities below 1MW • New potential hydrogen power generation capacity
Flexible / Peaker Combustion Generators	• Peaker Power Plants in SCG territory	• Any facilities below 1MW
Food and Beverage Manufacturing	• Large food and beverage processing and manufacturing facilities identified in CARB pollution map or EPA FLIGHT databases	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Primary and Fabricated Metals	• Large primary metal and fabricated metal facilities identified in CARB pollution map or EPA FLIGHT databases • Primary metals includes steel processing and aluminum production facilities	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Stone, Glass, and Cement	• Large stone, glass, and cement manufacturing facilities identified in CARB pollution map or EPA FLIGHT databases • Stone includes both gypsum and clay processing facilities	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Wood and Paper	• Large paper processing facilities identified in CARB pollution map or EPA FLIGHT databases	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases
Chemicals	• Large chemical production and processing facilities identified in CARB pollution map or EPA FLIGHT databases	• Small facilities not identified in CARB pollution map nor EPA FLIGHT databases • Current hydrogen manufacturers
Co-Generation	• All cogeneration facilities identified in EIA 923 and EIA 860 databases	• Any facilities below 1MW
Aerospace and Defense	• Large aerospace and defense manufacturing facilities	• Any aerospace and defense facilities without manufacturing capabilities • Small facilities
Refineries	• Large petroleum refineries	• Facilities producing alternative fuels in direct partnership with existing hydrogen suppliers

ANGELES LINK

Appendix

CPUC Environmental and Social Justice (ESJ) Action Plan (2022)

- "The ESJ Action Plan is intended to serve as a resource for CPUC staff, intervenors, stakeholders, and the public. The goals and objectives provide the broad vision and steps the CPUC will take to ensure equity in its programs and services."
- https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/news-and-outreach/documents/news-office/key-issues/esj/esj-action-plan-v2jw.pdf

CPUC ESJ Action Plan
Goals 1 and 2

- Goal 1 - Consistently integrate equity and access considerations throughout CPUC regulatory activities
- Goal 2 - Increase investment in clean energy resources to benefit ESJ communities, especially to improve local air quality and public health
  - 2.1 Outreach & Engagement
    - Broaden and deepen outreach and engagement with ESJ communities early in proceedings and processes related to resilient, clean energy
  - 2.2 Research & Analysis to Understand Impact
    - Further research and analytical opportunities to understand impacts in ESJ communities
  - 2.4 Address Impacts in ESJ Communities

ANGELES LINK

CPUC ESJ Action Plan Goals 4 and 5

- Goal 4: Increase climate resiliency in ESJ communities
  - Emphasize Adaptive Capacity
- Goal 5: Enhance outreach and public participation opportunities for ESJ communities to meaningfully participate in the CPUC's decision-making process and benefit from CPUC programs
  - 5.1 Improve Communication with ESJ Lens
  - 5.2 Continue to Emphasize Engagement with CBOs
  - 5.3 Build Pathways for Public Participation
  - 5.4 Enhance Engagement with Particular ESJ Communities and Individuals

SoCalGas

CPUC ESJ Action Plan
Goal 7

- Goal 7: Promote high road career paths and economic opportunity for residents of ESJ communities
  - 7.1 Maximize Authority to Promote High Road Career Paths
  - 7.2 Educate on High Road Careers
  - 7.3 Partner with Utilities and Sister Agencies

ESJ Action Plan
Other Goals

» What about goals not mentioned?

- Goal 3 refers to metrics for CPUC staff to meet in other industries it regulates (i.e., water, transportation)
- Goal 6 refers to CPUC enforcement actions
- Goal 8 refers to CPUC goals for training its staff on EJS
- Goal 9 refers to CPUC goals for monitoring success of the program

ANGELES LINK

Assembly Bill 617 Communities

- The California Air Resources Board (CARB) established the Community Air Protection Program (CAPP) to reduce exposure in communities most impacted by air pollution
  - Community members work with local air districts to conduct air monitoring and prepare community emissions reduction programs
  - Strategies to reduce air pollution or exposure at the community level include new regulations, targeted incentive funding, enhanced enforcement, and coordinating efforts with other agencies based on community priorities

ANGELES LINK

Assembly Bill 617 Communities

» Community Air Protection Program (CAPP)

- In 2018, CARB selected an initial ten communities for community air monitoring and/or community reduction programs under the CAPP
  - Additional communities for inclusion in the program have been selected annually since 2018
- Communities enrolled in the CAPP that may be potentially affected by the Project will be identified in the Desktop Environmental EJS Analysis

WELCOME PAG MEMBERS

Arrival and Continental Breakfast

Facilitator Welcome, Land Acknowledgement,
SoCalGas Safety Message, Roll Call

SoCalGas Executive Opening Remarks

Decorum Policy Review

Project Options and Alternatives
Member Feedback

High-Level Economic and Cost Effectiveness Technical Approach
Member Feedback

BREAK

NOx and Other Air Emissions Technical Approach
Member Feedback

GHG Emission Evaluation
Member Feedback

Schedule Review and Next Steps

Adjourn/Lunch

September 28, 2023
9:00a.m. – 12:15 p.m.

ANGELES LINK

Planning Advisory Group (PAG)

Quarterly Group Meeting #3

Warm welcome to our participants!
We will be starting shortly after 9:00 a.m.
to make sure everyone is present in-person and online.

SoCalGas

WELCOME FROM OUR FACILITATORS

ANGELES LINK

CHESTER BRITT
Executive Vice President
Arellano Associates
PAG Lead

ALMA MARQUEZ
Vice President Gov. Relations
Lee Andrews Group
CBOSG Lead

SoCalGas

HOUSEKEEPING:

This meeting will be recorded (video and audio), and a court reporter will be transcribing the meeting. Please announce yourself before you speak

Zoom microphones are muted by the host to eliminate background noise. You will need to unmute your microphone when called on to speak. *For both in-person and on-line participants please speak directly into the microphone to ensure everyone can hear*

We encourage you to turn on your cameras so we can better engage with you

Please feel free to use the Zoom chat to provide input and ask questions throughout the meeting

If you would like to speak, please use the "Raise Hand" button at the bottom of the Zoom screen

Wireless microphones will be passed to those speakers attending in person

AGENDA

- Arrival and Continental Breakfast
- Land Acknowledgement, Safety Message & Roll Call
- SoCalGas Opening Remarks
- Decorum Policy Review
- Project Options and Alternatives
  - Member Discussion
- High-Level Economic and Cost Effectiveness Technical Approach
  - Member Discussion
- Break
- NOx and Other Air Emissions Technical Approach
  - Member Discussion
- GHG Emission Evaluation Technical Approach
  - Member Discussion
- Schedule Review/Next Steps
- Adjourn/Lunch

ANGELES LINK

LAND ACKNOWLEDGEMENT, SAFETY MESSAGE & ROLL CALL

SoCalGas

EXECUTIVE OPENING REMARKS

ANGELES LINK

MARYAM BROWN
President
SoCalGas

SoCalGas

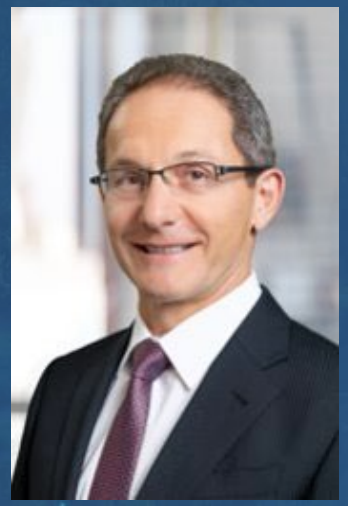
ANGELES LINK

DECORUM POLICY REVIEW

SoCalGas

SUMMARY OF PHASE ONE PROJECT OPTIONS & ALTERNATIVES AND HIGH-LEVEL ECONOMICS AND COST EFFECTIVENESS STUDIES TECHNICAL APPROACHES

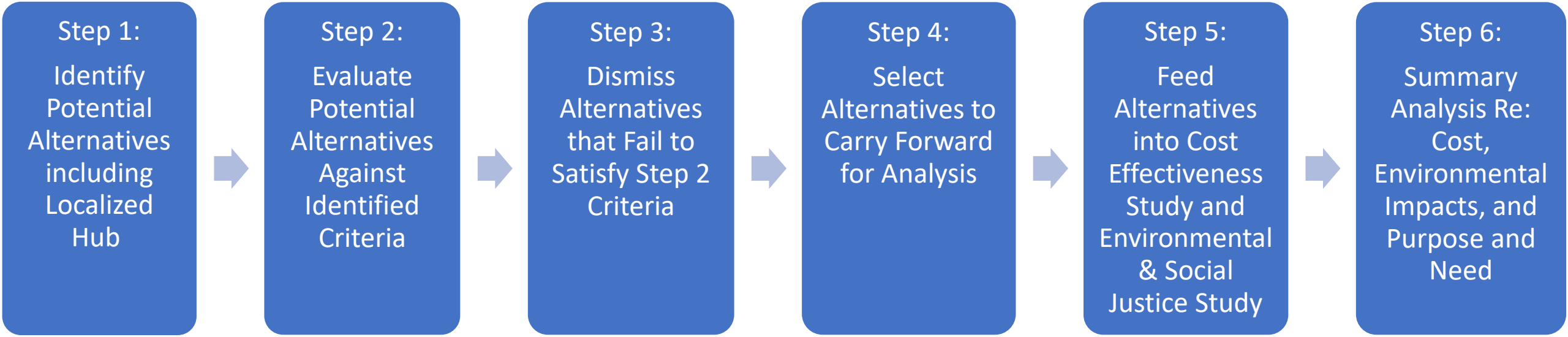
ANGELES LINK



YURI FREEDMAN
Senior Director
Business Development

SoCalGas

PHASE ONE PROJECT OPTIONS & ALTERNATIVES STUDY TECHNICAL APPROACH



PAG/CBO feedback is solicited at the following milestones as the Project Options and Alternatives study is developed: (a) study description; (b) technical approach; (c) data and preliminary outputs; and (d) draft report.

PHASE ONE PROJECT OPTIONS & ALTERNATIVES STUDY TECHNICAL APPROACH

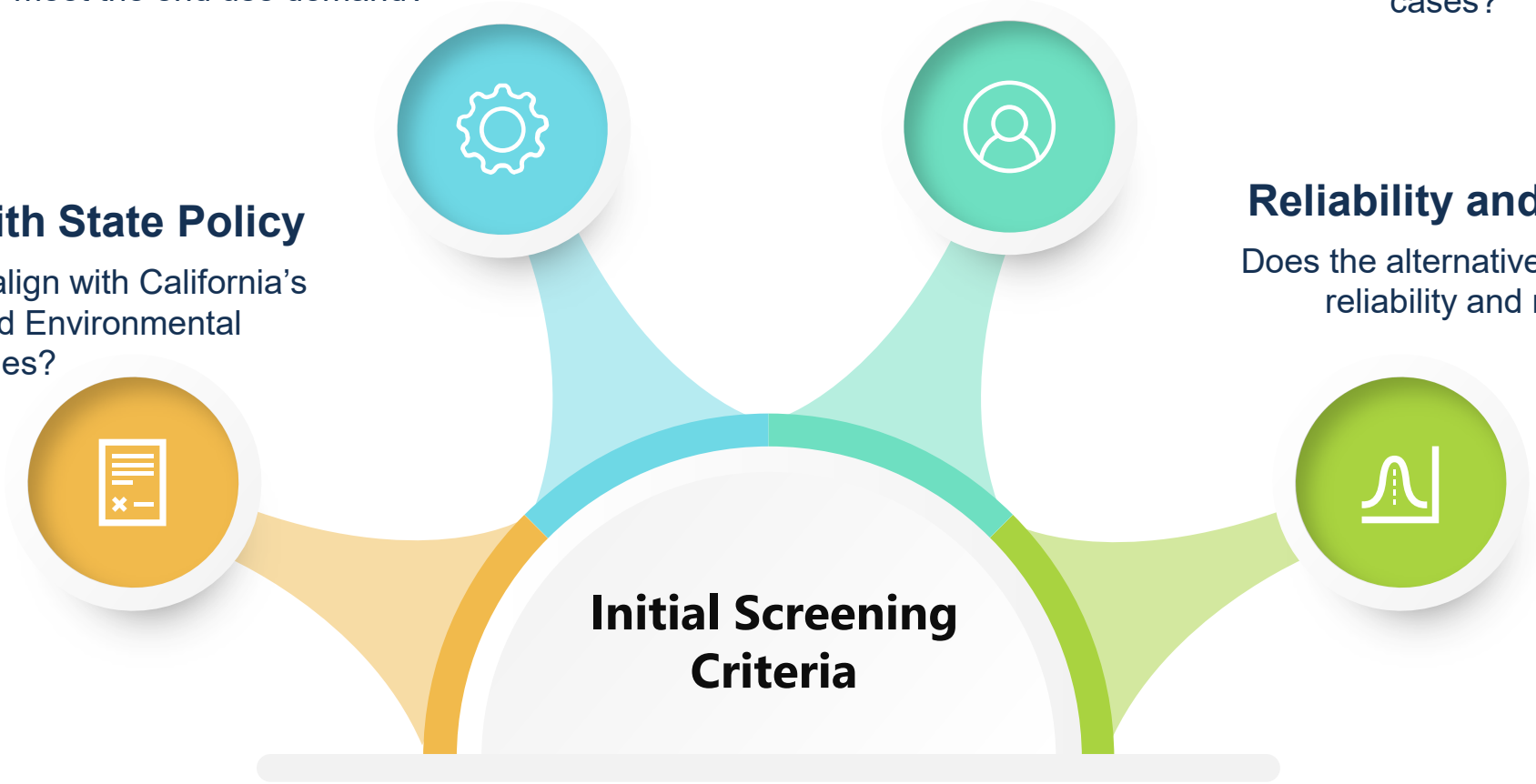
Defined Criteria of Elements for Initial Project Screening and Evaluation

Technological Feasibility

Does the alternative achieve the needed scale to meet the end use demand?

End User Requirements

Does the alternative support potential end use cases?



Compatibility with State Policy

Does the alternative align with California's Clean Energy and Environmental Policies?

Reliability and Resiliency

Does the alternative support energy reliability and resiliency?

Approaches to Technical Alternatives

Hydrogen Pipeline Alternatives

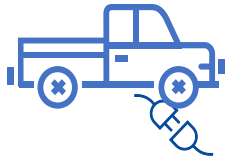
Alternative Routes or Configurations:
Alternative pipeline phases, segments, and/or configurations, storage locations, and compressor station locations

Localized Hydrogen Hub:
Localized system serving Los Angeles Basin with in/near basin production

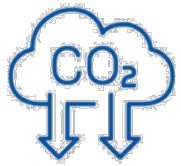
Other Alternatives

Non-Hydrogen Alternatives

Direct Electrification:
Electrify end uses instead of using hydrogen



Continued Use of Fuels with Carbon Management:
E.g., source-capture, ambient capture

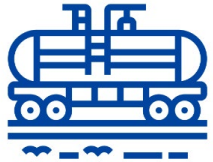


Energy Efficiency:
Customers reducing energy consumption

Renewable Natural Gas (RNG):
Methane from dairy, landfills, organic waste instead of hydrogen for power and commercial and industrial sectors

Hydrogen Delivery Alternatives

Deliver by:
Trucking, train, marine, and/or hybrid of trucking/train or electric transmission of renewable energy sources for hydrogen production in-basin



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Approaches to Technical Alternatives

Hydrogen Pipeline Alternatives

Alternative Routes or Configurations:
Alternative pipeline phases, segments, and/or configurations, storage locations, and compressor station locations

Localized Hydrogen Hub:
Localized system serving Los Angeles Basin with in/near basin production

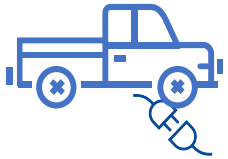
SoCalGas

Approaches to Technical Alternatives

Other Alternatives

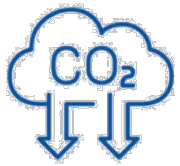
Non-Hydrogen Alternatives

Direct Electrification:
Electrify end uses instead of using hydrogen
Example: comparative assessment of the mobility sectors across various technological attributes (travel distance, refueling time, payload, etc.)



Energy Efficiency:
Customers reducing natural gas consumption

Continued Use of Fuels with Carbon Management:
E.g., source-capture, ambient capture



Renewable Natural Gas (RNG):
Methane from dairy, landfills, organic waste instead of hydrogen for power and commercial and industrial sectors

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Approaches to Technical Alternatives

Other Alternatives

Hydrogen Delivery Alternatives

Deliver by:
Trucking, train, marine, and/or hybrid of trucking/train or electric transmission of renewable energy sources for hydrogen production in-basin

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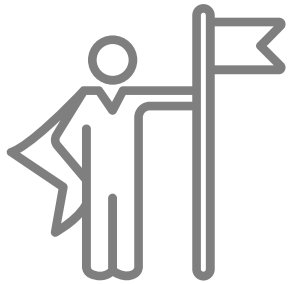
Assess Project Alternatives for Purpose and Need

Angeles Link is intended to fulfill several underlying purposes, including the following:

- Support the State of California's Decarbonization Goals, including mobility sector
- Optimize Service to All Potential End-Users
- Support Improving California's Air Quality
- Enhance Energy System Reliability, Resiliency, and Flexibility



- Enable Long Duration Clean Energy Storage
- Provide Cost Effective and Affordable Open Access Clean Renewable Hydrogen Transportation System
- Provide Efficient and Safe Clean Renewable Energy Transportation
- Help Reduce Natural Gas Use Served by Aliso Canyon Facility

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ANGELES LINK

MEMBER DISCUSSION: PROJECT OPTIONS & ALTERNATIVES TECHNICAL APPROACH

- Please announce your name and speak directly into the microphone
- Be concise and focus on discussion topics
- Verbal comments are not the only way to provide input, feel free to type a chat
- We are accepting input after this meeting if we run short on time or you think of things later

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Cost-Effectiveness Framework

Levelized cost of delivered hydrogen ($/kg) for Angeles Link

VS

Non-Hydrogen Alternatives

- Direct Electrification
- Energy Efficiency
- Renewable Natural Gas (RNG)
- Carbon Management

Hydrogen Pipeline Alternatives

- Multiple Pipeline Routing Options
- Localized Hub Option

Hydrogen Delivery Alternatives

- Trucking
- Train
- Marine
- Hybrid of trucking/train
- In/near basin production

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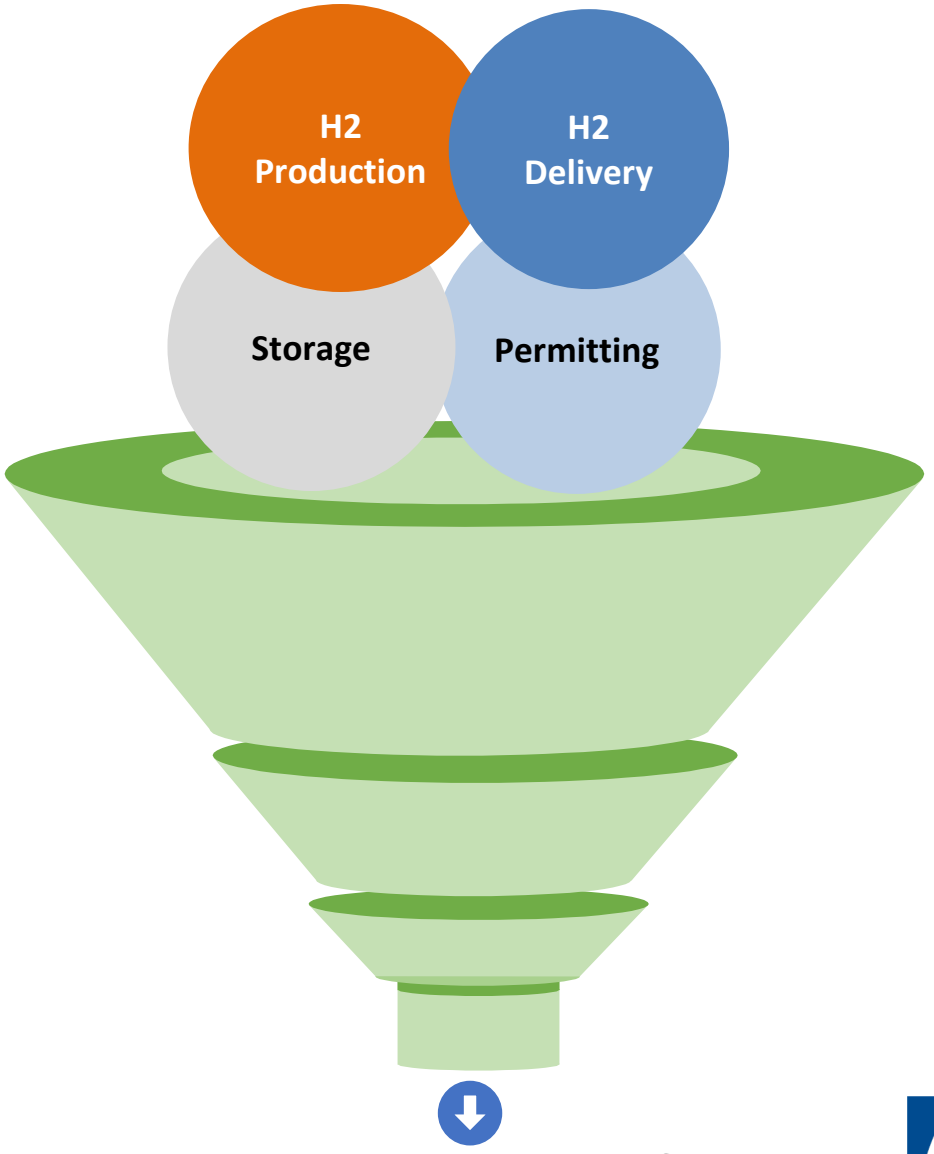
PHASE ONE HIGH-LEVEL ECONOMICS & COST EFFECTIVENESS STUDY TECHNICAL APPROACH

High Level Economics Framework

Input Assumptions

- **CAPEX**
  - Renewables and Electrolyzers
  - Pipeline
  - Compressor Stations
  - Construction
  - Potentially Storage
- **OPEX**
  - Fixed and Variable Costs
- **Incentives**
  - Federal tax credits
  - Low Carbon Fuel Standard (LCFS)
  - Other



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MEMBER DISCUSSION: HIGH-LEVEL ECONOMIC & COST EFFECTIVENESS TECHNICAL APPROACH

- Please announce your name and speak directly into the microphone
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BREAK (15 MINUTES)

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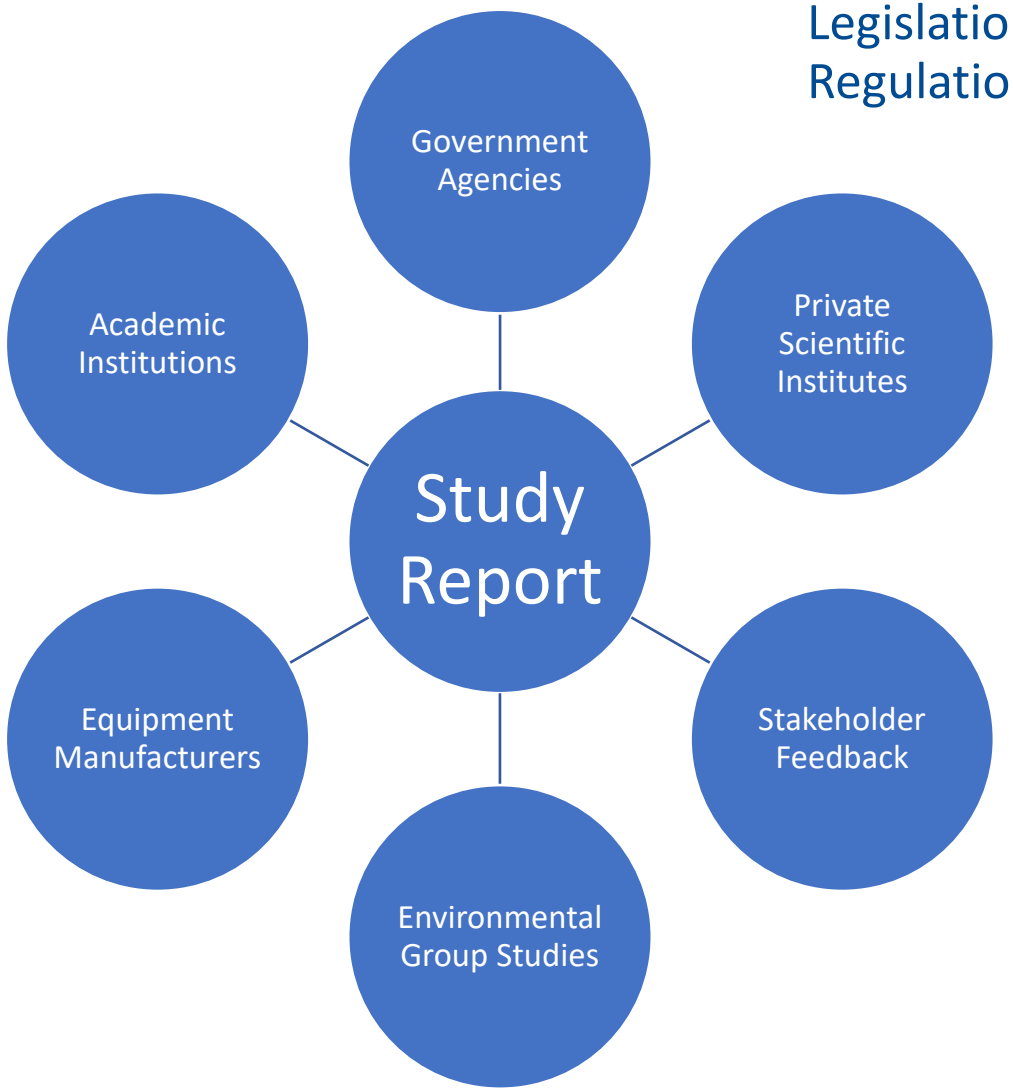
NOx EMISSIONS AND GREENHOUSE GAS EVALUATIONS: TECHNICAL APPROACH DISCUSSION

ANGELES LINK

DARRELL JOHNSON
SoCalGas Manager
Environmental Services

SoCalGas

NO_x EMISSIONS ASSESSMENT: INFORMATION SOURCES



Legislation/ Regulation
CARB 2022 SIP Strategy
CARB Advanced Clean Trucks Regulation
CARB Advanced Clean Fleet Regulation
South Coast AQMD 2022 AQMP
San Joaquin Valley APCD 2022 AQMP

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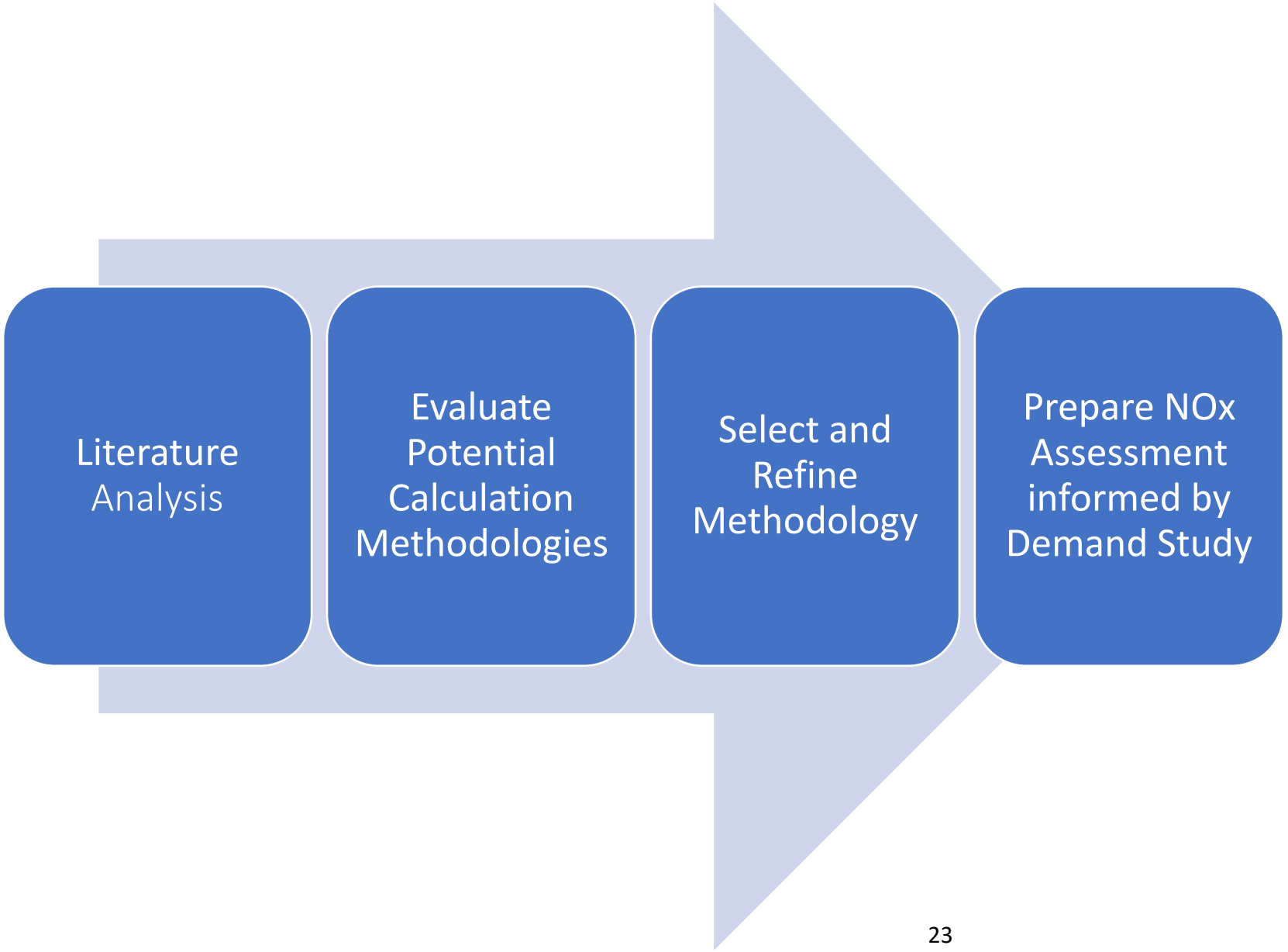
NO_x EMISSIONS ASSESSMENT: CALCULATION METHODOLOGY



Study Timeframe
2030-2045

Varying End User Adoption Rates and Timelines

Demand Study Model Results Used in Emissions Calculations

(Conservative, Moderate, & Ambitious Scenarios)

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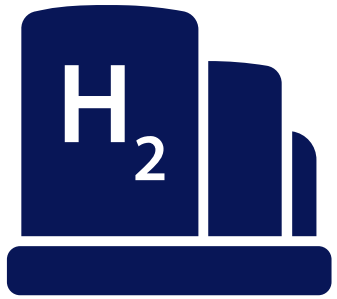
NO_X EMISSIONS EVALUATION: COMBUSTION CALCULATIONS

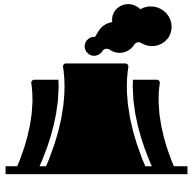
NEW SOURCES
New NOx



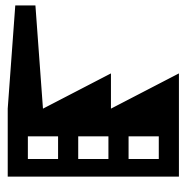
Infrastructure
(Production, Storage, Transmission)

EXISTING TYPES OF END USERS

STATIONARY SOURCES
Changed NOx



Power Generation



Hard to electrify Industries

MOBILE SOURCES
Changed NOx

Mobility

Replace carbon-based fossil fuels
(natural gas, gasoline, diesel, jet fuel)
with clean renewable hydrogen

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MEMBER DISCUSSION: NO_X EMISSIONS ASSESSMENT TECHNICAL APPROACH

- Please announce your name and speak directly into the microphone
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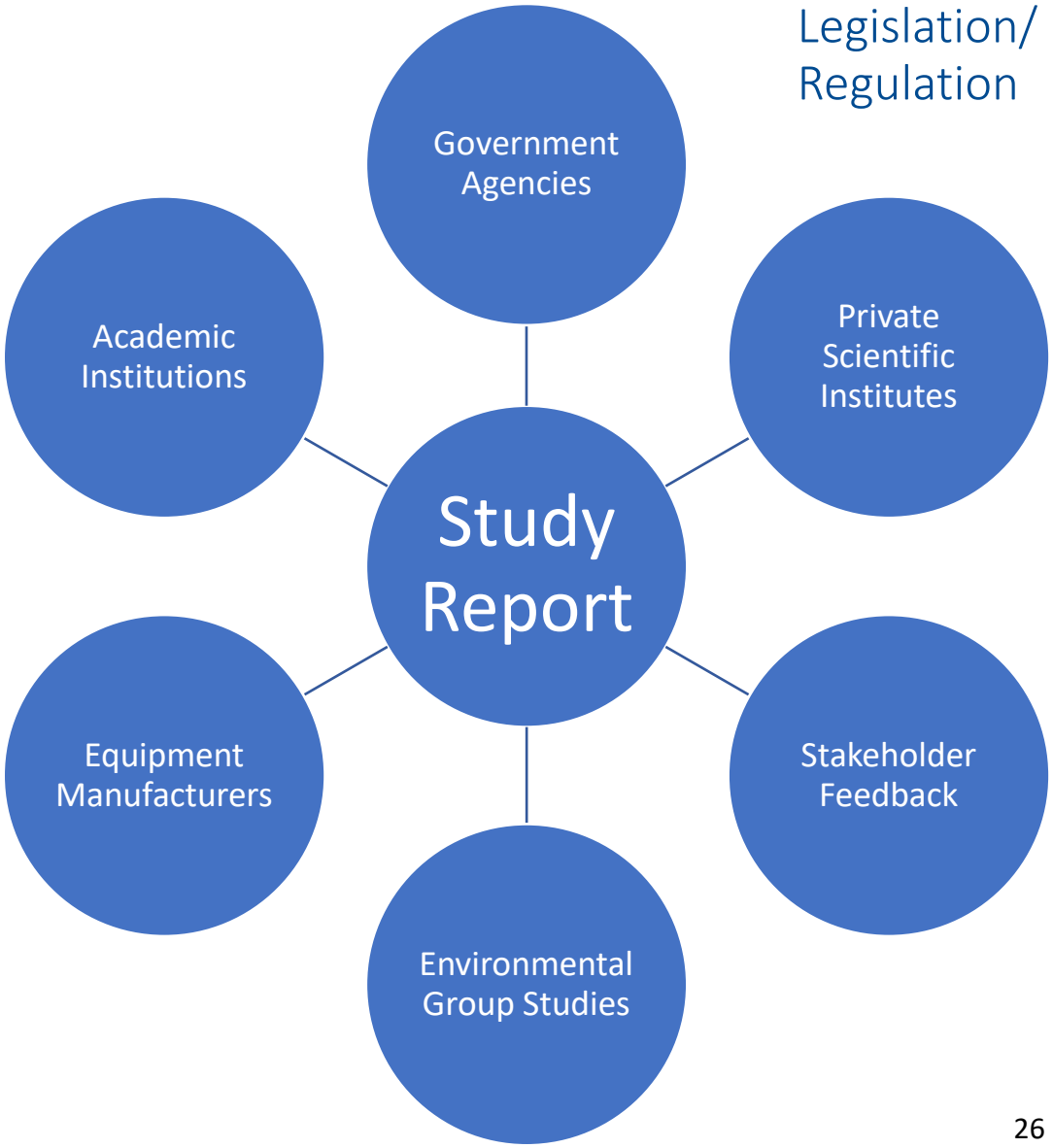
GHG EMISSIONS EVALUATION: INFORMATION SOURCES



Legislation/ Regulation	AB 32 / SB 32 / SB 1075
	CARB 2022 Scoping Plan
	CARB Low Carbon Fuel Standard
	CARB Advanced Clean Trucks Regulation
	CARB Advanced Clean Fleet Regulation

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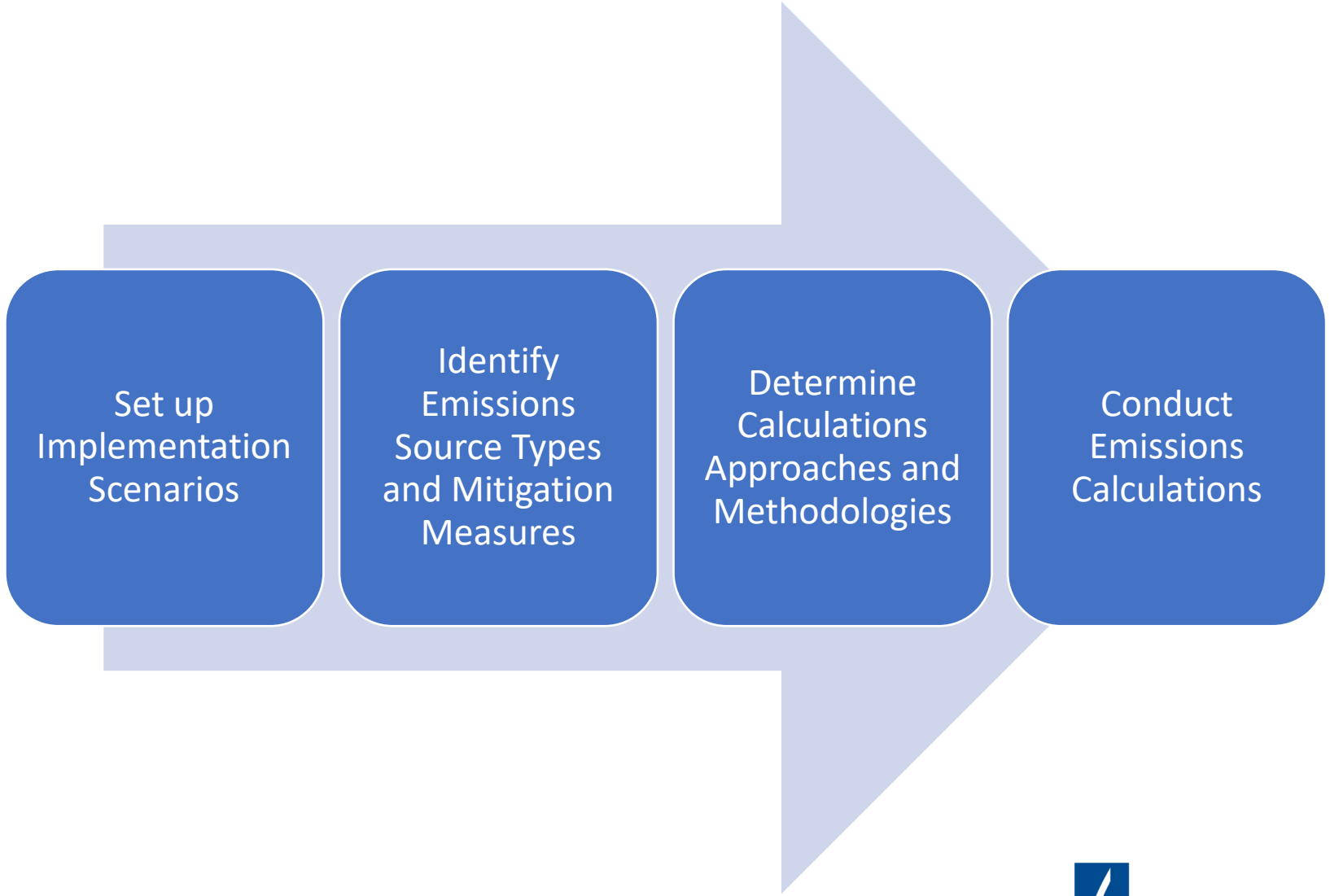
GHG EMISSIONS EVALUATION: WORKFLOW AND ASSUMPTIONS

Study Timeframe
2030-2045

Varying End User Adoption Rates and Timelines

Demand Study Model Results Used in Emissions Calculations

(Conservative, Moderate, & Ambitious Scenarios)



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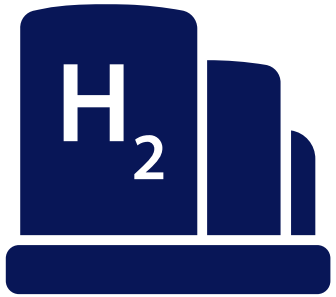
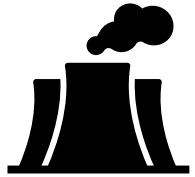
GHG EMISSIONS EVALUATION: COMBUSTION CALCULATIONS

NEW
Direct & Indirect GHG



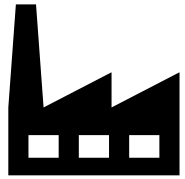
Infrastructure
(Production, Storage, Transmission)

EXISTING TYPES OF END USERS
CHANGED
Direct & Indirect GHG



Power Generation

Mobility



Hard to electrify Industries

Replace carbon-based fossil fuels
(natural gas, gasoline, diesel, jet fuel)
with clean renewable hydrogen

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MEMBER DISCUSSION: GREENHOUSE GAS EVALUATION TECHNICAL APPROACH

- Please announce your name and speak directly into the microphone
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SOCALGAS: UPDATED SCHEDULE & APPROACH TO PHASE ONE STUDY FEEDBACK

ANGELES LINK

JILL TRACY
Angeles Link
Senior Director
Regulatory & Policy

SoCalGas

Schedule and Approach to Angeles Link Phase One Study Stakeholder Feedback (Original Version)

	2023							2024					
PHASE 1	JUN	JUL	AUG	SEP (Today)	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Phase 1 **Study Descriptions**	✓ Q2 PAG/CBO Quarterly Meetings to Discuss Purpose and Need, Alternatives Study/Feedback ✓ Distribute Remaining Study Descriptions to Stakeholders ✓ Mid-July – Virtual feedback gathering sessions ✓ End of July – PAG/CBO Final feedback due												
Phase 1 **Study Technical Approach**			✓ Distribute Phase 1 Technical Approach Summaries to Stakeholders ✓ Q3 PAG/CBO Quarterly Meetings to Discuss Technical Approach Summaries ✓ Additional Technical Approach Stakeholder Feedback Gathering Sessions ✓ PAG/CBO Final Feedback to Technical Approach Summaries Due										
Phase 1 **Data and Preliminary Findings**						✓ Distribute Phase 1 Preliminary Findings/Data received to Stakeholders ✓ Q4 PAG/CBO Meetings to Discuss Preliminary Findings/Data/Feedback ✓ Additional Preliminary Findings/Data Stakeholder Gathering Sessions Feedback Gathering Session* ✓ PAG/CBO Final Feedback Due						
Phase 1 **Study Draft Reports**										✓ Distribute Phase 1 Study Draft Reports ✓ Q1 PAG/CBO Meetings ✓ Virtual Feedback Gathering Session ✓ PAG/CBO Final Feedback Due			
Phase 1 **Study Final Reports**													✓ Issue Final Reports

*allows 2 additional weeks due to holidays

Preliminary Schedule and Approach to Angeles Link Phase One Study Stakeholder Feedback (September 29, 2023)*

PHASE 1	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG
	202 Today							2024							
Phase 1 **Study Descriptions**	✓ Q2 PAG/CBO Quarterly Meetings to Discuss Purpose and Need, Alternatives Study/Feedback														
	✓ Distribute Remaining Study Descriptions to Stakeholders														
		✓ Mid-July – Virtual feedback gathering sessions													
			✓ End of July – PAG/CBO Final feedback due												
Phase 1 **Study Technical Approach**				✓ Distribute Phase 1 Technical Approach Summaries to Stakeholders											
					✓ Q3 PAG/CBO Quarterly Meetings to Discuss Technical Approach Summaries										
						✓ Additional Technical Approach Stakeholder Feedback Gathering Sessions									
							✓ PAG/CBO Final Feedback to Technical Approach Summaries Due								
Phase 1 **Data and Preliminary Findings**							✓ Distribute Phase 1 **Preliminary Findings**/Data received to Stakeholders								
								✓ Q4 Quarterly PAG/CBO Meetings to Discuss Preliminary Findings / Data / Feedback*							
									✓ Additional Preliminary Findings/Data Stakeholder Gathering Sessions Feedback Gathering Session						
										✓ PAG/CBO Final Feedback Due					
Phase 1 **Study Draft Reports**										✓ Distribute Phase 1 Study **Draft Reports**					
											✓ Q1 PAG/CBO Meetings				
												✓ Virtual Feedback Gathering Session			
													✓ PAG/CBO Final Feedback Due		
Phase 1 **Study Final Reports**														Issue **Final Reports** ✓	

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**Status of individual studies may vary and therefore the above deliverables may deviate from this preliminary schedule*

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MEMBER DISCUSSION: UPCOMING MEETINGS

- SAVE-THE-DATE: OCTOBER WORKSHOPS
  - THURSDAY, OCTOBER 19 AT THE ENERGY RESOURCE CENTER in DOWNEY
  - Hybrid option will be available
  - The studies reviewed during the October workshop will be open for feedback until Thursday, November 2
- Comments on the remaining Technical Approach Summaries are still due on Friday, October 13 to ALP1_Study_PAG_Feedback@insigniaenv.com
- Today's presentation and meeting recording will be available soon on the living library

SoCalGas

Thank you for your participation!

Please join us for lunch.

SoCalGas

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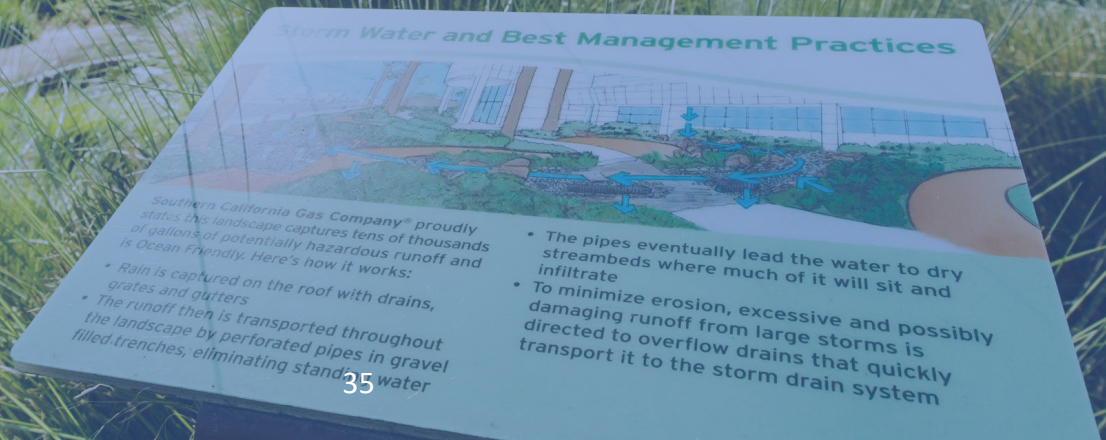
LUNCH



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APPENDIX 5 – LINKS TO PAG AND CBOSG MEETING RECORDINGS

PAG Recordings

July 18th, 2023 - Angeles Link PAG 07.18.23 Meeting Recording (vimeo.com)

July 20th, 2023 - Angeles Link 07.20.23 PAG Meeting Recording (vimeo.com)

August 29th, 2023 - PAG_August Workshop Recording (vimeo.com)

September 28th, 2023 - PAG Quarterly Meeting #3 (vimeo.com)

CBOSG Recordings

July 19th, 2023 - CBOSG 7/19/23 Workshop #1 (vimeo.com)

July 21st, 2023 - CBOSG - 7/21/23 Workshop #2 (vimeo.com)

August 28th, 2023 - CBOSG 8/28/23 Virtual Workshop (vimeo.com)

September 26th, 2023 - SoCalGas Angeles Link CBOSG Quarterly Meeting #3 - 9/26/23 (vimeo.com)

APPENDIX 6 – SUMMARY OF CBOSG MEETINGS, INCLUDING SURVEY QUESTION RESPONSES, OTHER FEEDBACK DURING Q3 MEETINGS, AND POLLING RESULTS

Meeting Topic

Angeles Link: CBOSG August Workshop

Polling Name :Zoom Poll

Question	Answer	% of Votes	Choice Type
How familiar are you with the supplemental Demand materials provided last week?	Very familiar	19%	Single Choice
How familiar are you with the supplemental Demand materials provided last week?	Somewhat familiar	38%	Single Choice
How familiar are you with the supplemental Demand materials provided last week	Somewhat unfamiliar	38%	Single Choice
How familiar are you with the supplemental Demand materials provided last week?	Very unfamiliar	6%	Single Choice
What Demand topics are you most interested in discussing?	Scope & Process	69%	Multiple Choice
What Demand topics are you most interested in discussing?	Methodology	38%	Multiple Choice
What Demand topics are you most interested in discussing?	Preliminary Outputs: Mobility	19%	Multiple Choice
What Demand topics are you most interested in discussing?	Preliminary Outputs: Power	19%	Multiple Choice
What Demand topics are you most interested in discussing?	Preliminary Outputs: Industrial	12%	Multiple Choice

SoCalGas - Angeles Link
Community-Based Organization Stakeholder Group (CBOSG)
July & August Workshops, and September Quarterly Meeting Summaries

7/19/23 & 7/21/23 CBOSG Workshops (9:00AM – 2:30PM)

Energy Resource Center, Downey CA

I. Attendee Report

- 7/19: 9 in-person attendees; 12 virtual attendees.
- 7/21: 6 in-person attendees; 16 virtual attendees.

Please refer to Appendix A and B for a complete list of attendees.

II. Purpose

- Review and receive feedback from CBOSG members on twelve of the Phase One Study Descriptions.
- Meet with subject matter experts leading Angeles Link studies.
- Provide CBOSG members with a brief introduction presentation on hydrogen.
- Review how stakeholder feedback is being tracked.

III. Presentation Highlights and Feedback Themes

- **Plan for Applicable Safety Requirements:** SoCalGas is conducting a comprehensive safety study to assess requirements, risks, and mitigations involved in the transmission, storage, and distribution of hydrogen. This study also considers population density, pipeline location, and alignment with safety practices.
    - Feedback Themes:
        - Discussion on repurposing natural gas pipelines for hydrogen, emphasizing the importance of assessing corrosion, leakage, and geological risks.
        - Discussion on SoCalGas' emergency response protocol, which includes coordination with local agencies, regulatory compliance, and various notification methods depending on the incident's scale.
        - Emphasizing the importance of raising community awareness around hydrogen safety.
- **Hydrogen 101:** SoCalGas provided an overview of hydrogen's properties, hydrogen production, fuel cell technology, existing hydrogen pipelines, safety protocols, and how Angeles Link as conceptualized is designed as a common carrier open access pipeline for clean renewable hydrogen.
    - Feedback Themes:
        - Concerns were raised regarding the safety of hydrogen, especially when stored or contained.

        - The need for a campaign to demystify hydrogen, address misconceptions, and alleviate fears.
        - Concerns about the heat released during fuel cell operation and its potential impact, especially in urban heat island areas during extreme heat events.
        - Suggestion to consider safety and environmental impacts not only during hydrogen transportation but also in production and end-use phases, even if they are not directly involved in production.
- **Workforce Planning & Training Evaluation:** SoCalGas is assessing its current workforce and internal training standards compared to the future needs for hydrogen infrastructure. The study is focused on operation and maintenance protocols, construction qualification protocols, timeline for workforce staging, and comparison to existing facilities.
    - Feedback Themes:
        - Concerns over how historically marginalized communities will get access to job and workforce training.
        - Discussion on permanent job creation and project labor agreements.
        - Discussion on keeping investments local, specifically in communities impacted by pipelines.
        - Suggestion to collaborate with the oil industry to support the workforce transition to hydrogen.
        - Emphasis on the need to connect with job training centers in Los Angeles.
- **Preliminary Routing & Configuration Analysis**: SoCalGas divided the study into three areas: pipeline routing and constructability factors, potential production and storage locations, and potential demand locations. The study considers geotechnical and seismic factors, community populations, and existing pipeline rights of way in the routing study process.
    - Feedback Themes:
        - Questions were raised on the schedule for determining the route.
        - Highlighted water-related jurisdictional matters involving various agencies pertaining to regulatory oversight and collaboration among agencies responsible for water resources.
        - Discussion on asset mapping and philanthropic investments was emphasized, particularly in communities affected by the pipeline route selection.
        - Concerns were raised about the timing of construction, the need for clear communication, adequate preparation to minimize disruptions, and ensuring community safety.
- **Demand Study:** SoCalGas is conducting an analysis of hydrogen demand for 2045, focusing on sectors like power generation, hard-to-electrify industries, and mobility. The study assesses the transition from fossil fuels to decarbonized energy, with a primary focus on hydrogen. The study's approach includes market data comparison and interviews with industry experts, researchers, and institutions.
    - Feedback Themes:
        - Scaling up the hydrogen sector to meet future demand and achieve affordability was identified as a significant challenge.

        - Discussion was raised on understanding how the region's efforts and advantages in hydrogen technology compared to other locations, such as Europe.
        - The discussion explored hydrogen's role in energy storage and resilience, especially for storing excess renewable energy during off-peak seasons for later use during peak demand.
- **Production Planning & Assessment:** SoCalGas is conducting a study that will identify potential sources of hydrogen generation, input requirements, estimated costs of production, and plans for how the quality of the hydrogen gas meets clean renewable hydrogen standards. The study evaluates renewable sources such as solar, wind, water splitting, and gasification of biomass.
    - Feedback Themes:
        - Support for emission-free hydrogen production.
        - Suggestion to identify the best locations for hydrogen production based on renewable resources and proximity to demand centers.
        - Interest in analyzing and comparing different hydrogen production technologies and their cost-effectiveness.
        - Questions raised on the possibility of hydrogen competing with other energy storage methods like battery storage, pump hydro, compressed air, etc.
        - Emphasis on the need for transparency, safety, and environmental considerations in the hydrogen production process.
- **High-Level Economic Analysis & Cost Effectiveness:** SoCalGas is conducting a high-level economic analysis to determine a levelized delivered cost comparison of hydrogen pipeline systems compared to decarbonization alternatives and other methods of delivery.
    - Feedback Themes:
        - Concerns expressed about the impact of hydrogen projects on communities and the need to consider the true cost and value for people.
        - Discussion on the need for scalability to drive down hydrogen costs was discussed, drawing parallels with successful cost reduction in renewable power due to policy support.
        - Questions raised about the definition of long distances for hydrogen transportation and the practicality of different transport methods.
        - Questions raised about the possibility of importing and exporting hydrogen to other states or countries.
- **Environmental & Social Justice Analysis:** As part of the Environmental Study, SoCalGas is conducting an environmental and social justice analysis, using the "CalEnviroScreen" tool, which will be used to help assess benefits, community impacts, hotspot areas, and environmental footprint reduction measures. Key areas of focus in this study involve environmental analysis and identifying current conditions.
    - Feedback themes:
        - Concerns raised about the "CalEnviroScreen" tool lacking sensitivity to environmental justice issues.
        - Discussion on the importance of engaging communities directly, especially those living near the pipelines, to understand the real-life impacts on their lives.
        - Request for inclusion of third-party academics or experts in the discussions.

        - Concerns about proximity to school sites and the impact on children's health.
        - Stakeholders were advised that the assessment will include consideration of cultural and tribal resources, including historic and prehistoric sites.
        - Commitment from the project team to address the feedback and ensure a transparent and inclusive process moving forward.
- **Hydrogen Leakage Assessment:** SoCalGas is conducting a study to identify potential for hydrogen gas leakage associated with production, storage, and transportation of clean renewable hydrogen, prioritize sources of potential leaks, and assess mitigation measures.
    - Feedback themes:
        - Concerns raised about the lack of specific studies on hydrogen as an indirect greenhouse gas in the IPCC (Intergovernmental Panel on Climate Change).
        - Request for more information on SoCalGas's research plans.
        - Concerns about the costs and inconveniences involved in the event of a pipeline leak under city streets or state highways.
- **Greenhouse Gas Emissions Evaluation:** SoCalGas is assessing potential for both GHG emissions increases and reductions resulting from the project and potential mitigation measures. The presentation also emphasized the potential for the Project to reduce carbon dioxide and other emissions.
    - Feedback themes:
        - Interest in an independent study.
        - Questions raised about SoCalGas' plans if hydrogen is deemed non-viable for the community.
- **Nitrogen Oxide (NOx) Emission Assessment:** SoCalGas provided an overview of the NOx emissions assessment, beginning with a discussion of how NOx (nitrogen oxides) is created through combustion processes and its role as a precursor to ozone and particulate matter. The study is evaluating the potential impact of NOx in hydrogen combustion and exploring mitigation opportunities.
    - Feedback themes:
        - Discussion on appreciating nitrogen's positive role in nature while addressing its harmful effects as nitrogen oxides.
- **Stakeholder Feedback Tracking:** Insignia Environmental explained its role in the stakeholder engagement process of the project and the approach to tracking stakeholder feedback through transcriptions and recordings of meetings. The four milestones of Phase One studies and the proposed schedule of corresponding comment periods were shared.
    - Feedback themes:
        - Suggestion to extend the comment period beyond the typical 4-week timeframe, citing the complexity of the draft reports.
        - Suggestion to involve international bodies like the United Nations and the National Park Service in designating gas fields as World Heritage Sites and considering cultural preservation.
- **Water Resources Evaluation *(Amended Agenda item as requested by CBOSG members):*** SoCalGas is conducting a study that will evaluate available water sources for hydrogen production.
    - Feedback themes:

        - Discussion was raised on evaluating recycled water, wastewater, and other water sources for hydrogen production.
        - Concerns raised to prioritize and determine the most suitable water supply source for hydrogen production.
- **Land Rights, Right-of-Way & Franchise**: SoCalGas provided an overview on land rights and franchise, including a discussion of land rights and franchise agreements, explaining that the company has agreements with cities and counties to use public right of way. The study is reviewing existing franchise agreements to accommodate a new pipeline and may negotiate new agreements if necessary.
    - <u>Feedback themes:</u>
        - Emphasized communication and community engagement regarding the process of working with private properties and streamlining.
        - Concerns raised on potential negative impacts on communities and specific mitigation measures during pipeline construction on private properties.

8/28/23 Virtual CBOSG Workshop (10:00AM – 12:00PM)

Via Zoom

I. Attendee Report:

- 22 virtual attendees.

Please refer to Appendix C for a complete list of attendees.

II. Purpose

- Review and solicit feedback on the Phase One Demand Study technical approach and preliminary outputs.
- Review changes made to the Environmental & Social Justice Analysis per CBOSG July workshop feedback.

III. Presentation Highlights and Feedback Themes

- **Demand Study Technical Approach and Preliminary Outputs:** SoCalGas shared Demand Study model inputs across mobility, power generation, and industrial sectors, which evaluates the potential demand for hydrogen in SoCalGas service territory from 2025-45. Preliminary outputs of the demand study were presented in three adoption scenarios: conservative, moderate, and ambitious. The primary factors driving adoption rates are policy and legislation, technology feasibility, commercial availability, and business readiness. Specific output data was shared.
    - Feedback Themes:
        - Questions raised about the potential costs to rate payers in relation to hydrogen demand.
        - Discussion on how hydrogen generated power will be stored and distributed, and if there are companies that are already doing this.
        - Interest in opportunities for K-12 school communities to utilize hydrogen and how they could be included in the demand equation.
        - Concerns raised about higher NOx emissions and how SoCalGas will ensure that the hydrogen remains "green" throughout the entire lifecycle and is not used to further exacerbate air quality issues.
        - Discussion on clarifying the definition of "clean renewable hydrogen."
- **Environmental & Social Justice (EJ) Analysis:** SoCalGas acknowledged previous CBOSG discussions on environmental and social justice, emphasizing the importance of these issues and expressing SoCalGas's commitment to addressing environmental justice concerns. The presentation focused on seeking CBOSG input for developing a community-focused engagement plan during Phase One to be implemented in Phase Two.
    - Feedback Themes:
        - Recommendation to have a third-party facilitator lead the discussions centered on EJ and the efforts outlined in the community engagement plan.
        - Request to be more inclusive of the groups that form the CBOSG, including more Native American representation and additional CBOs; CBOSG members offered to provide input on additional groups to invite.

- Suggested strategies for the community engagement efforts, including roundtable discussions and listening sessions; recommended all discussions be geographically and demographically diverse and be mindful of selecting meeting locations and times based on the needs of the engagement audience.
- Overall recommendations for CBOSG engagement included continuing the practice of polling the CBOSG for priorities to focus conversations. It was also recommended to provide transcripts, notes and references such as a glossary and FAQ from the previous meetings. SoCalGas addressed that these materials would be made available in the online living library.

9/26/23 CBOSG Quarterly Group Meeting #3 (9:30AM – 12:00PM)

Energy Resource Center, Downey CA

I. Attendee Report

- 7 in-person & 16 virtual attendees.

Please refer to Appendix D for a complete list of attendees.

II. Purpose

- Discuss recurring and important concepts related to natural gas and hydrogen.
- Provide two external/volunteer speakers on hydrogen related topics.
- Give CBOSG members the opportunity to breakout in small groups and develop community engagement plan strategies.
- Review updated schedule and approach to Phase One Study Feedback.

III. Presentation Highlights and Feedback Themes

- **Glossary of Terms:** SoCalGas provided an overview of several technical terms related to the natural gas and hydrogen industry. They also discussed challenges in "hard to electrify sectors" and highlighted the need for alternative energy sources like hydrogen.
    - Feedback Themes:
        - Question about "PIGS" (pipeline inspection tools) was asked, clarifying that they travel through pipelines using gas pressure and collect data along the way.
        - Recommendation to use the term "mixed hydrogen compound gas" instead of "blended hydrogen" to be more precise and neutral in terminology.
        - Clarification on the term "hard to electrify sectors," to which it was explained that these are sectors with challenges in electrification due to high energy requirements and operational complexities.
- **Hydrogen Overview by DNV:** DNV, a global assurance and risk management company, presented an overview of hydrogen, its properties, and safety considerations. Several topics concerning hydrogen were addressed, including historical incidents like the Hindenburg disaster and hydrogen vehicle safety. A comparison of hydrogen with natural gas and gasoline properties was provided. The presentation emphasized the need for hazard management, best safety practices, and leveraging existing knowledge as hydrogen plays a growing role in the clean energy future.
    - Feedback Themes:
        - Discussion on the definition of "non-toxic," and it was explained as the absence of a bodily response to the ingestion or inhalation of the material.
        - There was a question raised regarding how hydrogen gas is produced, and two main methods were discussed: electrolysis using renewable energy to separate hydrogen from oxygen in water and using steam methane reforming (SMR) or autothermal reforming (ATR) with natural gas where carbon is separated as CO2 and stored safely, or biomass, a renewable resource.
        - Discussion on the efficiency of hydrogen fuel cell cars compared to electric vehicles (EVs). It was noted that fuel cells are highly efficient, potentially offering greater mileage compared to standard EVs.

- **Environmental Justice Community Engagement Plan – Breakout Session Activity:** SoCalGas provided an overview of the status of Angeles Link, which is in Phase One focusing on preliminary feasibility studies and planning. Phase Two, which involves performing additional feasibility engineering and design studies and will involve an application to the California Public Utilities Commission, remains uncertain in terms of specific plans. The presentation emphasized the need for ongoing stakeholder engagement and discussed the intention to develop a community engagement plan during Phase One to guide actions in Phase Two. In-person and virtual CBOSG attendees were then divided into smaller groups to generate ideas and initiate discussion around the planning process for the Environmental Justice Community Engagement Plan.
    - <u>Feedback Themes:</u>
        - Emphasize the individual impact of the project, including cost, timing, and community benefits.
        - Engage diverse communities, focus on grassroots organizations in affected neighborhoods, simplify information dissemination, use visual tools for clarity, and ensure language accessibility.
        - Advocate for greater visibility of CBOSG members representing tribal groups for a balanced discussion on Native American consultation.
        - Engage young people within communities, contact and educate businesses along the pipeline route, and prioritize hiring from within local communities.
        - Use a combination of meeting formats, provide interpretation services in multiple languages, and hold meetings in various community locations.
        - Mitigate potential communication challenges through techniques like repeat and confirm, feedback-based engagement, consistent follow-through, and community games and incentives.
        - Engage local government as stakeholders and a vehicle for distributing information to the community.
- **Air Emissions 101 by SoCalGas and Mitsubishi:** Presenters from SoCalGas and Mitsubishi Power Americas discussed the importance of managing NOx emissions while transitioning to clean renewable hydrogen as a clean and efficient energy source for power generation. The basics of NOx were introduced by SoCalGas, and Mitsubishi emphasized the role of hydrogen in addressing the challenges of renewable energy curtailment and the decarbonization of the energy sector. Existing technologies for NOx emissions controls relating to hydrogen combustion was also discussed, as well as the use of hydrogen as an energy storage medium and its potential to be blended with natural gas in gas turbines.
- **Updated Schedule and Approach to Phase One Study Feedback:** SoCalGas discussed the ongoing progress of the 16 studies of Phase One. It was acknowledged that the studies are advancing at different paces which is impacting the feedback schedule and stakeholder engagement. The importance of stakeholder feedback in shaping future meetings and the Phase One studies was emphasized. The revised schedule includes an additional two months to allow stakeholders more time to review the technical studies and draft reports. The presentation concluded with the commitment to transparency and the provision of resources to support stakeholders in their review process.

Next Steps for CBOSG

- Next meeting will be on October 19 at the Energy Resource Center (9240 Firestone Blvd., Downey); meeting agenda and supporting materials will be available soon.
- All Q3 meeting resources are now available in the Living Library.
- Feedback on the technical approaches for the following topics are due on Friday, November 3: Project Options and Alternatives, Preliminary Routing/Configuration Analysis, Right-of-Way Study, and Workforce Planning and Training Development are now in the Living Library; feedback period closes on 10/13/23.
- Feedback on remaining technical approaches for the other studies is still kindly requested by Friday, October 13.
- To continue to send all comment and feedback to ALP1_Study_CBO_Feedback@insigniaenv.com.

Appendix A

CBOSG July 19 Workshop Attendee Roster

#	First Name	Last Name	Affiliation
CBOSGG Members			
1	Aida	Vega	Alma Family Services*
2	Marcia	Hanscom	Ballona Wetlands Institute*
3	Christopher	Arroyo	California Public Utilities Commission
4	Kenta	Estrada-Darley	Coalition for Responsible Community Development
5	Ricardo	Mendoza	Coalition for Responsible Community Development
6	Roselyn	Tovar	Communities for a Better Environment
7	Robert	van de Heok	Defend Ballona Wetlands
8	Andrea	Vega	Food & Water Watch*
9	Jill	Buck	Go Green Initiative
10	Kristin	Fukushima	Little Tokyo Community Council
11	Luis	R Pena	Los Angeles Indigenous Peoples Alliance*
12	Sydney	Rogers	Parents, Educators/Teachers, and Students in Action*
13	Alex	Jasset	Physicians for Social Responsibility LA
14	Faith	Myhra	Protect Playa Now*
15	Rashad	Rucker-Trapp	Reimagine LA Foundation
16	Jackson	Garland	SMC Eco Action Club*
17	Lydia	Ponce	Society of Native Nations
18	Enrique	Aranda	Soledad Enrichment Action*
19	Gerry	Salcedo	Southeast Rio Vista YMCA*
20	Andrea	Leon-Grossmann	Vote Solar
21	Thelmy	Alvarez	Watts Labor Community Action Committee
22	Aida	Vega	Alma Family Services*
23	Marcia	Hanscom	Ballona Wetlands Institute*
24	Christopher	Arroyo	California Public Utilities Commission
Non-CBOSG Members			
25	Rachael	Potts	Arellano Associates
26	Sohrab	Mikanik	Arellano Associates*
27	Stephanie	Espinoza	Arellano Associates*
28	Chester	Britt	Arellano Associates*
29	Anniken	Lydon	Insignia Environmental
30	Armen	Keochekian	Insignia Environmental
31	Julie	Roshala	Insignia Environmental
32	Rick	Garcia	Lee Andrews Group
33	Alyssa	Martinez	Lee Andrews Group*
34	Alma	Marquez	Lee Andrews Group*
35	Antonia	Issaevitch	Lee Andrews Group*

36	Andy	Carrasco	SoCalGas
37	Chanice	Allen	SoCalGas
38	Darrell	Johnson	SoCalGas
39	Brian	Haas	SoCalGas
40	Megan	Lorenz	SoCalGas
41	Emily	Grant	SoCalGas*
42	Edith	Moreno	SoCalGas*
43	Sebastian	Garza	SoCalGas*
44	Neil	Navin	SoCalGas*
45	Amy	Kitson	SoCalGas*
46	Katrina	Reagan	SoCalGas*
47	Douglas	Chow	SoCalGas*
48	Jill	Tracy	SoCalGas*

*Attended in-person

Appendix B

CBOSG July 20 Workshop Attendee Roster

#	First Name	Last Name	Affiliation
CBOSG Members			
1	Aida	Vega	Alma Family Services
2	Marcia	Hanscom	Ballona Wetlands Institute
3	Jessy	Shelton	California Greenworks
4	Christopher	Arroyo	California Public Utilities Commission
5	Robert	van de Hoek	Defend Ballona Wetlands
6	Andrea	Vega	Food & Water Watch*
7	Jill	Buck	Go Green Initiative
8	Kristin	Fukushima	Little Tokyo Community Council
9	Jamie	Patino	Los Angeles Indigenous Peoples Alliance
10	Sydney	Rogers	Parents, Educators/Teachers, and Students in Action*
11	Alex	Jasset	Physicians for Social Responsibility
12	Faith	Myhra	Protect Playa Now
13	Rashad	Rucker-Trapp	Reimagine LA Foundation
14	Shawna	Andrews	Reimagine LA Foundation*
15	Raul	Claros	Reimagine LA Foundation*
16	Lydia	Ponce	Society of Native Nations
17	Cheyenne	Rendon	Society of Native Nations
18	Enrique	Aranda	Soledad Enrichment Action*
19	Gerry	Salcedo	Southeast Rio Vista YMCA
20	Andrea	Williams	Southside Coalition of Community Health Centers

21	Andrea	Leon-Grossmann	Vote Solar
22	Thelmy	Alvarez	Watts Labor Community Action Committee*
23	Aida	Vega	Alma Family Services
24	Marcia	Hanscom	Ballona Wetlands Institute
25	Jessy	Shelton	California Greenworks
26	Christopher	Arroyo	California Public Utilities Commission
27	Robert	van de Hoek	Defend Ballona Wetlands
Non-CBOSG Members			
28	Sohrab	Mikanik	Arellano Associates
29	Stephanie	Espinoza	Arellano Associates*
30	Nancy	Verduzco	Arellano Associates*
31	Anniken	Lydon	Insignia Environmental
32	Julie	Roshala	Insignia Environmental
33	Armen	Keochekian	Insignia Environmental*
34	Alisa	Lykens	Insignia Environmental*
35	Rick	Garcia	Lee Andrews Group
36	Alyssa	Martinez	Lee Andrews Group*
37	Alma	Marquez	Lee Andrews Group*
38	Eden	Vitakis	Lee Andrews Group*
39	Chanice	Allen	SoCalGas
40	Katrina	Reagan	SoCalGas
41	Darrell	Johnson	SoCalGas
42	Kevin	O' Sullivan	SoCalGas
43	Glenn	La Fevers	SoCalGas
44	Clair	Schmidt	SoCalGas
45	Andy	Carrasco	SoCalGas*
46	Emily	Grant	SoCalGas*
47	Edith	Moreno	SoCalGas*
48	Sebastian	Garza	SoCalGas*
49	Douglas	Chow	SoCalGas*
50	Jill	Tracy	SoCalGas*
51	Frank	Lopez	SoCalGas*
52	Geoff	Danker	SoCalGas*

*Attended in-person

Appendix C

CBOSG August 28 Workshop Attendee Roster

#	First Name	Last Name	Affiliation
CBOSG Members			
1	Marcia	Hanscom	Ballona Wetlands Institute

2	Marc	Carrel	Breathe Southern California
3	Jessy	Shelton	California Greenworks
4	Ayn	Craciun	Climate Action Campaign
5	Ricardo	Mendoza	Coalition for Responsible Community Development
6	Kenta	Estrada-Darley	Coalition for Responsible Community Development
7	Roselyn	Tovar	Communities for a Better Environment
8	Robert “Roy”	van de Hoek	Defend Ballona Wetlands
9	Andrea	Vega	Food & Water Watch
10	Jill	Buck	Go Green Initiative
11	Kristin	Fukushima	Little Tokyo Community Council
12	Belen	Bernal	Nature for All
13	Ella	Cavlan	Parents, Educators/Teachers, and Students in Action
14	Alex	Jasset	Physicians for Social Responsibility-LA
15	Faith	Myhra	Protect Playa Now
16	Raul	Claros	Reimagine LA Foundation
17	Rashad	Rucker-Trapp	Reimagine LA Foundation
18	Enrique	Aranda	Soledad Enrichment Action
19	Andrea	Williams	Southside Coalition of Community Health Centers
20	Andrea	Leon-Grossmann	Vote Solar
21	Thelmy	Alvarez	Watts Labor Community Action Committee
22	Autumn	Ybarra	Watts/Century Latino Organization
Non-CBOSG Members			
23	Christopher	Arroyo	California Public Utilities Commission
24	Marissa	Girolamo	SoCalGas
25	Douglas	Chow	SoCalGas
26	Emily	Grant	SoCalGas
27	Jill	Tracy	SoCalGas
28	Edith	Moreno	SoCalGas
29	Hector	Moreno	SoCalGas
30	Chris	Gilbride	SoCalGas
31	Yuri	Freedman	SoCalGas
32	Liz	Davis	SoCalGas
33	Frank	Lopez	SoCalGas
34	Armen	Keochekian	Insignia Environmental
35	Julie	Roshala	Insignia Environmental
36	Alisa	Lykens	Insignia Environmental
37	Rick	Garcia	Lee Andrews Group
38	Alma	Marquez	Lee Andrews Group
39	Alyssa	Martinez	Lee Andrews Group
40	Rachael	Potts	Arellano Associates
41	Keven	Michel	Arellano Associates

42	Chester	Britt	Arellano Associates
43	Stevie	Espinoza	Arellano Associates
44	Marissa	Girolamo	SoCalGas
45	Douglas	Chow	SoCalGas
46	Emily	Grant	SoCalGas
47	Jill	Tracy	SoCalGas

Appendix D

CBOSG Quarterly Meeting #3 Attendee Roster

#	First Name	Last Name	Affiliation
CBOSG Members			
1	Andrea	Vega	Food and Water Watch*
2	Enrique	Aranda	Soledad Enrichment Action*
3	Kenta	Estrada-Darley	Coalition for Responsible Community Development*
4	Luis	Melliz	Soledad Enrichment Action*
5	Luis	Pena	Los Angeles Indigenous People's Alliance*
6	Rashad	Rucker-Trapp	Reimagine LA Foundation*
7	Ricardo	Mendoza	Coalition for Responsible Community Development*
8	Ciriaco	Pinedo	Mexican American Opportunity Foundation
9	Jessy	Shelton	California Greenworks
10	Lourdes	Caracoza	Alma Family Services
11	Marc	Carrel	Breathe Southern California
12	Alex	Jasset	Physicians for Social Responsibility - LA
13	Andrea	Williams	Southside Coalition of Community Health Centers
14	Ava	Post	Watts Labor Community Action Committee
15	Ayasha	Johnson	Parents, Educators/Teachers & Students in Action
16	Belen	Bernal	Nature for All
17	Kevin	Weir	Protect Playa Now
18	Kristin	Fukushima	Little Tokyo Community Council
19	Jill	Buck	Go Green Initiative
20	Michael	Fisher	Greater Zion Church Family
21	Robert	van de Hoek	Defend Ballona Wetlands
22	Marcia	Hanscom	Ballona Wetlands Institute
23	Roselyn	Tovar	Communities for a Better Environment
Non-CBOSG Members			
24	Chester	Britt	Arellano Associates*
25	Stevie	Espinoza	Arellano Associates*
26	Nancy	Verduzco	Arellano Associates*
27	Sohrab	Mikanik	Arellano Associates*
28	Christopher	Arroyo	California Public Utilities Commission

29	Pedram	Fanailoo	DNV*
30	Cynthia	Spitzenberger	DNV*
31	Armen	Keochekian	Insignia Environmental*
32	Julie	Roshala	Insignia Environmental
33	Alisa	Lykens	Insignia Environmental*
34	Rick	Garcia	Lee Andrews Group
35	Alma	Marquez	Lee Andrews Group*
36	Alyssa	Martinez	Lee Andrews Group*
37	Alan	Rodriguez	Lee Andrews Group
38	Antonia	Issaevitch	Lee Andrews Group*
39	Edna	Degollado	Lee Andrews Group*
40	Peter	Sawicki	Mitsubishi Power Americas Inc.*
41	Douglas	Chow	SoCalGas*
42	Emily	Grant	SoCalGas*
43	Jill	Tracy	SoCalGas*
44	Edith	Moreno	SoCalGas*
45	Hector	Moreno	SoCalGas
46	Frank	Lopez	SoCalGas
47	Andy	Carrasco	SoCalGas*
48	Darrell	Johnson	SoCalGas*

*Attended in-person

APPENDIX 7 - SUMMARY OF PAG MEETINGS, INCLUDING SURVEY QUESTION RESPONSES, OTHER FEEDBACK OBTAINED DURING Q3 MEETINGS, AND POLLING RESULTS

Meeting Topic

Angeles Link: PAG August Workshop

Polling Name :Zoom Poll

Question	Answer	% of Votes	Choice Type
How familiar are you with the supplemental Demand materials provided last week?	Very familiar	5%	Single Choice
How familiar are you with the supplemental Demand materials provided last week?	Somewhat familiar	41%	Single Choice
How familiar are you with the supplemental Demand materials provided last week?	Somewhat unfamiliar	41%	Single Choice
How familiar are you with the supplemental Demand materials provided last week?	Very unfamiliar	14%	Single Choice
What Demand topics are you most interested in discussing?	Scope & Process	59%	Multiple Choice
What Demand topics are you most interested in discussing?	Methodology	50%	Multiple Choice
What Demand topics are you most interested in discussing?	Preliminary Outputs: Mobility	32%	Multiple Choice
What Demand topics are you most interested in discussing?	Preliminary Outputs: Power	50%	Multiple Choice
What Demand topics are you most interested in discussing?	Preliminary Outputs: Industrial	36%	Multiple Choice

SoCalGas Angeles Link
Planning Advisory Group (PAG)
July & August Workshops, and September Quarterly Meeting Summaries

7/18 & 7/20 PAG Workshop (9:00AM-2:30PM)
Energy Resource Center, Downey, CA & Zoom

I. Attendee Report

- 7/18: 5 in-person & 21 virtual attendees.
- 7/20: 8 in-person & 19 virtual attendees.

Please refer to Attachments A and B for a complete list of attendees.

II. Purpose

- Review and receive feedback from PAG members on Phase One Study Descriptions.
- Meet with subject matter experts leading each study.
- Review how stakeholder feedback is being tracked.

III. Presentation Highlights and Feedback Themes

- **Plan for Applicable Safety Requirements**
    - Feedback Themes:
        - Support for comprehensive safety studies
        - Support for community education programs about hydrogen
- **Workforce Planning & Training Evaluation Scope**
    - Feedback Themes:
        - Reiteration on the importance of moving forward with hydrogen swiftly, recognizing the demand for sustainable energy, affordability, community education, and the need for research into previous incidents.
        - Emphasis on expanding workforce education and training programs.
- **Preliminary Routing & Configuration Analysis**
    - Feedback Themes:
        - Reiteration of the need for a full demand study before reviewing other Phase One Angeles Link studies
        - Requests for further information on potential redundancies in hydrogen transportation.
        - Interest in how the individual studies will build upon one another to complete Phase One.
        - Request for a more detailed study descriptions to be sent to PAG members.
- **Demand Study**
    - Feedback Themes:

        - Questions regarding cost projections, variables determining demand, and how demand study interrelates with other studies.
        - Request for the demand study to include cargo handling equipment.
        - Support for delivery of hydrogen gas beyond Los Angeles.
- **Production Planning & Assessment**
    - Feedback Themes:
        - Discussions were raised on the current grid emissions, the need for cost analysis of electrification, and the in-state vs. out-of-state sources for hydrogen production.
        - Questions on the competitiveness of hydrogen production given the need for electricity.
- **High-Level Economic Analysis & Cost Effectiveness**
    - Feedback Themes:
        - Concerns were expressed about the timing of investment in hydrogen infrastructure and the potential for higher costs.
        - Concerns were raised about the potential high cost of the project and who would bear this burden.
- **Environmental & Social Justice Analysis**
    - Feedback Themes:
        - Emphasis on research into non-pipeline alternatives into the environmental analysis.
        - Questions regarding safe hydrogen transport, timing of hydrogen usage, and whether environmental analysis will consider potential impact of hydrogen leakage or emissions.
        - Request for qualitative and quantitative analysis on air pollution and climate change for project impacted communities.
        - Questions regarding the assessment of analysis from federal social justice tools and the extent the project will expand to meet federal requirements.
        - Support for an environmental study to include potential leakage and nitrogen oxide (NOx) emissions in disadvantaged communities.
- **Hydrogen Leakage Assessment**
    - Feedback Themes:
        - Questions regarding whether study will consider research on existing hydrogen pipelines, live research in existing hydrogen facilities, and how the study will identify how the leakage will be determined.
        - Concerns regarding the difficulty of capturing hydrogen leakage rate at low levels.
- **Greenhouse Gas (GHG) Emissions Evaluation**
    - Feedback Themes:
        - Questions regarding the expected life of the hydrogen pipeline concerns surrounding the tracking of duplicative emissions reductions and whether research would look at the net impact of positive GHG emissions and the effect of hydrogen.
        - Emphasis on researching electric transmission lines.

        - Request for SoCalGas to provide scopes of work for consultants and extend the comment period to later than July 31.
        - Suggestion for study to include carbon intensity.
        - Question regarding what materials used to combat pipeline degradation.
- **Nitrogen Oxide (NOx) Emission Assessment**
    - Feedback Themes:
        - Feedback recommending that NOx emissions assessment can only be adequately completed once the demand study has been finalized.
        -
        - Questions regarding identification of sectors that combust hydrogen, expected NOx levels for Los Angeles Basin, and whether hydrogen could be entirely green and emit zero emissions.
        - Request for the study to clarify that NOx emissions result from use rather than production of hydrogen.
- **Stakeholder Feedback Tracking**
    - Feedback Themes:
        - Request for presentation slides to be distributed before meetings with space for notes.
        - Questions on where to submit comments, whether the comment system will be available for viewing, and how global comments will be classified.
        - Request for PAG member contact list to share feedback.
        - Questions on the timeline for receiving information and how feedback is being addressed.
        - Some members preferred virtual-only meetings due to ease; others disagreed and noted their preference for in-person interactions because it is more engaging—general agreement to keep to hybrid formats to accommodate both preferences.
        - Request for an extended timeline to submit feedback and for a solidified timeline for each study.
        - Recommendation for PAG members to pre-classify their comments to streamline the comment collection process.
- **Water Resources Evaluation*:***
    - Feedback Themes:
        - Questions about how the water study fits into the overall project scheme, specifically regarding SoCalGas' involvement in hydrogen production.
        - Request for clarification on how the water study aligns with the project's focus on transporting clean, renewable hydrogen.
        - Request for clarification to understand the strategic purpose of the study beyond contributing to understanding large-scale hydrogen production for the project's effectiveness.
        - Suggestion of the possibility of setting standards for hydrogen producers and end-users based on the water used and the impact on emissions.
        - Emphasis on considering water sources to produce hydrogen in the LA Basin.

8/29 PAG Workshop (2:00PM-4:00PM)

Via Zoom

I. Attendee Report

- 26 virtual attendees.

Please refer to Attachment C for a complete list of attendees.

II. Purpose

- Demand Technical Approach and Preliminary Inputs
- Review and receive feedback from PAG members on changes to approach to Environmental Justice Analysis study

III. Presentation Highlights and Feedback Themes

- Environmental Justice Analysis
    - Feedback Themes:
        - Participants requested release of and had questions about modeling tool
        - Members inquired about general assumptions the analysis made; i.e. did the electric generation power analysis assume all gas-fired power plants stayed online or does it account for retirements
        - Resource materials and interpretation of said materials was also discussed i.e. CARB's scoping plan
        - Demand study should consider EJ Analysis
- Demand Study
    - Feedback Themes:
        - Approach still seems cookie-cutter; what is SoCalGas proposing that is different?
        - Regional air quality benefits, end use and EJ relationship needs to be studied, which could/should also impact routing
        - Encouragement to use a variety of desktop tools

9/28 PAG Quarterly Meeting #3 (8:30AM-12:00PM)

Energy Resource Center, Downey, CA & Zoom

I. Attendee Report

- 23 attendees (8 in-person; 15 virtual)

Please refer to Attachment D for a complete list of attendees.

II. Purpose

- Provide information and solicit feedback from PAG members on:
  - Project Options and Alternatives Technical Approach
  - High-Level Economic and Cost Effectiveness Technical Approach
  - NOx and Other Air Emissions Technical Approach
  - GHG Emissions Evaluation Technical Approach
- Review updated schedule and approach to Phase One study feedback.

III. Presentation Highlights and Feedback Themes

- Project Options and Alternatives and High-Level Economic and Cost Effectiveness Technical Approach
  - Feedback Themes:
    - Question regarding whether localized hub includes in-state or out-of-state production.
    - Recommendation for two additional screens including effectiveness/affordability and emissions impact.
    - Request for clarification on differentiating between “cost-effectiveness” and “affordability”
    - Emphasized the importance of cost-effectiveness and need to capture all equipment and infrastructure costs in analysis.
    - Emphasis on the need for more comprehensive data when evaluating issues.
    - Request for cost effectiveness to be used in all technical alternatives.
    - Discussion surrounding importance of Aliso Canyon to manage gas movement
    - Request for clarity on primary need Angeles Link is trying to address.
    - Question on whether SoCalGas is considering operating pipelines at higher pressures.
    - Preference for shorter transport distances driven by concerns over the potential for leaks in longer pipelines.
    - Suggestion for existing electric transmission infrastructure to deliver power to on-site electrolyzers as a way to minimize costs.
- NOx and Other Air Emissions Technical Approach
  - Feedback Themes:
    - Questions on whether NOx study will include end uses of hydrogen, potential NOx emissions from the pipeline, and additional air pollutants including PM.
    - Request for clarification on NOx sources.

        - Question on how study will determine geographical impacts to disadvantaged communities.
        - Clarification on whether the study will incorporate hydrogen use in power generation.
        - Request for SoCalGas to consider not selling hydrogen for combustion so as to avoid additional NOx emissions.
        - Concerns regarding SoCalGas assumptions regarding hydrogen fuel cell vehicles.
- GHG Emission Evaluation
    - Feedback Themes:
        - Clarification questions on carbon measurements.
        - Emphasis on proper infrastructure design and maintenance to prevent continuous emissions.
        - Importance of using both GWP 100 and 20 and examining climate impacts of different hydrogen leakage rates
- Updated Phase One Schedule
    - Feedback Themes:
        - Question on feedback timing.
        - Request for meeting transcripts and recordings.

Attachment A

PAG July 18 Workshop Attendee Roster

#	First Name	Last Name	Affiliation
PAG Members			
1	Maddie	Munson	Agricultural Energy Consumers Association
2	Miles	Heller	Air Products
3	Rizaldo	Aldas	California Energy Commission
4	Katrina	Fritz	California Hydrogen Business Council
5	Robert	Spiegel	California Manufacturers and Technology Association
6	Christopher	Arroyo	California Public Utilities Commission
7	Arthur	Fisher	California Public Utilities Commission
8	Chris	Myers	California Public Utilities Commission
9	Matthew	Taul	California Public Utilities Commission
10	Joon Hun	Seong	Environmental Defense Fund
11	Nick	Connell	Green Hydrogen Coalition*
12	Hope	Fasching	Green Hydrogen Coalition
13	Sal	DiCostanzo	ILWU Local 13*
14	Tim	DeMoss	Port of Los Angeles*
15	Rashad	Rucker-Trapp	Reimagine LA
16	Rodney	Cobos	SoCal Pipe Trades
17	Maryam	Hajbabaei	South Coast AQMD
18	Sam	Cao	South Coast AQMD
19	Charles	Wilson	Southern California Water Coalition
20	Norman	Pedersen	Southern California Generation Coalition*
21	Marna	Paintsil-Anning	Utility Reform Network
22	Arun	Raju	UC Riverside
23	Tyson	Seigel	Clean Energy Strategies representing Utility Consumer Action Network
24	Ernest	Shaw	Utility Workers Union of America 483*
Non-PAG Members			
25	Chester	Britt	Arellano Associates*
26	Stevie	Espinoza	Arellano Associates*
27	Nancy	Verduzco	Arellano Associates*
28	Armen	Keochekian	Insignia Environmental*
29	Anniken	Lydon	Insignia Environmental*
30	Julie	Roshala	Insignia Environmental
31	Rick	Garcia	Lee Andrews Group
32	Alma	Marquez	Lee Andrews Group*
33	Charice	Allen	SoCalGas*
34	Diana	Boyadijan	SoCalGas
35	Douglas	Chow	SoCalGas*

36	Sebastian	Garza	SoCalGas*
37	Chris	Gilbride	SoCalGas
38	Emily	Grant	SoCalGas*
39	Brian	Haas	SoCalGas
40	Eric	Hofmann	SoCalGas
41	Armando	Infanzon	SoCalGas*
42	Darell	Johnson	SoCalGas*
43	Amy	Kitson	SoCalGas*
44	Glenn	La Fevers	SoCalGas*
45	Megan	Lorenz	SoCalGas
46	Edith	Moreno	SoCalGas*
47	Neil	Navin	SoCalGas*
48	Katrina	Regan	SoCalGas*
49	Jill	Tracy	SoCalGas*

*attended in-person

Attachment B

PAG July 20 Workshop Attendee Roster

#	First Name	Last Name	Affiliation
PAG Members			
1	Maddie	Munson	Agricultural Energy Consumers Association
2	Miles	Heller	Air Products*
3	Rizaldo	Aldas	California Energy Commission
4	Katrina	Fritz	California Hydrogen Business Council*
5	Robert	Spiegel	California Manufacturers and Technology Association
6	Christopher	Arroyo	California Public Utilities Commission
7	Arthur	Fisher	California Public Utilities Commission
8	Kaj	Peterson	California Public Utilities Commission
9	Chris	Myers	California Public Utilities Commission
10	Matthew	Taul	California Public Utilities Commission
11	Brian	Goldstein	Energy Independence Now*
12	Joon Hun	Seong	Environmental Defense Fund
13	Nick	Connell	Green Hydrogen Coalition
14	Hope	Fasching	Green Hydrogen Coalition
15	Matt	Schrap	Harbor Trucking Association
16	Nathaniel	Williams	Local Union 250*
17	Hector	Carbajal	Local Union 250*
18	Rodney	Cobos	Southern California Pipe Trades
19	Maryam	Hajbabaei	South Coast AQMD
20	Aaron	Katzenstein	South Coast AQMD
21	Sam	Cao	South Coast AQMD
22	Norman	Pedersen	Southern California Generation Coalition*
23	Marna	Paintsil-Anning	Utility Reform Network
24	Jack	Brouwer	UC Irvine
25	Tyson	Seigele	Utility Consumer's Network
26	Ernest	Shaw	UWUA 483*
27	Anthony	Flores	UWUA 483*
Non-PAG Members			
28	Chester	Britt	Arellano Associates*
29	Stevie	Espinoza	Arellano Associates*
30	Nancy	Verduzco	Arellano Associates*
31	Armen	Keochekian	Insignia Environmental*
32	Anniken	Lydon	Insignia Environmental*
33	Julie	Roshala	Insignia Environmental
34	Rick	Garcia	Lee Andrews Group
35	Alma	Marquez	Lee Andrews Group*
36	Diana	Boyadijan	SoCalGas

37	Andy	Carrasco	SoCalGas
38	Douglas	Chow	SoCalGas*
39	Sebastian	Garza	SoCalGas*
40	Emily	Grant	SoCalGas*
41	Aila	Green	SoCalGas*
42	Brian	Haas	SoCalGas*
43	Stephanie	Henley	SoCalGas*
44	Eric	Hofmann	SoCalGas
45	Darell	Johnson	SoCalGas*
46	Amy	Kitson	SoCalGas
47	Glenn	La Fevers	SoCalGas*
48	Frank	Lopez	SoCalGas
49	Edith	Moreno	SoCalGas*
50	Neil	Navin	SoCalGas*
51	Jill	Tracy	SoCalGas*
52	Andrea	Warren	SoCalGas

*attended in-person

Attachment C

PAG August 29 Virtual Workshop Attendee Roster

#	First Name	Last Name	Affiliation
PAG Members			
1	JP	Gunn	Air Products
2	Sarah	Wiltfong	Bizfed
3	Katrina	Fritz	California Hydrogen Business Council
4	Christopher	Arroyo	California Public Utilities Commission
5	Arthur	Fisher	California Public Utilities Commission
6	Chris	Myers	California Public Utilities Commission
7	Matthew	Taul	California Public Utilities Commission
8	Theo	Caretto	Communities for a Better Environment
9	Shara	Burwell	Communities for a Better Environment
10	Sara	Gersen	Earth Justice
11	Brian	Goldstein	Energy Independence Now
12	Joon Hun	Seong	Environmental Defense Fund
13	Russell	Lowery	Environmental Justice League
14	Nick	Connell	Green Hydrogen Coalition
15	Karla	Sanchez	Harbor Trucking Association
16	Jan	Smutny Jones	Independent Energy Producer's Association
17	Sal	DiCostanzo	ILWU Local 13
18	Aaron	Guthrey	Los Angeles Department of Water and Power
19	Pete	Budden	Natural Resources Defense Council
20	Maryam	Hajbabaei	South Coast AQMD
21	Sam	Cao	South Coast AQMD
22	Charles	Wilson	Southern California Water Coalition
23	Norman	Pedersen	Southern California Generation Coalition
24	Arun	Raju	UC Riverside
25	Aaron	Stockwell	The United Association
26	Tyson	Seigel	Clean Energy Strategies representing Utility Consumer Action Network
Non-PAG Members			
26	Chester	Britt	Arellano Associates
27	Stevie	Espinoza	Arellano Associates
28	Nancy	Verduzco	Arellano Associates
29	Rachael	Potts	Arellano Associates
30	Alisa	Lykens	Insignia Environmental
31	Armen	Keochekian	Insignia Environmental
32	Julie	Roshala	Insignia Environmental
33	Alma	Marquez	Lee Andrews Group
34	Chris	Gillbride	SoCalGas
35	Douglas	Chow	SoCalGas

36	Emily	Grant	SoCalGas
37	Edith	Moreno	SoCalGas
38	Frank	Lopez	SoCalGas
39	Hector	Moreno	SoCalGas
40	Jill	Tracy	SoCalGas
41	Yuri	Freedman	SoCalGas
42	Marybel	Batjer	California Strategies

Attachment D

PAG September 28 Quarterly Meeting Attendee Roster

#	First Name	Last Name	Affiliation
PAG Members			
1	Vince	Wiraatmadja	Air Products
2	Sarah	Wiltfong	Bizfed
3	Rizaldo	Aldas	California Energy Commission
4	Katrina	Fritz	California Hydrogen Business Council*
5	Robert	Spiegel	California Manufacturers and Technology Association
6	Christopher	Arroyo	California Public Utilities Commission
7	Christopher	Myers	California Public Utilities Commission
8	Matthew	Taul	California Public Utilities Commission
9	Nathaniel	Skinner	California Public Utilities Commission
10	Tyson	Siegele	Clean Energy Strategies representing the Utility Consumers' Action Network
11	Theo	Caretto	Communities for a Better Environment
12	Joon Hun	Seong	Environmental Defense Fund
13	Michael	Colvin	Environmental Defense Fund*
14	Nick	Connell	Green Hydrogen Coalition*
15	Karla	Sanchez	Harbor Trucking Association
16	Nermina	Rucic	Los Angeles Department of Water and Power
17	Jesse	Vismonte	Los Angeles Department of Water and Power
18	Pete	Budden	Natural Resources Defense Council
19	Mike	Galvin	Port of Los Angeles*
20	Sam	Cao	South Coast AQMD
21	Charley	Wilson	Southern CA Water Coalition
22	Ernest	Shaw	Utility Workers Union of America 483*
23	Robin	Downs	Utility Workers Union of America 483*
Non-PAG Members			
24	Chester	Britt	Arellano Associates*
25	Stevie	Espinoza	Arellano Associates*
26	Nancy	Verduzco	Arellano Associates*
27	Marybel	Batjer	California Strategies*
28	Armen	Keochekian	Insignia Environmental
29	Anniken	Lydon	Insignia Environmental
30	Julie	Roshala	Insignia Environmental
31	Armen	Keochekian	Insignia Environmental
32	Alma	Marquez	Lee Andrews Group*
33	VJ	Atavane	SoCalGas
34	Kent	Kauss	SoCalGas
35	Andy	Carrasco	SoCalGas

36	Frank	Lopez	SoCalGas
37	Douglas	Chow	SoCalGas*
38	Edith	Moreno	SoCalGas*
39	Maryam	Brown	SoCalGas*
40	Yuri	Freedman	SoCalGas*
41	Darrell	Johnson	SoCalGas*
42	Jill	Tracy	SoCalGas*
43	Yuri	Freedman	SoCalGas*

*attended in-person

APPENDIX 8 – TRANSCRIPTS

HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:	
ANGELES LINK COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP PLAN FOR APPLICABLE SAFETY REQUIREMENTS	CERTIFIED COPY

TRANSCRIPT OF PROCEEDINGS

Remote Meeting via Hybrid Meeting

Wednesday, July 19, 2023

Transcribed by:

Leticia Reyna

Job No.:
42910LEE-AUDIO

HEARD BEFORE SO CAL GAS
ANGELES LINK TEAM

In the Matter of the Meeting re:)
)
ANGELES LINK COMMUNITY BASED)
ORGANIZATION STAKEHOLDER GROUP)
PLAN FOR APPLICABLE SAFETY REQUIREMENTS)
_____)

TRANSCRIPT OF PROCEEDINGS, held via Hybrid in-person and Zoom videoconference on Wednesday, July, 19, 2023, transcribed by Leticia Reyna.

Wednesday, July 19, 2023

MS. MARQUEZ: Good morning, everyone, and welcome to this morning's CBOSG Workshop Project and the Angeles Link Projects. I want to take this opportunity to say welcome to those that are here in person, to those that are here also participating virtually. I hope it wasn't a long drive for some of you. With that said, I would like to first have a land acknowledgment to get us started. So, I just want to start with we respectfully acknowledge the indigenous people's on whose ancestral lands we gather of diverse and vibrant communities of Tongwa, Tatavian, Serrano, Keesa, and Shumask (phonetic) people, who for generations have cared for their lands and make their home here today. We honor and pay our deepest respect to their elders and descendents, past, present and emerging. As they continue their enduring stewardship of these lands and waters for generations to come, we acknowledge our collective responsibility and commitment to elevating the stories, culture and community of the original caretakers of the region and our grateful for the opportunity to live and work on these an ancestral lands. We celebrate the resilience, strength and unwavering spirit of indigenous people's and are dedicated to creating collaborative, accountable and respectable relationships with indigenous patients and local tribal governments. So my name is Alma Marquez, and I am the CBO facilitator with Lee Andrews Group, Vice President of Government and Relations and along with me today. I have cofacilitator, Chester Britt, who will be walking us through today's member discussion and helping us throughout this agenda for this morning's presentation and into early afternoon. With that said, I'd like to move us forward with some basic housekeeping rules. First and foremost, we are having this as a virtual workshop. Therefore, we'd like to really encourage you all to use your microphones so that our court reporter is able to capture everything that's mentioned here today. As well as folks who are joining us virtually, if you could please speak into your mic's so we're able to get everyone's feedback and we're able to record it and share with you all after. We'd also like to remind everyone that this meeting is being recorded and will be made available for folks who would want to get this access to it afterwards. We -- you will have the ability to un-mute yourselves. And when your name is called specifically for self-introductions and throughout today's workshop so you can give us feedback. Also, we are having these microphones -- wireless microphones available. So, again, as I mentioned feel free to make your comments throughout today's workshop when we feel that you need to give us some feedback. Again this is a workshop and it is going to be a little bit of a stretch today. However, we really want to encourage everyone to take some breaks and feel free to have some refreshments so that we can make this as comfortable as possible for you all especially for those who are here in person. So with that said, I'd like to start with self introductions. And we're going to start with the folks that are here in person. And if you could please state your name and what organization you're with. Again, so this is for our court reporter who is here to us -- with us this morning. And is doing a great job of making sure everything is being recorded. So let's go ahead and start with my left -- with Enrique. If you can give your name and your self-introduction organization.

MR. ARANDA: Good morning (Spanish speaking) Enrique Aranda with Soledad Enrichment Action in Los Angeles.

MS. GARLAND: Hello, everyone. I'm Jackson Garland from Eco Action Club in Santa Monica College.

MS. HANSCOM: Morning. Marcia Hanscom with Ballona Wetlands Institute.

MR. SALCEDO: Good morning. Gerry Salcedo from the Southeast RioVista, YMCA in the city of Maywood.

MS. VEGA: Hi. Good morning, everyone. Aida Vega with Alma Family Services.

MR. PENA: (Spanish speaking) Good morning. My name is Luis Peña, I'm with the Los Angeles People's Alliance.

MS. MARQUEZ: And did we get everybody here this morning? Oh, and then I'll go over to my left hand side.

MR. ANDREWS: Larry Andrews with SoCal Gas, Emergency Management Operations and Strategy.

MS. KITSON: Hi, good morning. Amy Kitson. I'm the director of Angela's Link Engineering and Technology.

MS. GRANT: Good morning. Emily Grant, Sr. Public Affairs Manager with Angeles Link.

MR. BRITT: And I'm Chester Britt with Arellano Associates. And I'll be serving as the facilitator today with Alma.

MS. TRACY: Good morning, everyone. Jill Tracy, Sr. Director of Angeles Link, Regulatory and Policy.

MR. LOPEZ: Good morning, everyone. Frank Lopez, Director of Regional Public Affairs for SoCal Gas.

MS. MARQUEZ: Okay. So, let's go ahead and move on with our folks that are joining us virtually. And let's go ahead and start with Robert van de Hoek. If you could introduce yourself and what organization your with. Robert?

MR. VAN DE HOEK: --

MS. MARQUEZ: Okay. I'm not sure if you're hearing us, Robert -- but, you're on here. Oh, okay. So Robert van de Hoek is joining us -- sends his regards for not being here. He is with the Defend Ballona Wetlands. And let's go ahead and move it -- let's popcorn it over to Andrea.

MS. LEON-GROSSMANN: Hi. (Spanish speaking) good morning. My name is Andrea Leon-Grossmann. I am the Deputy Program Director of the west with Vote Solar. And I'll pass it on to Christopher.

MR. ARROYO: Good morning. I'm Christopher Arroyo, and I work at the CPUC.

MS. MARQUEZ: So. Christopher Arroyo with the CPUC. And let me go ahead and pass it to Lydia Ponce.

MS. PONCE: Good morning, relatives. This is -- can you hear me?

FEMALE UNIDENTIFIED SPEAKER: Yes.

MS. PONCE: Okay great. 'Cause my computer is confusing. It was telling me mute, un-mute, postal un-mute. Good morning, relatives. It's Lydia Ponce calling from the unseated territory of the Tonga people (phonetic) known as the Sagna (phonetic) and infamously known as a Venice, California. I work for society of native nations. We have one foot in California, one in Texas, and I'm with American Indian Movement. Thank you.

MS. MARQUEZ: Thank you Lydia. And let's go ahead and pass it to Alex Jasset from PSRLA.

MR. JASSET: Good morning, everyone. My name is Alex Jasset with Physicians For Social Responsibility Los Angeles, thanks.

MS. MARQUEZ: Thank you, and I believe that's all the CBO's we have online. Am I missing anyone that are with the CBO's stakeholder group? Oh, Kristin.

MS. FUKUSHIMA: Yes. Hello, everyone. Sorry -- my name is Kristin Fukushima. I use she and her pronouns, and I'm from Little Tokyo Community Counsel.

MS. MARQUEZ: Thank you Kristin, and I believe that is all the folks that are joining us online. Am I missing anyone? I believe -- we don't have anyone else. Okay. Well, thank you all for joining us virtually. We look forward to meeting you at another meeting here in person as we'd love to have you here in the future. With that said, I'd like to move us on to an agenda. As you can see, we have a pretty -- a pretty full agenda for today. So please bear with us. Again, as I mentioned, we want you to be as comfortable as possible. And we're going to make this as painless as possible because we have an amazing set of speakers today, and we really want to encourage your feedback and your questions that you may have for today's presentation. We are going to have a little break at 10:20. With a tour that I think you'd all find very interesting -- it's over in the parking area towards the back. And that it's going to be about a 30 minute tour, and we really want to encourage you all to take that, we'll be joining you as well. And then we'll come back and finish with the working plan and training you evaluation then to the preliminary routing configuration analysis. We'll have a 30 minute lunch, and then go into the remaining present studies for today. And then we'll have a wrap-up between 2:55 and 3:00 o' clock. So that's our agenda for today. If anyone needs to be leave early, please let us know. As we want to make

sure that you have all the information that is given today at this morning -- at today's workshop. And with that said, I'm going to go ahead and move forward with introducing, Larry, who is the Emergency Strategy and Operations Manager. Who is going to give us a safety message.

MR. ANDREWS: Thank you. Good morning, everybody. Pleasure to be here. As part of my role and emergency management some of the things we look at is things to be proactive and prepare. We do partner with various first responders and other communities. One of the topics that I thought would be important today is I wanted to touch a little bit on wildfire safety. Very applicable now with the heat. There's a lot of vegetation 'cause of the heavy rains that we've had over the first part of the year. And I thought I'd give you guys -- share some tips that could prepare you prior to something happening. And to give you some context of what I mean by the risk of wildfires. In 2023 alone, Cal Fire has responded over 3300 brush fires in some capacity or volume of the impact. And over the last five-days we've had five different fires break out -- just in this area alone. The most recent one was a rabbit fire, which is still going on in Beaumont. It's about 55 percent contained, but it's already at 8200 acres. So, as we've seen in the years past, what are some of the things that we -- could be doing to be prepared in case wildfires do break out in our areas. Some of the things that you can do is be mindful of the vegetation around your home or a community that you live in. Those, those firebreaks are clearing that shawbury (phonetic) increases -- decreases the chances of fire impacting your area -- does provide defense. It also allows fire fighters to be able to look at other areas that might be in a bit more jeopardy. So it allows them to look at different areas that they want to protect. In addition to that, having an evacuation plan is really crucial. Not just having it, but also practicing it. As everybody has, I'm sure, experienced at some point when it's time to go, you want to make sure that those things are muscle memory. Couple of things that you could be doing with that evacuation plan is really having a to go bag and a kit. A couple of things that you would want to think about in that bag is cash because if, if there's a problem in the area where computers are down, and you need any type of gas or -- or anything like that. You want to be able to be able to pay cash because you wouldn't be able to use your card. Which, most people use their ATM or credit card now, so. Another thing is medication; you might not have a pharmacy readily available for a couple miles and it could be a couple of hours to get in or out of an area that you're trying to evacuate. And then make sure that you have, you know, communications to family members so that way that you -- you can communicate once you're in a safe area so they're not concerned that you might be impacted. And then lastly, really working with your neighbors. Kind of assembling a plan together; Relying on other people for different things is helpful if you already have a plan together. That will allow you to be much better prepared when you're dealing with these type of impacts. So, again, couple general just reminders of things to be prepared for in a wildfire because these can happen fairly quickly. They can happen at any time during the day and having a really solid plan will make you much safer should you be impacted by that. That's what I have for today, thank you.

FEMALE UNIDENTIFIED SPEAKER: Something you reminded me a long time ago is also never go home with an empty tank of gas. 'Cause you never know what's going to happen in the middle of the night. So I was driving home last night and the last thing I wanted to do is stop at the gas station and put a hundred dollars of gas into my car, and I just was reminded to never go home with an empty tank of gas.

MR. BRITT: Just, again, for the court reporter. Whoever is speaking just make sure you state your name so the court reporter can get it into the record, thanks.

MS. MARQUEZ: Okay. And I believe we have one more person who joined us. Faith, if you could please introduce yourself and the organization your with.

MS. MYHRA: Yes. My name is Faith Myhra, she her, and I'm with Protect Playa Now. Thanks for having me.

MS. MARQUEZ: Welcome, Faith. And then we're going to go ahead and turn it over to Frank Lopez.

MR. LOPEZ: Hello, everyone. My name is Frank Lopez I'm Director of Regional Public Affairs For SoCal Gas. Thanks for that safety message, Larry and Jill. And I'll be a little bit vulnerable here, and I'll mention that I did not make that wise decision a couple of days ago. And I actually did run out of gas in the middle of the night with my family in the car -- it was not fun. But I think it's important to share that information as well, so. For those of you don't know me much. My name is Frank Lopez I'm the Director of Regional Public Affairs for SoCal Gas. So my team manages the relationships with the 200 and -- more than 240 local governments throughout our service territory.

And 500 communities. We also manage a lot of the relationships with our community based organizations. Many of you have probably come across a lot of the public affairs managers that work on my team while operating and kind of cover your regions. So, for me and my team is very important. This particular group is very important to me for two reasons. I'm really glad to be here because one, I was actually part of the Angeles Link team very early on when we were going through the application to get the memorandum account, and I specifically worked on the formation of the PAG and the CBO Group. So it's really good to finally be here when, you know, this was originally something in concept. And now there are people sitting in a room talking about Angeles Link. So it's really kind of come full circle for me. So that's one of the reasons why this is really important to me. Secondly, it's important to me because I grew up in La Puente, California. Does anybody know where La Puente, California is by the way? Yeah, that's cool. A lot of folks don't know where that is. But for those of you who don't know it's in the San Gabriel Valley. It's actually the city that borders City of Industry, which is one of the largest, you know, manufacturing logistics hubs in the state of California. As you can imagine

there's a lot of trucks a lot of industrial activity out there and that's where I grew up. And I, you know, I remember there being a lot of, a lot of, you know truck traffic and the emissions that come from that. So for me, I always kind of had that. It's kind of my framework as I kind of pursued my career. That led me to actually work in an environmental justice organization in the Bay Area for a really long time working around the built-in environment. Regional transportation plans. So for me, you know, environmental justice issues. Issues of the environment are very, very important to me for that reason, and I think -- when I think of the benefits that Angeles Link can provide to the region, I'm even more invested in the success of this group in particular, so. I want to also thank you for just taking the time to come out and do this. I know that -- this is a lot of work. I, I, served on advisory groups in the past, and I know that they can be very time consuming. But I think it's really worth it. Like in the long run, this is a very large project with significant impacts and you have a seat at the table. A driver's seat at the table with that. And so we're here because of the input that you've provided. You told us, hey, we want more meetings, we want more information, we want to be more

engaged. And we listened -- so that's why we're sitting here today. So thank you for taking the time. I think it's really important for you guys to be here and to be engaging with us and providing your input. So I want to continue building on the momentum that we had at the last meeting. I will ask of you, you know, please continue to be engaged but also I would like for everyone to contribute in some capacity. I know we've had a lot of people also tuning in online, and I want to make sure that everyone's voice is heard. So be mindful of that as you kind of provide your input. There are no good questions, no bad questions, no bad thoughts. You have something in mind, feel free -- please raise your hand and provide input. So, once again, I just want to thank all of you for taking time to be here and to help us out with this really important effort, Thanks.

MR. BRITT: All right. Thank you, Frank. So we're going now to get into the meat of our agenda. I'm going to be passing it over to Amy in just a second. If you're with us, and I think most of you were, by looking around the room at our meetings in June. We talked about having 16 work streams or work studies that we need to go through with you. And that's what this week is about. We're going to be doing, I think about six of them today and the balance of them on Friday. We've met

yesterday with the Planning Advisory Group, the PAG. And went over what the presentation is for you. We went over that with them yesterday. We'll be going over the next set of meetings with them tomorrow. So we have a full week of meetings. And the purpose of these meetings is really to be workshops. We have our normal quarterly meetings, which we're having with you guys on a quarterly basis. We have, kind of, an agenda that's set forward for that. To make sure we cover a lot of different topics with you. But these meetings in particular are roll up your sleeves, let's really focus on the subject matters that we're needing to focus on and get input from you related to those subject matters. So we're going to ask today as we go through the different topics. That when we get to the member dialogue, that we really focus in on that specific subject matter that we're talking about. To make sure that we get as much input as we can about that subject matter in particular. So that as the technical work is done, it's incorporating your comments and your thoughts, okay. Again, as Frank mentioned there is no bad question, there is no bad thoughts. We want to hear from all of you. We know that this is a long day. We're going to try to make it as useful as possible for you and for us. If you need to get food or use the

restroom, it's out to the left -- restroom and the food is back there. I was also just told -- I think there was a snafu and mix up. The tour is going to be on Friday; it's not today. There's a conflict in terms of the availability to do the tour today. So, for those of you who can make the meeting on Friday that's when the tour will take place. There will be, I think, other opportunities to do the tour, if not today. So, again we're going to be meeting with you guys for the next year at least. So, I think there's going to be more than one opportunity to do the tour. With that, I'm going to turn it over to Amy Kitson, who is the Angeles Link Director of Engineering and Technology. Our first subject matter today is the Plan For Applicable Safety Requirements. And she's going to cover that and then we'll have a discussion about that presentation.

MS. KITSON: Good morning. I thought I'd take a couple of minutes to introduce myself because it's probably the first time you've seen me speak for you. So, again, I'm Amy Kitson, Director of Angeles Link Engineering and Technology. I started my career in the utility business almost 20 years ago in August in Michigan. So, I'm originally from Michigan -- I went to Michigan State University for my Mechanical Engineering Degree, and I worked at Consumers Energy there for a few years before moving to California and working for Southern California Gas Co. I've started my career here in Integrity Management. But what that means is essentially the group that is doing all of the inspections and maintenance and review of all the different data that we're doing on all of our pipelines from the large pipelines that transport to the smaller lines within our neighborhoods, and then from there I moved to our engineering and field operations group and then now most recently into our clean energy group where I'm working on this project. So I'm happy to be here with you today, and we're going to dive into the safety study as we go through, and I think, as Chester mentioned -- some of you may have gotten a larger packet of, you know, 30 some pages with way more detail on these. If you haven't looked at it, that's completely fine. Just know that that's there if you haven't looked at it yet. That goes into even more detail than we're going through with the slides, but as we go through, feel free to ask questions. So first, I want to mention that safety -- that SoCal Gas is fully committed to safety. Is one of our core values as, you know, Larry stated in the groups that he resides in. It's something that we take very seriously for both our employees, contractors, public and our system. It's a foundational aspect of our business. So this is a study that even though we're undertaking it under hydrogen, that we're very, very familiar with from our natural gas system. The objective of the safety study is to evaluate the safety requirements involved in the pipeline transmission. So those are our big, big large steel pipelines that come -- that transport from the desert into the LA basin as an example. Storage and distribution and transportation of hydrogen. So that's like, kind of, looking at the whole system as a whole. How are we going to transport it around our system. And assessing the applicable safety requirements for employee, contractors, system and public safety. This is a very holistic view of the safety approach. And I did want to mention, too, as we're framing this. Is to keep in mind that hydrogen has been safely used for decades and industrial applications within our local communities already. Including LA basin. There's 1600 miles nationwide -- hydrogen pipeline, and we have many refueling stations and other pipelines already in our state. So this is isn't new; and so there's a lot of base line information that we're able to, to use and compile as part of the study. The first segment of consideration -- is our safety considerations. So what we're looking at here, is we're characterizing the physical and chemical properties of hydrogen. Because we're used to transporting natural gas and there are differences with transporting hydrogen as a new gas. That's what we're looking at specifically here. The impact, the safety of the gas transmission safety system. We're also identifying key risks and potential mitigations. So what that means, is mitigations means things like what type of surveys will we need to do, what type of inspections would we need to do, what type of materials or coatings or welding practices would we need to do for hydrogen. And then identifying and applying key safety codes in the U.S. and globally. So as I stated, there's a lot of hydrogen pipelines in the United States; but also in Europe and other the countries as well. So we're looking to incorporate those, those codes and standards. And then specifically we want to look at our -- also, our internal standards as well. So we have procedures to do our daily work for the natural gas side of the system. And what -- we want to look at what needs to change of those procedures and material specifications. And then what might we need new ones for completely -- for hydrogen specifically. And then, finally, looking at employee contractor system and public safety specifically. Identifying a public safety concerns and developing a public safety awareness

plan for hydrogen and include, and including outreach to people like our local first responders that Larry is very familiar with that there's questions after this. Similar to what we've been doing for decades in our day to day operations for the natural gas. Okay. This slide is -- contains all the high level descriptions of work that we're going to be covering. That, as I stated, are like -- there's way more details in each one of these areas in, in your packet that you have. But I'm going to touch on them right now. So these are, again, a variety of components that we traditionally address in our natural gas side. Using methods consistent with our current base business. But then incremental to the hydrogen work specifically. So these are the sections we'll be addressing in our final report. And this is what we plan to include, and we'd like your feedback on. We plan to design our system similar to our natural gas pipelines based on population density, location of our current pipeline. Current pipelines and right-of-ways and alignment with our integrity management practices and hydrogen best safety practices. That's -- I think that's where I'm going to touch on and then I will open it up for, for questions.

MR. BRITT: All right. Thank you Amy. So I just want to remind you, again, we would ask that you state your name and speak directly into the microphone so the court reporter and people online can hear. If you are online, and you want to speak please just raise your hand and so we can see that you're requesting to speak. We'll un-mute your microphone, call on your name then we'll be able to hear you as a group. We would ask that you guys be concise and direct to the point of what we're talking about so that we can try to document as much information from as many people as we can on these various subject matters. Verbal comments are not the only way that you can provide input. You might have -- you should have already been told through the e-blast that we've been sending that the 30 page document that we sent out for the work studies that has the project descriptions in them. You have until the end of this month to formally provide input on those so we will be collecting that input not only today, but also in any documentation you send us through e-mails or a letter or whatever process you want to send us information. We'll be able to get that as well. So today's verbal comments are not the only way to provide input. You can also, as part of the process today, chat if you're online. And you don't want to make a verbal comment, you can just chat your information we are documenting all of that as well. And then we are accepting, as I mentioned, input after this meeting. So with that, I want to just go back to the slide that Amy was presenting. And just ask what are your thoughts about this study to address safety? We want to make sure -- we know safety is a big issue, and we want to make sure we're covering issues that are important to the community. So I want to just open it up to anyone that has any comments. And it looks like we already have someone who raised their hand online, which will get us started. So we'll start with you, Robert. If you can just un-mute your microphone. We should be able to hear you, and we'll take your comment.

MR. VAN DE HOEK: Okay. Good morning, everybody. Can you hear me?

MR. BRITT: We can here you great.

MR. VAN DE HOEK: Okay, great. Yeah, safety is a big issue, and I'm very interested in having more signage and interpreted things out on the ground. And what intersections throughout our city where pipelines are passing and, and letting the public know and if -- it when it's passing through your neighborhood. And I -- I think it's probably a constant thing that needs to happen because people move in and out of areas. And then I have a question about -- I didn't know hydrogen pipelines are everywhere in the United States. Are they -- is there a pattern where some states don't have it and some do -- and what are some examples of the states? Are -- is the urban states that have the most hydrogen pipelines and rural states like Wyoming, which is, like, considered a rural state doesn't have that much pipelines. Any patterns about the geography of our hydrogen pipelines and how many and all that, thanks.

MS. KITSON: Making sure I was still on. Hi, Robert thank you for that comment and question. I'll start on your first one on signage. We do have pipeline markers for our current natural gas pipelines. Especially on our large high pressure pipelines, but I take your note. It's something that we could, you know -- we could get you more information on, on how we do that signage. And then there is a national pipeline mapping system that has both pipelines from Southern California, as well, as nationwide on the large transmission system that the public does have access to. So you can go in and plug in your address or ZIP code and see what's in that area that -- I can get you the -- we can follow up on the exact website for the team. And then, as far as for the current hydrogen pipelines that are in the nation today. Primarily, they're in large industrial areas. And then but there are hydrogen filling stations that are sprinkled around in the

different communities, and I am not -- I'd have to follow up for you on where we -- you could have location of that visibly for the public, but --

MR. BRITT: All right. Thank you, Robert, for your comment and question. The next person online who has raised their hand is Andrea. Andrea, if could you un-mute your microphone. We should be able to hear you.

MS. LEON-GROSSMANN: Hi. Well, first I want to talk in terms of --

MR. BRITT: I'm sorry, Andrea, can I interrupt you. Can you just make sure you state your name and organization for the court reporter, thanks.

MS. LEON-GROSSMANN: Sure. Andrea Leon-Grossmann with Vote solar. I want to first -- in terms of emergencies, as we were talking, or, you know, most folks were talking at the beginning of this conversation and having cars fueled up. I've driven an AV for the last 11 years, and I, I must say that -- that's something that I think in terms of safety is far none. Especially now with having rooftop solar, is something you can fuel at your own home without having to fret about where you're going to get your fuel if, if there's a big earthquake. So that's, I think, that's something really advantageous. And talking about safety, I do want to ask what about, you know, what are the pipelines that would be used, that are already existing that have gas, if there's hydrogen put in them. Is there, is there risk of corrosion? And also what about leakage rates. And if there's new pipelines put in for hydrogen only. Also what is the life span of those pipes and also what would be the leakage rate.

MS. KITSON: All right. Thank you for your question, Andrea. I'll touch on what we're doing for our existing infrastructure. I will touch a little bit about that when we get on the routing study, as well, but this is very pertinent to the safety area as well. So it is something that we're looking at as far as our phase one studies is both utilizing, when we say "repurposing" we kind of look at it in two ways. Repurposing our right-of-way, where we currently have current pipelines. And then we are evaluating repurposing our current gas pipelines for hydrogen. And part of that evaluation, will be exactly what you stated as what are the -- whether corrosion, cracking other things. What do we have to look at with our current pipelines and see if that's something that we can do or will we put in new -- new materials and new pipeline in that place. I think that's it, though, did I cover all of her questions?

MR. BRITT: I think that did -- all right. Thank you for your comment or question, Andrea. Is there anyone in the room that has any questions about safety? All right. Your guys's hands went up simultaneously so you guys can decide which one to go first. But go ahead, Faith.

MS. MYHRA: Yeah, so I have a question.

MR. BRITT: You could just state your name, I'm sorry, and organization.

MS. MYHRA: Oh, yeah. Faith Myhra with Protect Playa. And I think it was, Larry, you were saying is in charge of communications during emergencies is that my understanding? So, my question is around who gets reported to and who gets communicated with during these emergencies because in the past, we've had issues with just doing what's just required. And that isn't necessarily what makes things safe. And that has shown in how instance have rolled out. So I'd like to know, like, who are you required to and who are you in addition to that going to be communicating with reaching out with. And in what kind of timely manner?

MR. BRITT: Great question. So in an -- process of an emergency, so we do follow the instant command structure. I would just also as I see it, it's a FEMA best practices. And the way that works, it's not just my department; it's a collective assembly of various or departments within our company. So, Frank would be one of our stakeholders, we'll work with RPA, Regional Public Affairs or PIO's, which is our Public Information Officer. And then what we'll do, is we'll start to understand what the event is. Craft communications and then start to push that out. In addition to that, we'll partner with our local emergency response offices. Whether it's a county or city. And then and then we'll branch that out to other agencies as well. To notify the communities of any potential risk or impact. That's part of the emergency side. That's not necessarily a requirement. That's just the right thing to do to inform the public so we can make sure that they're safe. There's other regulatory and compliance requirements. Those agencies can consistent of FEMSA, the Public Utilities Commission. COOPA, which is health and HazMat. There are some requirements in our regulations that we will also notify them. Notification, timing -- we do try to do it as applicable. Safety is the utmost importance to us. So if, you know, responding with first responders and mitigating a potential risk. If it -- if it's mitigating that risk, is more, more challenging than reporting; we'll make sure it's safe first. Then we'll start to make that communication and that's a pretty

standard operating procedure when it comes to an event because we really want to mitigate any risk to any initial area that could be impacted. But those communications go fairly quickly. We have currently right now in our operations we have three different groups that are on 24/7. So we have our emergency management team that looks at our service territory for potential impacts. At somebody's staff 24/7. Then we have two other departments in operations, which is our customer contact center. As well as our dispatch and there's phone numbers that are available to customers and first responders should they see something that could become an issue so we can start gathering that information and getting it out.

MS. MYHRA: Can I do a follow-up question too --

MR. BRITT: Sure.

MS. MYHRA: Okay. So as far as -- like, you know, you talked about emergency responders. So I'm assuming that, you know, includes the police department, the fire department. Does your plan also include public elected officials who have a lot of contact ability and, you know, how -- how local that does get? 'Cause for example in the city of Los Angeles a lot of the people who communicate in their neighborhoods, are these neighborhood counsels. Are there people that get reached out to an emergency plan on that level as well?

MR. BRITT: I will pitch that over to Frank, if you don't mind, 'cause we -- our teams partner extensively, one of Frank's main -- he's team's main functions is, is getting down to that elected and granular group.

MR. LOPEZ: Yeah, so Frank Lopez, Regional Public Affairs. So yeah, we usually do notify the local elected official. And the city of Los Angeles would typically be the counsel member and their staff. It really just depends on, on the scale and the scope of the issue. If it's a significant issue, I mean, we'll do GEO targeted social media post. In some cases, we've even done out-bound dialing and sent e-mails to customers directly through our customer contact center. But we try to go above and beyond of what's, what's required. We'll notify the people that we think is best to share information with the community about an incident.

MR. BRITT: All right, Marsha.

MS. HANSCOM: Marsha Hanscom, Ballona Wetlands Institute. A clarification question. You mentioned there were 1600 miles of hydrogen pipelines. Were you saying in California or the whole the country?

MS. KITSON: Do I need to verbally say it for the court reporter?

MR. BRITT: Just speak into the mic, yeah.

MS. KITSON: So yeah, just to confirm it. 1600 miles nationwide.

MS. HANSCOM: And are any of those operated by SoCal Gas currently or --

MS. KITSON: No. None of them are currently operated by SoCal Gas.

MS. HANSCOM: Okay. So then the other question relates to Andrea's question about leakage. Is there any kind of study or assessment of how those -- the leakage or corrosive issues related to those pipelines?

MS KITSON: Yeah, we actually have a hydrogen leakage study, I think, for this team it would be Friday that they will be touching on -- on that study specifically in detail -- Friday, mh-hm.

MS. ROGERS: Hi there. Sorry for being late. I'm Sydney Rogers from PESA. My concern is always about equity when it comes to service and response as opposed to certain areas and urban areas. When it comes to leakage, response. Especially when it comes to pipelines. I'm going to be Frank -- white areas might be serviced, but black and brown areas might not be looked at as closely. And I want to ask about, like, are they being looked at, are they being serviced, are they being responded to. Are they being -- especially with this kind of -- now we're going deeper into these kinds of areas and stuff. And the response to those kinds of things. We've already seen, you know, leakage getting out of control with other things. Now we're going into hydrogen and stuff like that too. It's really important to make sure 'cause communities will be looking closely at these kinds of things now. And especially people of color will be looking at, oh, you're going to go into this now. How will the response be? How will the emergency response be? Are you putting things in place for these kinds of communities?

MS. KITSON: Yeah, great question, Sidney. So we -- in our system, we have operation -- leak survey practices and operation maintenance practices that are uniform and the same across our entire system no matter where you're located. So it is -- we look at these things based on material, leakage rate. And and we do -- we have routine surveys, like Larry mentioned, that are -- that are done across our system irregardless of ZIP code.

MR. BRITT: Will there be any specific section in the safety study regarding equity or is there any

specific, like, task related to that?
MS. KITSON: Yeah, and specifically when we get to the routing setting that is something that we're looking at. And then, from a safety perspective, we like to look at safety as a holistic per -- you know, the same as -- all our (unintelligible) and system, yeah.
MR. BRITT: Okay. We have a couple of people who have chatted some questions or comments. I'll take the first one Alex. Are there plans to store or transport hydrogen and other forms, such as, ammonia. If so, where will -- where will those be and what are the unique risk of other chemical compounds?
MS. KITSON: For Angeles Link, we're looking at transporting the gasless form of hydrogen. We're not looking at liquid hydrogen or through ammonia.
MR. BRITT: Okay. And then Lydia also chatted can you update us regarding tribal consultation and consent? Two separate conditions of prior informing seems like we're putting the cart before the horse. So, I don't know if we need to respond to that. But we'll just -- thank you for your comment. And obviously we're documenting all of the comments we're getting. Anyone else?
MS. MARQUEZ: I believe we have a question from Enrique. And then also we could set way into having Andrea introduce herself, who also joined us.
MR. BRITT: Oh, absolutely yes.
MS. MARQUEZ: Thank you.
MR. BRITT: Go ahead Enrique.
MR. ARANDA: Thank you, Chester. It's just a question to everyone, really. My concern is -- Enrique Aranda -- my concern really has to do with geography and stationary mobile source of pollution. More specifically some of us know intimately well. We grew up in the city's most adversely impacted by, by these source of pollution -- we know the impact well. And with that said, I'd like to know if whether there will be, will there be a nexus study? A potential siting of the pipeline and any impact it would have to come across color around the corridor and the 710 freeway, specifically.
MR. BRITT: Yeah, you know, that's a really good question. We actually have a presentation later on in the agenda today about routing and siting, which we'll probably get into a little bit more of that detail. So, if you wouldn't mind holding on to that thought, we'll come back to that. I want to make sure that we're getting all of the issues related to safety 'cause it seems like this is a popular topic. So, if you don't mind, Enrique, we'll come back to that question later today. And, Andrea, if you could introduce yourself 'cause I know you came in a little bit late. We'll just make sure you get an opportunity to do that.
MS. VEGA: Hi. Yes, Andrea Vega, here with Food and Water Watch.
MR. BRITT: Thank you so much. I want to probe a little bit deeper into this topic. About if, if there are any community issues, specifically, that you're concerned about. And any mitigation measures that you maybe think we should consider. You know, safety is a very localized issue, you know, people live where they live and the pipelines go where they go. And, you know, in an urban environment, you always have, you know, that intersection of infrastructure along with people, you know. I mean we live in an urban environment, so everyday we're used to intersecting with infrastructure because we do it all the time. Whether it's a bridge or a road or a pipeline or utilities, you know, our streets are being opened up all the time. So I was just curious, you know, from a communities perspective, what are the concerns related to safety and are there any thoughts about mitigation measures that you would like for SoCal Gas to think about in the studies that they're about to do or doing. Sydney.
MS. ROGERS: I think one of the main concerns is always -- especially in the urban areas one of the pipelines being hit while there's construction going on and all of a sudden there's gas or anything going by schools or going by a University or going by a park or something and all of a sudden there's children and everyone being affected. And now there's a huge emergency going on. And now it's weeks and months of -- something. And it's the taking more than long -- well, you know, taking more than it takes for it to be solved, right? As opposed to in other areas they're like, oh, we solved it in 48 hours and it's done. Whereas, in south-central, it's taking six, eight, nine a year for it to get taken care of. You know, what I mean.
MR. BRITT: Huh-uh.
MS. ROGERS: And it takes longer. You know, those kinds of things that, that really sticks out to a lot of people of color's minds. Of like why did it take 48 hours over in Silver Lake, whereas; in South-Central it took 18 months.
MR. BRITT: Right.
MS. ROGERS: You know, what I --
MR. BRITT: No, great input. And that's why we're here is to get that kind of of input so the

studies that we're doing -- make sure that we address those things. So that when you see the final results of the study, that you'll see that kind of of input in the study itself. Yes, absolutely. Faith has her hand raised.

MS. MYHRA: I think that was a very good question. And in that vein one of the things that I'm thinking about really is earthquakes. We know that's a big issue with gas and the structure. A lot of ours is older and it wasn't necessarily thought through and it's on fault lines. So what part of these studies are going to be, you know, geological surveys and avoidance of these areas all together?

MR. BRITT: Again, good input. We do have a section about routing. And we'll get into the little bit of a detail similar to what Enrique brought up. We'll have a fuller conversation about that in our future presentations today.

MS. HANSCOM: Marcia Hanscom, Ballona Wetlands Institute. I love your question. I've been waiting for SoCal Gas to ask me that. I think they know the answer, but I'll say it again. We have a gas storage facility in our community in Playa del Rey. And if the state California -- science and technology -- can't remember the name of it exactly. But there was a report done for the legislator and it said that -- basically, concluded that our gas storage facility, which is the oldest one in the state -- the first one. It was done experimentally when, you know, people just weren't sure if it were to even work. So, given that technology and given that now, there are lots of people that live near and top of it, it was concluded that it's the most dangerous one in the state. So, I'd like to ask SoCal Gas, to consider. If you're redoing this whole operation into hydrogen to not use that facility and close it down not less than 1 percent of the gas in the whole state is stored there. You know, close that down if it's that dangerous, which it appears to be. And we've had, we've had impacts in our community for years. Decades. Don't we don't want to have an (unintelligible) kind of situation there. And it could happen -- and everybody knows that. So it would be great for an alterative for, you know, to not have storage in that particular area. Plus, it's on top of the state ecological reserve. I would love to see some studies done -- nobodies done any studies that I know of about how the chemicals and many different chemicals used for the injection and extraction are impacting the wildlife there, which we have endangered species and all. So would love to see some kind of study related to that if it's possible, thank you.

MR. BRITT: Again, thank you so much for your input. That's exactly why we're here is to get that kind of input. We're documenting everything you guys are telling us. Someone on the chat also chatted how about storage, how will hydrogen be stored? Kind of related to what Marcia was just saying. Will it ever be stored as ammonia. Will it be stored at any of the storage fields. So, Amy, I don't know if you could address that --

MS. KITSON: Yeah, yes, I can. So, and we'll touch on this again on the routing study as well -- but we're looking at third party storage options not something that SoCal Gas would be storing at this time. But it is part of our routing -- our routing study. And looking at what that would look like both out of state and in state third party storage options. We do not plan on storing the hydrogen with ammonia within SoCal Gas is operations.

MR. BRITT: All right, thank you. I wanted to touch on one more subject before we leave this subject and go to our next presentation. This was a big subject matter at the Planning Advisory Group meeting yesterday. There was a big the discussion about public safety and stakeholder engagement process to elevate the understanding of hydrogen safety. And I was wondering what thoughts you guys might have about public engagement stakeholder engagement and elevating public awareness, if you have any thoughts about that. I want to make sure that we talk -- cover that topic because, again, it was a big topic yesterday at our meeting, and I want to make sure we get any thoughts you might have regarding that. While you guys are thinking about that, Robert has raised his hand online. So we're going to go ahead and take his comment and then I'll come back to that thought as well. Robert, if you could un-mute yourself.

MR. VAN DE HOEK: Okay. I'm un-muted. Can you hear me.

MR. BRITT: We can.

MR. VAN DE HOEK: Okay. So following up on what --

MR. BRITT: I'm sorry, Robert, Robert. Could you just state your name and organization for the court reporter, thanks.

MR. VAN DE HOEK: Okay. Yes, my name is Robert van de Hoek, and I'm the founder and a Director of the Defend Ballona Wetlands Community Group in Los Angeles, California. And following up on what Marcia Hanscom just stated at Playa del Rey, there's about ten

locations where there's a stairway at the gas -- not the hydrogen but the natural gas -- locations where it's like a stairway in a store or home. You go down like 20 steps approximately and then you're like 15 feet below ground in a cement, enclosed, you know, cavity. And a hole. And if these gas lines are going to be re-modernized or you're not even you needing them, I would like make a point here that you need those infrastructure stairways that go below ground and call them -- repurpose them now into called grottos -- wildlife grottos, cave. And that there are more than a dozen species of native bats that are insect eaters, predators. And they'd be very valuable to have those bats. Some of those are on the endangered species list and heading towards that listing and it would make the gas company look good that it repurposed it's under ground stairway cavities grottos. And made them wildlife habitat -- some of them could be made for -- and it would be safety. I think one reason you're removing them is a safety issue because people might try to go down those. But you can grate them just like you have them locked now, but with an opening so bats can fly in and out. And their small, they can tuck their wings and go through that quiet easily. And a few of them might be able to be made for raccoons, for the wildlife. Anyway -- I've touched on a few -- oh, there's a swallower too. A species of swallow's birds that would love to nest in those dark spaces too. And their also very curious for the public to be able to walk down and see bats hanging, you know, safely during the day time and that, thanks.

MR. BRITT: Thanks so much for your input. We're going to go next to Lydia. Lydia you have your hand raised. If you could un-mute yourself.

MS. PONCE: Yes, thank you. Lydia Ponce, Society of Native Nations. I'm thankful that you have acknowledged my question; however, you know, there's great concern especially by process of the community being informed and understanding what exactly that you're asking us to support. With indigenous elders in four directions in Los Angeles be at the Hottchaman, Shumasch, Tongva, Tatavian (phonetic), in the LA basin; let alone Southern California. An e-mail is not going to work. It's just not going to work. Not even a phone call. It's actually a lot more formal/informal, which is establishing relationships. And -- it might question might pose because I had a gardener next door and it was too noisy, and I couldn't raise my hand. I would really appreciate it if you could update us all for transparency and accountability because indigenous local tribal people, original of the land, for 10,000 plus years are still here. And they are actually elders that I answer to. And I thank you for your time.

MR. BRITT: Thank you Lydia. I know that Alma is really doing a great job of reaching out and coordinating directly to each of the groups related to the CBOSG, and I'm sure we'll take that input, Alma, and make sure that you continue to work directly with them.

MS. KITSON: Absolutely, Lydia. And thank you for your comment regarding making sure that we are acknowledging our tribal nations and our tribal governments for the LA Basins so thank you for your feedback.

MR. BRITT: All right. We are to just keep on schedule 'cause we do have a very full agenda today. We're going to go ahead and keep going. Go ahead, Marcia, we'll take you last. And then I just want to reminded everyone. As I mentioned, I would like to know more feedback on the whole idea on public awareness and how to engage stakeholders to educate and, you know, raise that level of public awareness. Again, today's meeting is not the only way to provide input. So if you have thoughts about how to do that, please send us an e-mail or send a chat later in the meeting or however you would like to do that. And you have until the end of this month to weigh in. So make sure it's incorporated into this study. And with you, Marcia, and then we'll go to the next subject.

MS. HANSCOM: Marcia Hanscom, Ballona Wetlands Institute. I just want to uplift and underscore the question that I believe I heard Lydia ask. I don't think she was asking for an being acknowledgement of the tribal groups. I think she was asking for making sure that there was going to be tribal consultation. And that's a different thing than simply doing a land acknowledgment or acknowledgment that they are the tribal people, but you know, I'd like to hear too, like, what are -- what has been done or is it just being thought of now. And what is the plan for tribal consultation?

MS. MARQUEZ: So, if I can take that, Chester, we have been in communication, but I think Lydia is asking us for transparency of the correspondence that we're having. And that's what we're going to make sure she has access to, as well as the group, if that's what you would like. This is all public information where we're having -- making sure we're in a full transparent process. And I, I did catch that from Lydia what she's asking for. So thanks for raising that question, Marcia, and making sure we are clear on what Lydia is

asking.
MR. BRITT: I think Amy -- you had something to offer about a previous comment.
MS. KITSON: Yeah, sorry. I just wanted to follow up on the ammonia question. Just in reminding you'll see it throughout all of our presentations, but I thought it was something that I should have stated along with the ammonia question is that we -- the Angeles Link commitment is green hydrogen. So it generated from water and renewable energy. So that is something, you know, in the environmental studies we'll go into detail on those, but did I want to remind everybody that that's our commitment for this project. And that as you see the studies keep that in mind as you're going through for your comments as well.
MR. BRITT: All right. With that we're going to go to the next subject matter now. Katrina joined us. If you want to introduce yourself, Katrina, she is our next speaker, and she'll be covering hydrogen 101. You know, one of the things we heard in our June meeting with you guys was that you would like for us to provide some kind of educational information about hydrogen. It was pretty clear that not everyone comes from the same background of understanding of what hydrogen even is about; how does it work. And so we wanted to interject that into all of our agendas going forward where we provide some level of education about the hydrogen process that Angeles Link represents. And so Katrina is going to give us that presentation today. And then following that, we want to hear more from you about other ideas related to this subject of what we could cover in future meetings, okay. So I'll hand it over to Katrina.
MS. REGAN: Thank you, Chester. Can everybody hear me okay? All right.
MR. BRITT: Speak directly into the mic.
MS. REGAN: Perfect, thank you. So my name is Katrina Regan. I'm the Engineering and Technology Development Manager for Angeles Link. And today we'll be going through a little bit of hydrogen. A little bit of my background -- I have a Civil Engineering Degree, and I also have an MBA and IT and in finance and a graduate certification in Renewable Engineering. I do want to make sure I note that we're going to talk about hydrogen today. We're going to talk about it in very simple terms because everybody has various levels of understanding right now that they bring with them. And hydrogen because it's based in science can get very technical very quickly in nature. So, we're going to keep it high level today. I'm going to hold back my engineering desire to get technical, and we're just going to cover the basics together, so. But like Chester said would absolutely be interested to know from you what other topics you'd like to hear about in the future so we can make sure we bring them up. All right. So what is hydrogen? So, and why does that matter too. Understanding the properties of hydrogen really allow us to predict how it will behave in a variety of different circumstances. So first of all, hydrogen is the most abundant element in the universe. 75 percent of the mass of the known universe is made of hydrogen. Let that sink in for a second, but then think about the world around us. Hydrogen is the third most abundant element on the surface of the earth. So this is something that is already all around us today everywhere. So it's very -- it's got some longevity, right? It is the lightest and most abundant element and it's the smallest as well. So those really factor in when we make our designs. But also along with being the smallest and lightest, it's non-toxic and it's non-poisonous. So, if you've ever smelled gasoline vapors before, gasoline can be toxic; but hydrogen is non-toxic and non-poisonous. So getting a whiff of it is okay -- it won't hurt you. You're all familiar with helium balloons, right? We all have balloons at parties. But it may surprise you to know that hydrogen is two times lighter than helium. And it's the six times lighter than natural gas. So so it is rising away from you at a rate about 45 miles per hour, which seems pretty fast to me. So hydrogen naturally wants to move and rise very quickly. And therefore, unless another roof or another structure contains the rising gas, the laws of physics prevent hydrogen from lingering near a leak or near people who are using hydrogen filled equipment. The hydrogen really just wants to disperse really quickly. So simply stated, to become a fire hazard; Hydrogen must first be confined. However, because hydrogen is the lightest and smallest element in the universe, it's very difficult to do that unintentionally -- you need to intend to do it. When looking at facilities where hydrogen is these properties are taken into account, and they allow for safety measures to be taken and designs are engineered to help hydrogen escape up and away from any operators in a case of an unexpected release. So the main take away here from this slide, is that all fuels are unique. They all have characteristics that we need to consider and hydrogen is no different from those in that manner. All right. So -- next, next let's talk about production. All right. While SoCal Gas will not be a producer of

hydrogen here are some terms you may have heard that might help you better understand how hydrogen is produced and why it's classified the way that it is. All right. So first, hydrogen production is often referred to in terms of color or carbon intensity. The color codes of hydrogen refer to the process or the source used to make the hydrogen. But they all produce the same hydrogen molecules. So hydrogen produced through green hydrogen, is still hydrogen. And the same goes for, for the other colors. But green hydrogen for example, would mean hydrogen that's produced using renewable energy and electrolysis. The colors on the slide, illustrate some of the more common forms of hydrogen but there are many, many others out there that are not listed on this slide -- and so there are quite a few production pathways to create hydrogen. So while colors my define the production process, we can go ahead now -- let's go ahead and talk about what carbon intensity is. Carbon intensity is a quantitative way to document your hydrogen production and the characteristics there of it. So carbon intensity really starts to define the amount of greenhouse gas emissions that are associated with your production process itself. So -- in the final decision that approves SoCal Gas to record costs for phase one activity, it identified what

type of hydrogen is acceptable for Angeles Link. And it used about two different requirements to define that gas, right? So we're -- the first one, is that the production method used must not exceed a standard of four kilograms of carbon dioxide on a life cycle basis per kilogram of hydrogen produced. So the easiest way to think about that is it's almost like the carbon footprint of the production process. So for every kilogram of hydrogen you produce, there can only be at most, four kilograms of CO2 also produced. Second, to remain consistent with the desire to use only renewable resources in the production of any hydrogen, Hydrogen produced using any fossil fuel would not be eligible for Angeles Link. So for example, something like grey hydrogen would not qualify for Angeles Link. So on this slide, some of these production pathways do qualify, some do not. And there are production pathways that are not shown on this slide today. The main take away here is that Angeles Link will carry only clean, renewable hydrogen that has a carbon intensity of four kilogram's of CO2 per kilogram of hydrogen and also uses one hundred percent renewable energy as the feedstock. All right. So next we're going to talk about two -- we're going to briefly talk about two hydrogen technologies that are pretty common that you're going to probably see

come up frequently. So the first is electrolysis. So this is one of the common ways of forming hydrogen, right? Electrolysis of water, is the process by which the water is split into hydrogen and oxygen using electricity. The hydrogen can then be captured, and can be utilized as a tool. It's a process that occurs within an electrolyzer. And there are multiple types of commercial electrolyzer available that have different types of specifications associated with them. Electrolyzers have been used for over one hundred years. So, while there's a lot of new technology that's currently being developed today to make them more efficient, this isn't really new technology. It's been used for quite a while. It's -- yeah, okay we're not going there. Okay. Here, so fuel cell technology -- this is another pretty common form of hydrogen technology. And a fuel cell often looks like a large basic, metallic box. A very simplistic way of thinking about a fuel cell, is that it works like a battery but it doesn't run down and it doesn't need recharging. They produce energy by converting available fuel like hydrogen into electricity. It's a device that runs hydrogen and oxygen through from the air through a process and it ends up generating electricity and heat, which can then be used. So if you've seen Toyota

Mirai's on the road, those are fuel celled, electric vehicles. So fuel cells can also be used in areas other than transportation, like as, a portable and emergency back up power. And the only tailpipe emission is water. But the vehicle is still considered to be electric -- there is no combustion occurring. The fuel cell was also invented back in the 1800's and it was started to use them as commercially in 1960. So again, while there are advancements making it operate even more efficiently; it is older technology still. Also, fun fact, it was used during the Gemini five mission on the -- by NASA on the World's Man Space Flight Endurance record. So this is technology that, you know, was using space and now it's being used in our cars today, so very exciting. Hydrogen pipelines -- oh, let's go to the next slide here. So hydrogen pipelines, right, this is what Angeles Link is. And hydrogen pipelines operate throughout the United States already there are over 1600 miles of hydrogen pipeline today that are in operation. Some of them are in the LA basin already, a lot of them are near the golf coast. So this is technology that has been in operation for quite a while. But most hydrogen pipelines today, are privately owned. And as Angeles Link, as it's proposed, would operate as a common carrier open access pipeline. Moving hydrogen long

distances via pipeline, has long been considered to be the most cost effective transportation method; which is why we've had so many hydrogen pipelines today privately. For the proposed Angeles Link, we would provide access to the pipeline for multiple producers of clean, renewable hydrogen and this maybe existing producers who are moving to clean, renewable hydrogen and it maybe also new producers. But ultimately, a common carrier open access pipelines allow third parties to connect to a system that has a public purpose and essentially move clean, renewable hydrogen to hard to electrify parts of the economy in a non-discriminatory way. Hydrogen pipelines have many of the traditional pipeline components, so they have valves, compressor stations, regulators. They're very similar to the existing pipeline infrastructure that we have today. Lastly, it's important to think about hydrogen as a complementary fuel -- especially in the renewable space. Move via pipeline, it's another pathway for renewable energy like solar and wind and it helps to de-carbonize -- it helps support a de-carbonized future, really. Where we de-carbonize all of the inputs to the electric system, and we do it in a way that's reliable and resilient. We need a reliable and resilient energy system, and that is something that Angeles Link and

hydrogen could and can play a part of. Thank you.

MR. BRITT: All right, thank you so much for that, Katrina. I feel like a hydrogen expert already. Hopefully that was helpful for some of you to kind of just get some background on some of those subject matters. It's very interesting to listen to Katrina go through the slides and explain how hydrogen is functioning in the universe. And then I'll bring it all the way down to the local level of, you know, potentially putting in pipelines and having it run through communities so that it can be provided as a fuel source for the different sectors that are hard to electrify. I want to know if there's any questions about what Katrina talked about, any clarifying questions. I also want to know if there's any subject matters related to hydrogen in future meetings that we might want to focus on so that we're providing you, again, these educational opportunities to get information that would help you understand what's going on. Enrique, you look like you might be lifting your hand up. But if you are, I want to make sure --

MS. MARQUEZ: And Chester, if I could just add. This was something that was requested from our June meeting; so that's why we included the hydrogen education 101 from Katrina, whom I think did a very good job of giving us just basic examples that we can visualize for this presentation. So thank you for that, Katrina.

MR. ARANDA: That's right, Alma, thank you. Thank you Katrina it's very helpful 'cause it's really taking that deep dive we all needed. I remember sharing with Chester at the last meeting that a few years ago I read this book, "A Hydrogen Bomb." So when I went to buy an EV, I didn't want to get the Toyota Mirai 'cause I already thought of the car exploding. And that's, I think that's a common fear. There needs to be a need -- with your questions about community engagement or more (inaudible) Chester. I think there needs to be a demystified hydrogen campaign. Especially, in communities of color and multi-lingual format. Because there is a fear that's very general and unless, unless you have the background you have, Katrina, most of us you fear the un-known. I think definitely in the Latino community hydrogen is like the big "coo-cuy" (phonetic) the big "chupa-cabras" (phonetic) no one wants to talk about -- but it's fear, thank you.

MR. BRITT: No, it's really important to think about, right. I was just mentioning even before the presentation today, that there's that movie coming out, "Oppenheimer", and I was thinking how ironic, you know, because there's an association with hydrogen and bombs. And that's really not, really -- it's not a direct correlation. And so, I think, you know, but there is those unfounded fears and misperceptions that are out in the community that I think that demystifying campaign is a perfect way of putting it, that would be very helpful to the process for sure. Because some people have concerns, and we should give them the information that helps them to not be afraid of things they ought to not be afraid of, right. Anyone else have any thoughts? Yes, Andrea.

MS. VEGA: Hi. Andrea Vega, with Food and Water Watch. One of the main questions I had, was where exactly would the water be sourced from for the electrolysis process, and have you estimated right now what the average water usage would look like for just annually.

MR. BRITT: So there is a section that is going to be coming up this afternoon talking about production and demand. And there will be also a section on routing as well. And so all of those things are going to help answer that question, Andrea, because the engineer that's going to provide that information, who's Yuri, who is not seating here yet, but he will be here. And he'll be better suited to kind of answer that

question and provide that level of detail. But, yes, that's coming today for sure. And if you want to say something --

MS. REGAN: Thank you for your question Andrea -- Andrea. Water is definitely something that we get asked a lot about, and we do have an entire study on water too. So that's something that will be presented on Friday as well, yeah.

MR. BRITT: Any other thoughts on what we might provide you for information related to the hydrogen process in future meetings? If not, we'll be creative and keep giving you our thoughts of what it would be helpful to know. I think Katrina did a fantastic job today just giving you, kind of, the 101. I know that was helpful for me to just hear and understand how hydrogen works. So many things in our life we just take for granted, right. We turn on the gas and it works; and we just assuming it should work and yet, SoCal Gas has been doing it for a 150 years, and I think that's some of the things -- yes, Jackson.

MS. GARLAND: Hi I'm Jackson Garland from Eco Action Club in Santa Monica College. I am a little bit still unclear on just like fuel cell technology. I think it's really hard to just, kind of, fully understand just from like a short hydrogen 101 presentation. And I know that there are some implementations of hydrogen where it does include combustion. And I just don't know if these answer -- I don't think these questions can even be answered right now. I don't know can hydrogen even be burned like a hundred percent by itself? But I don't know.

MS. REGAN: So I think there are different applications of hydrogen, definitely. We do have some really good information too on our website we can send out a whole link to part of our sustainability. It talks about fuel cell and there's a whole host of different questions -- but also, it answers. And that would help provide a little additional context and detail, I think.

MR. BRITT: And hopefully you can come back on Friday. I don't know if you're able to or not, but we are going to do that tour on Friday, which is part of the micro-grid that is out in the back parking lot here has a fuel cell in it, and they did a little bit of an explanation about that. I don't know if this is fair to say but what I -- my take away is the fuel cell kind of acts a lot like a battery -- in its simplest form of understanding it. So it's able to, you know, produce energy like a battery does electricity for hydrogen as well. So --

MS. REGAN: It uses an electrical chemical process.

MR. BRITT: Yeah, I'm not an engineer so I probably should not have offered that. But that's what my take away was from my tour that I did yesterday when we went out. And hopefully, if you get a chance to do the tour, you'll see the actual fuel cell out in the back parking lot and the process that makes the fuel cell work and then how the fuel cell is used to power the home as well.

MS. GARLAND: Thank you. I appreciate it.

MR. BRITT: All right. Well, if we don't have anything else -- do we have anyone online? Okay. I'm sorry, Alex, you have a comment, but I want to -- while I'm figuring out what your comment is on the chat, Robert, I'm going to go to you. You have your hand raised, and we'll take your comment if you could un-mute yourself.

MR. VAN DE HOEK: Okay. I'm un-muted. Can you hear me?

MR. BRITT: Yes, yes, we can.

MR. VAN DE HOEK: Okay. I'd like to add a little bit to the hydrogen 101 -- whoops, I made a mistake already, and this is a good teaching. The hydrogen gas or h2, 101 class because I'm a scientist also -- and background in chemistry and biology. And I've been called the Carl Sagan of -- science and also Bill Nye, kind of, science guy. Like, Roy the science guy. So, to popularize a little bit with what Katrina said. Even -- you as a moderator, too, have used the word hydrogen as a noun but without saying gas. We don't know -- it's not known what's being talked about. When the word hydrogen is used as an adjective, and you turn it into a noun. What that means is h2 or hydrogen gas, is what we're talking about when hydrogen is in a sugar molecule and taste sweet, then it's okay to say hydrogen because that's positive. Or when you smell an aroma and alcohol, wine you're smelling alcohol, which is hydrogen vapors; but not hydrogen gas. It's combined with oxygen. And methane -- when we say, methane gas, we're making sure we're saying there's carbon in it and it's important for people to -- it's not that hard, it's not rocket science to know the difference between saying hydrogen gas and hydrogen bonded with other molecules. We need to always have that clear. At what -- 'cause as you're talking to me, and I hear you saying hydrogen and then I hear -- I have to, like, sort that out and what that -- what that's actually meaning. And in terms of flammability, or explosibility and hydrogen it's safe, as Katrina said, but she mentioned just briefly that if

it's backed up or is not allowed to move freely then it becomes dangerous. And a small hairline crack in the rocks or a valve or monitoring device or where bolts are being used, if it's just got a little bit of tiny, little gap, it's still -- and the hydrogen is pressurized, it's still backed up. It's still going to be, always -- it's always going to have to be -- it does have to be honestly talked about as always dangerous to the public when it's contained, thank you.

MR. BRITT: Thank you. Did you want to say something, Katrina?

MS. REGAN: Yeah, thank you, Robert. Those were really good points. I did want to make sure that we're on the same page. All fuels are unique, right. And we have to consider those different properties, right, when we make our designs. So through the engineering designs, through our safety protocols and our, you know, for handling these things. We're doing maintenance and operational activities we do consider how the gas or how -- whatever the medium is going to respond and react and that helps us in order -- to make sure that our processes equipment, procedures, and designs are safe for the public and our operators.

MR. BRITT: All right. Thank you. We do have a chat from Alex that I want to read and maybe, Amy, you can address some of this. It says I hadn't heard that fuel cells produced heat until just now. How much heat is released and could that be a concern for communities living near large scale, fuel scale operations. Particularly in areas with an urban heat island effect especially during extreme heat events.

MS. REGAN: We do have a study that's gonna really go much further in depth on production. Of hydrogen and our demand side, you know, the usage and the end use considerations for hydrogen. We do know in cars, you know, combustion processes produce heat as well. It's a very common by-product of a lot of reactions -- and it doesn't pose an issue in any fuel cell vehicles. But that's not to say it's not something that can be evaluated further.

MR. BRITT: All right. Great, Katrina. And then, Alex, you also had another chat that I wanted to read. And I think this is the one that Amy might be able to have a response to. It says in response to the last section I would encourage you to consider not just the safety of your own transportation operations, but also the safety of the production facilities and eventual end uses. It seems that SoCal Gas is indifferent to where the hydrogen is made or ends up. Which, also raises concerns about hydrogen methane blending for power generation, which is unwise for lots of reasons just because SoCal Gas won't be the one storing or burning it. For me, you are part of this process and would still bear some responsibility for delivering it to those storage combustion facilities if something were to happen. So I urge you to consider the wisdom of the whole life cycle and not just your own contributions.

MS. REGAN: Yes thank you. Thank you, Alex, that was a good point and something that we should make sure to make more visible and point out. This is something that we do consider even as part of our natural gas system. Although, like hydrogen and natural gas, we aren't the third party that's producing. We do consider and have systems in place to make sure that those are safe before entering our system. And it will be something that we will consider with our hydrogen transportation life cycle as well.

MR. BRITT: All right. And then, we also have a chat from Rosalyn. Will Angeles Link carry hydrogen powered by bio gas or hydroelectro -- hydroelectric or what about hydrogen that might count as renewable energy through carbon accounting?

MS. REGAN: Thank you. That's a great question. And I think that's something we're all interested to know more about because there are so many new emerging technologies in order to produce hydrogen and keep the carbon intensity very low. And also make the most use of the renewable resources that we have around us in an efficient way. One of our studies is focused on production. And Yuri Freedman will be talking about it this afternoon -- further, and I believe a component of it is exploring the different options for production pathways that will apply for Angeles Link.

MR. BRITT: All right. Yes, Jackson.

MS. GARLAND: Sorry. Jackson Garland Santa Monica, Eco-Action Club. I just -- it's just one thing about the presentation. I heard it really quickly. Could you remind me of the kilograms, like, that will be produced of hydrogen from water? It was mentioned very briefly.

MS. REGAN: Yeah, one of the requirements from the final decision, for the gas that will be in Angeles Link is that per kilogram of hydrogen produced there's only four or less kilograms of carbon dioxide produced. So it's a four to one.

MS. GARLAND: Okay. Cool awesome, that will be it. Thank you.

MR. BRITT: Yeah, no worries. Anyone else?

All right. That was a really good the discussion, actually. I really enjoyed that. I want to now switch. We're going to our next subject matter, which is workforce planning and training evaluation. Amy, I believe, you're up next again. And we'll have another presentation followed by discussion.

MS. REGAN: Yeah, thank you, Chester. So the next study is, like Chester said, is the Workforce Planning and Training Evaluation. I did similar to, kind of, a theme. You'll see with our first few studies is, you know, SoCal Gas has a strong existing workforce of over 8,000 management and represented union -- an extensive maintenance and operation and background so because of that we plan to leverage a lot of that workforce, as we look forward to the future in implementing our hydrogen infrastructure. The objective of this -- of this study is to assess our current workforce and internal training standards compared to the future potential workforce classification and training needed to strategically build transfer and transition workforce to maintain an operator -- operator hydrogen infrastructure. So similar to our safety standards that we were chatting about earlier. We were looking at what other procedures or standards and training that we need in place to move forward from moving transitioning to natural -- from natural gas to hydrogen. Some of the -- to go into a little more detail specifically at what we'll be looking at with this study is our operation and maintenance protocols. So we will be looking and reviewing and providing guidance on specific topics on our current operation and maintenance protocols and what may also need to change and also what is existing in the industry already for hydrogen O&M procedures. Secondly, we will look at department of transportation and other construction qualification protocols. So, this is actually putting the pipeline in the ground and in the field to design in construction requirements including welding, weld fluck (phonetic) criteria, pipe specifications. I think some of those came up earlier in some earlier questions. What type of materials and then what associated training differences might be needed for those. And then we're looking at the timeline for this workforce staging. So as we move forward in looking at the Angeles Link project as a whole, what type of timing do we need as far as for our training and to start on boarding our different folks. So this is an area that we've already started working with different organizations, and we continue to look forward to working with others. Such as the LA Urban League, Ulta Sea (phonetic), Advantis Academy (phonetic), AQMD and others that are very interested in working with us on this endeavor. And we're specifically LA Urban League and Advantis Academy are looking for in our disadvantaged communities and training; green energy jobs in those communities. For SoCal Gas, and the other surrounding companies for those green energy jobs. We're supporting those in a number of ways. We're looking -- we're helping develop the curriculum. We're helping with the tour your going on, on Friday. Like we offer that to both our community groups and students. And looking at guest speakers or helping them with mock interviews. There's a number of ways that we've started to engage and are very open to engagement with other community groups if you have any suggests. And then the next thing we're going to be looking at, is comparison to existing SoCal Gas facilities, I believe, this will come up again in the routing discussion as well and came briefly for the safety. But we are looking at what current natural gas facilities we have and will be used as a basis for applicability for hydrogen. It's not -- it's not just pipelines or other facilities as well. And then we're looking at accredited training programs for hydrogen for our employees and third party companies that will be supporting us in operations or qualifications. And we started to educate our employees, like similar to what Katrina just gave, a hydrogen 101. We're starting that process internal to our company as well as far as -- and as long as further technical education. And then finally, the risk of management overview of this whole process. So to review our current practices and workforce in areas that we need to make changes and then prioritizing those changes. That's in a nutshell what this study is going to, to cover. So, any feedback that you have on that would be appreciated.

MR. BRITT: Great. No, thank you so much, Amy. In our last meeting in June, there was a robust conversation that we had about workforce training and job creation and the need for local training and opportunities. I think Michael Fisher was real vocal about that and even suggested having like roundtable discussions with folks at his congregation about that. So I want to build off of that idea and thought process on this subject matter. Like, what are the thoughts about workforce, planning and training that you would like to make sure are addressed in the study so that we're capturing those things? Enrique, Melissa?

MR. ARANDA: Thank you Chester. It's always helpful to see the responsive nature of the formatting, however, I see a lot of elements from some of the points

that Reverend Fisher, and I brought up. More specifically with the over all, I guess, architectural aspects of a robust community benefits agreement. And us as being active participants in that -- design process. We talked about permanent job creation,a project labor agreement. It's good to hear that you have marketing units that are already working with SoCal Gas. However, that excludes the community that we haven't had access to those types apprenticeships or permanent jobs -- a local hiring provision. And more importantly, I think, leaving those dollars in the community is most adversely impacted or effected by this project and that being local businesses diversity and procurement to ensure that local businesses get a first round at any, at any revenue or any dollars allocated for this project. So, I think in general just having a process in place that allows us to be part of that design process will be not only appreciative, I think it's going to go very far in having support and minimizing any -- or opposition.

MR. BRITT: Yeah, Amy, do you want to address that in how that might be addressed in this study?

MS. REGAN: Yeah. That's that's a great, great feedback. I do want to say as a start, SoCal Gas has diverse business -- 43 percent of our capital spend is is diverse business. So that's something that we take very seriously, and we'll continue to look at throughout this project. And as far as, the community engagement where -- like I said two -- specific -- at least two of the programs that we're looking at for -- students as well, as workers from the disadvantaged communities. And we will continue to look for those and any feedback or other opportunities that you have for us, that we're very open to working towards. That's very important to this.

MR. BRITT: Marcia.

MS. HANSCOM: Yeah, Marcia Hanscom, Ballona Wetlands Institute. I -- I heard at the last meeting. Several SoCal Gas executives saying that you're completely committed to getting us off of fossil fuels to, you know, to those the Governor's goals in that regard. And so I'd like to suggest that there be some formal outreach to the oil industry. I mean, it's just not gas, it's oil as well and that, you know, those are, those are the folks the workers from that industry are the ones that come to the hearings constantly opposing us who are trying to move us off of fossil fuels and it's because they are fearful of losing their jobs. So I'm hopeful that you will include that in your just transition from the entire fossil fuel industry if this is the way you're going to be going.

MS. REGAN: Great comment.

MR. BRITT: Yeah, great comment. We actually had Ernie from one of the labor unions yesterday at our planning advisory meeting. He made a really strong point about how there's a lot of workers that are working in the industry now that are looking forward to the transition into these new sectors. And that the training programs and all the things that Amy was talking about are going to be very, very important for that to happen -- so great comment. It's not something we haven't heard before we did here yesterday as well. Did someone else have their hand raised? Yes, Luis.

MR. PENA: Yeah, Luis Peña from the LA and Business People Alliance. I guess for me, growing up in Boyle Heights, East LA. Would be an encouragement if or suggestion for, for you to partner with local training centers -- like the occupational -- East LA Occupational Center or the East LA Skill Center in order to -- you know, open the door or have access to local communities around the area to, to access these training programs.

MR. BRITT: Yes, and again. Something we heard yesterday for sure and, you know, that's exactly the kind of comments that we're meeting today to hear. Is so that those types of things are addressed specifically in the studies. And it's not just an idea but we're actually gonna put some implementation action items to those ideas and make sure those things happen. Absolutely.

MS. REGAN: And if you have any suggestions on ones we should partner with -- please.

MR. BRITT: Yeah, any specific. I mean, we're getting a lot of general comments. Which, we're obviously documenting, taking but as a follow-up, if you think, oh, they should be working specifically with this group or that group, please forward that information we'll make sure that information gets into the studies as they're being done. Okay. We have some hands raised online. It looks like Kenta -- if you could un-mute yourself and make sure you state your name and your organization, thanks.

MR. ESTRADA-DARLY: All right. Hi everybody. I'm Kenta Estrada-Darly with the Coalition For Responsible Community Development. Community development non-profit in South Los Angeles. So choose to echoing some of the stuff that was shared already. I think with the -- the workforce planning study; and this may overlook with some of the other studies that are more around like equity and impact on community. I

think this was said but just outlining the number of new jobs that is projected to be created. And then different options as far as project labor agreement, or like whether this is projected to be union work that would fall under a PLA or so -- what are the different options as far as local hire or project labor agreements or community benefited agreements that would allocate a certain number of jobs and business to local communities? And then just on the second question around trained -- workforce training entities. We are a work source center in South Los Angeles, but there's a whole network of work source centers in both the county and city that I think one would plug into this and also be interested in the current efforts that are going on -- that were mentioned.

MR. BRITT: Again, thank you so much for your input. I don't think there was a question there, but we took your comment and Amy is nodding so I think a lot of the things you mentioned are obviously going to be addressed.

MS. KITSON: And we do plan to have the temporary and permanent jobs that will be created but that's an excellent point that should be pointed out and that will definitely be in the final report.

MR. BRITT: Any other thoughts about how we can make sure that the local communities are benefiting from this project? Robert? We have a new hand -- I think, Robert, you've raised your hand. If you can un-mute yourself.

MR. VAN DE HOEK: Okay. I'm un-muted. Robert van de Hoek. I'm actually a 20 year union SEIU 721 service industry and (inaudible) Stewart. And our union is very democratic, very ethnic, equity based. As you can imagine in the service industry you have every ethnicity and gender involved as that includes so many different service industries. And -- but other unions are real small unions. Electrical unions, plumbers union, fitters, welding. These unions are not equity based. These are still very biased towards white men. With hierarchy that sometimes will have a minority or a woman showing to say we're doing that; but it's not really that. And given that there's a lot of that kind of work that's going to need to be done. My question is how are you going to present that to the public and say you're going to -- have the unions that are, that are -- that don't have this biased from their historical (inaudible) documentaries that in educational on that -- not that's not going on with our unions, and when I did -- when I heard the number 8,000 unions. Is that -- was that 8,000 employees who were at unions? That really raised an alarm for me.

MS. KITSON: Well, you know, we have eight -- well our current company is 8,000 strong but it's management and union, so.

MR. VAN DE HOEK: Okay. Well, again my question is, you know, how are you going to, like, find a pathway so that you aren't going to pick your traditional plumbers union or electrical union that you're going to have like a -- maybe a gas company can support having an all woman's electrical union. Where no men, no white people are allowed in the union so that we start to see that it's equity based, honestly. Thank you.

MS. KITSON: Yeah, that's a great question, Robert. So one of the ways -- so we look back to the unions that we outsource to or the contractors and the consultants that we outsourced you. Again, 43 percent of that spend is in-diverse, in-diverse -- either women owned or diverse owned businesses. So that is something that we actively look at from that perspective. And then I will say, you know, back to even our employees that we mentioned, right. That, that diversity -- the diversity of our own current company employees mirrors that of the communities that we serve as well so. Definitely appoint that we will take as part of the study to continue and we can always do better. But it is something that we actively take very seriously as a company.

MR. BRITT: All right. Again, good conversation. Any other thoughts before we leave this subject matter? All right. I'm going to suggest that maybe we take a five-minute break or ten-minute break. Give everyone a chance to fill up their coffee, get some water or some food. We are bringing lunch. We have one more presentation before lunch and it's the presentation on routing and configuration, which I think will be a robust conversation. So if we take a five or ten-minute break that will give us plenty of time to have that presentation and a full discussion before we get into lunch. All right. So right now it's about -- almost ten to 11:00. So let's just meet back here at 11:00 and we'll start into the next presentation, thank you.

MR. BRITT: Okay. I think we're almost to get started. A couple of items just coming out of the break that I wanted to make sure I mentioned. One of them is some of the issues that have come up related to water -- I had for gotten that actually when we did our survey at our last meeting, water did not come to the top of the priority list for the CBOSG so it was not on our list of subjects that will be covered on Friday. If you want us

to add it, we could add it. We're also going to have presentation today on both the routing as well as production and demand, which we can answer some of the questions you have related to water. So maybe we don't have to make that decision right this very second. But maybe towards the end of the day, we can take a poll again to see if you'd like us to add water for Friday. But we will try to address as many of those water issues as we can in our presentations as part of today's meeting, okay. The second thing I wanted to point out is although, we are having the tour on Friday, which is the full tour involving going into the demonstration house as well. Jill was pointing out to me, and I knew this too, but I just had forgotten. That the micro-grid, which is along the side of the house, has TV's that are set up as stations for each section of the micro-grid where you can literally do a self-guided tour and push on the screen and get information -- it's really well done. And so, I think, because on our agenda today we did have originally the tour incorporated into it in terms of timing, and we had a very short lunch. We will extend our lunch after this presentation to an hour and allow you to do the self-guided tour today, if possible. You won't be able to get into the demonstration house, but if you would like to see the micro-grid and some of the things, Jackson, that you were mentioning that is available. We will have staff that can go with you and try to answer as many of the questions as we can during that self-guided tour. So I forgot that that's available, but again, just another noteworthy thing to add. So with that, I think we're going to -- oh, I wanted to make one other point. A lot of this -- this came up yesterday as well. A lot of the studies that we're doing are inter-related in some way with other studies, which is not surprising, right. And in some ways certain studies can't be done in isolation without the benefit of the other studies being done. And so, there is that overlap that happens, and I think you're going to see that in this presentation, which we are going to be talking about routing and things like. And then there's the issues of equity that we've already heard and things that come up in that the discussion, and I think we're not ignorant of the fact that these studies are inter-related. We are making those points getting that feedback and making sure that our studies are informing each other so that as the studies are done they get the benefit of that other information, and I think I just wanted to point that out. So with that, I think I'll turn it back to Amy, and she will go through the next set of slides related to the transportation routing and configuration analysis.

MS. KITSON: Last thing you'll see Katrina and I first thing -- no, so -- all right. So, the next study that we're going to go into is Routing and Configuration Analysis. And like Chester said, this is probably one of the ones that feeds in to itself in a lot of different studies. So a lot of studies feed into this one and then this one informs a lot of other studies. So we will do our best to answer your questions along the lines that you have today, but there's a lot of -- justice environmental studies that are on Friday that will probably answer additional questions as well. So just, kind of, keep that in mind as we go through. So the -- the routing approach that we're taking, I do want to remind everyone up front a little bit first is -- when we did our application that Katrina mentioned in the Hydrogen 101 for Angeles Link, we had some reports that we affectionately call the spec reports. Spec services put those together for us to help inform the application. It's on our website on the Angeles Link area, and you'll see those reports in as part of that there's ten different routes that were high level routes that were put together for that. So we are using those reports to inform now this next study and going into it a bit deeper. So those reports aren't limited, you know, the routes that we're going to be looking at aren't limited to those. But we're aiming to move from that Macro system approach to now more of a system level evaluation to identify specific opportunities that we would want to target to build out Angeles Link first. So at the end of this phase one report, we aim to present several preferred routes that we would like to move forward with. The routing study is broken out into three areas. So, we have the pipeline routing and constructability factors. And so, that -- I think Faith was talking a little bit about -- like geotechnical and earthquakes and other, and other considerations. And that will be part of that part of the study. So again, we're looking at a lot of our existing pipeline right-of-ways and current routes along pathways that we currently have today. But as part of that, we have a lot of data already both from a geotechnical perspective, but both communities populations like what we call identified sites that we have for our natural gas pipeline. So that will be in consideration as we look forward to those. The second part of the study, will be a potential production and storage locations. So Yuri is going to talk about production after -- I believe, after lunch now. And

that will, again, that's one of the studies that's speeding into it. So we need production and we need demand centers along our route to be -- for it to be a preferred route. So that's something we're looking at as we discuss third party storage locations both mainly in the state of California and then there are some storage locations just over the border that, like, longer term could be of consideration for the project. And then finally, potential demand locations. So where our big demand are and then, again, that study is going to be in more detail after lunch of the specific sectors that we're looking at for the demand locations. And then -- yeah, just broken down further what we just talked about so the constructability these are specifically some of the things that we're looking at. And I mentioned this yesterday, and I'll mention it, again, here today. A lot of the lessons learned that we've learned and built our pipeline system over time. I mean, we've been in operation for over 150 years and we've evolved -- and it's very exciting, for us, if we do build a brand-new pipeline system that we can gear it towards all of those things that we've learned from both the constructability perspective, as well as safety and other safety -- you know, such as beveling or material type or, you know, location. So we can kind of build

this with all of those 150 years of lessons learned in mind, which is very special for us. And then in addition to that, the evaluation criteria that we're looking for our routes, specifically, for this groups interest is -- there's an environmental and social as part of that, as well as engineering. So that is something that's being fed into the system and then the selection so -- what we're doing with all of these different factors -- it's a lot of factors. So 34 different factors that are building into this route. And then we're going to weigh them all and then take them into consideration to ultimately spit out our preferred routes that we would prefer. All right. So that's it as a high level, and I'll hand this back over to Chester for -- questions on the routing.

MR. BRITT: All right. So, now we're getting into the local levels when we're talking about the routing. Enrique, I want to make sure we go back to you and your question about the court orders and, you know, some input that you might have about that. Anyone else that has any comments online or in person? We want to make sure we get your comments as well and address those. Amy covered a lot, a lot of categories -- one of the things about, you know, the routing and configuration is the local perception of construction

challenges, right. When we're talking about building infrastructure, there's always construction related to that. And then after the construction is over, there's actually infrastructure project that exists whether above ground or below ground you have to cover span sometimes. You're covering, you know, existing washes or intersections or whatever it is that you need to cross. And so, there's a lot of those types of things to consider so I want to make sure that all of us have a chance to weigh in on this subject matter. 'Cause I think this is one in particular that all of us can relate to, and I want to make sure we get everyone's input. So, I think -- does somebody have their hand raised? Lydia, I believe, in the comment you typed a comment says what's the timeline to decide the routes?

MS. KITSON: That's a great question, Lydia. So, our timeline is the entire phase one timeline for Angeles Link. So the twelve to eighteen months from when we began the study. So, you'll start getting preliminary information from this group as we go, like Chester said, throughout the year. It's not the last time you'll hear from us, but the final proposed routes will be, you know, towards when the designs or when the study is wrapping up -- towards probably like the beginning, you know, end of this year beginning of next

year where we'll start having the preliminary results and then the final report will be mid-next year.

MR. BRITT: Yeah, so I just want to capitalize on what Amy just said. I had neglected to mention that or just remind you guys, I think we brought it up in June. But this process that we're going through this week with you is really focused on scoping methodologies making sure that the inputs that we get from you are incorporated into the technical process. There are some preliminary results that will be coming in the fall, which will be coming back to you with and making sure that we get the opportunity to share some of that with you and get your feedback on what we're initially seeing. And then as the final results to these studies begin to trickle in, late year and early next year, we'll be coming back out to you again and presenting those results to you again. So, this will not be the only time that we're going to be talking about these subject matters. But, again, this week we're specifically talking about the scoping and methodologies that we're incorporating into the process to make sure that we include that. So, related to Lydia, your question. You will be given the opportunity to oversee and review and discuss prior to the final routes being decided. So that specifically answers, I think, your

question on that.
MS. KITSON: I just want to add on to -- like when we talk about final routes. So, this is phase one so, like I said, there will be several preferred routes coming out of that. And then phase two will even go into a deeper dive to looking at those and solidifying them more. So I just wanted to --
MR. BRITT: Yeah, a really good point. Along with the environmental process to clarify those. Enrique?
MR. ARANDA: Thank you, Chester. As a stakeholder, I just wanted to recognize how important it is to have a community engagement process driven by two (unintelligible) like Arellano and Lee Andrews Group that do so well in engaging the public. And you both work -- both firms, respectfully work with not just community engagement mechanisms but more importantly a participatory process in size selection and the build environment. We'd like to see that in the same vein happen here. We like to be just like we are now in terms when it comes to configuration and route selection how do you engage us in doing so. And I know that's why we're here, but it needs to get taken to another level. Along with you (inaudible) I wanted to not get off course, but you mentioned water, and I think like some

of the cities like where we are now. (Unintelligible) city's you have so many jurisdictional issues with water agencies from WRD to a small mutual waters and city like Maywood and Carahey (phonetic) it's important to really work with these small agencies and not forgot them. I know Frank was here and work for all the different governmental entities but it's an important factor. And just, one last thing, Chester. I think it's really important -- when you look at (unintelligible) mapping, you look at the communities that will be effected by the route selection. Just really consider philanthropy and there's been a lot of substantial investment. Basically, investment done by foundations like CCF and California EnDownment and First Five LA. Looking at environmental factors, looking at health, and looking at wellness, and I just want to bring that up to the forefront to be, to be considered as you go along. So, thank you.
MR. BRITT: Yeah, appreciate that input, Enrique. And I don't know, Amy, if you want to weigh in on that, but I'll just say that I know SoCal Gas is committed to a robust communication program as more detailed information is, you know, presented through these technical studies to make sure that's, again, engaged with the public in a dynamic and meaningful way.

Okay. Okay -- I think, Lydia, you've now raised your hand. So we want to make sure that we get to you. So, if you can un-mute your microphone, we should be able to hear you and you can make your comment. Lydia, are you there?
MS. PONCE: Yeah, it took a split second for the host to un-mute me. I thank you for the opportunity.
MR. BRITT: I'm sorry, Lydia. I'm sorry, could you just announce your organization.
MS. PONCE: Yeah, Lidia Ponce Society of Native Nations. It's exactly my point -- the gentlemen, Enrique, who was speaking. I -- you know, we're not on the Madonna name or share, you know, famous namesakes. I would like to know in the room who is speaking equally because I don't know -- Enrique, I haven't had the honor or the pleasure to meet you yet. However, when people in the room are speaking, I really don't know your names, and I would like to learn them, thank you.
MR. BRITT: Absolutely. We'll do our best to make sure we announce who we are. Jerry --
MR. SALCEDO: Hi Gerry Salcedo Southeast Riverside YMCA. Just question, I know -- I understand that we're under phase one. But can you -- are you

believe to share those potential sites that you're looking at now. 'Cause I'm sure there's sites that you're looking at, and I know that the -- we're going to be part of the decision of the routing and stuff but is there -- could you just share the current sites that you're potentially putting in the pipeline at.
MR. BRITT: Good question.
MS. KITSON: Yeah, that is a good question so -- I think what we can share is, at least on a macro level, is the those spec routes that I spoke of earlier. If you go to the Angeles Link section of SoCalGas.com, you can see those ten potential routes, and like Chester said, we're still just getting this study off the ground and scoped out so that's probably the best we could provide you today 'cause we're using that as a basis to narrow it down and then I will say -- as we start talking about the demand and production and other things that will feed it -- that will start, you know, pairing down where -- which sites we use. We don't have anything more detailed than that to share with you today. But I think that if you went there, it would give you at least a visual of where we're looking.
MR. BRITT: So, Amy, can you -- 'cause this helped me when I was starting to understand the route discussion. In any route you need a point A and a point

B, right. You need a source, and you need an end use or where you were going. And I was originally struggling when I got involved in this process of like understanding. Well, where is point A and where is point B. I think there is some uncertainty where our point A is, right. Where is the source. It has to be attached to water, it has to be attached to renewable energy and that is really part of the why we can't give definitive corridors right now 'cause we don't know where point A or point B is definitely. But can you speak to that maybe more and help illuminate a little bit more about that.

MS. KITSON: Yeah, thank you, Chester, yeah. So, when I keep saying demand and production that's the point A and point B, right. So when Yuri speaks after lunch, he's going to be talking about those production sites. And when we say, "production" it's those green, renewable, solar farms and water areas and then the demand would be the customer side. So we kind of need an idea of what -- where those two points are to know where best to route the pipeline .

MR. BRITT: Yeah, does that help, Gerry, to answer. Yeah -- so, I mean we don't definitively know yet. We know -- I guess, Amy, is it fair to say that you know generalized corridors that would be useful

based on 150 years of, you know, routing natural gas pipelines, you know, where the corridors are that would work or not work where the urban environments are, you know, there's a lot of opportunities in certain corridors and not opportunities in other corridors, is that fair?

MS. KITSON: That's fair. And especially so back to those initial routes a lot of them were built off of our initial pipeline right-of-ways -- we're trying to utilize as much as we can so we're not, you know, disrupting communities outside of what we already do. So a lot of those initial routes were built off of that -- those corridors. And then, there was a very high level preliminary point A and point B, you know, as part of your initial application for Angeles Link. And then that's just going to get further refined so that we know where to begin and built out a system that's best of use to the customers.

MR. BRITT: The other thing that was in the presentation in the package that we presented to them, was related to a potential of storage technology both above and below ground. And I was just curious if maybe you could, again, share some more information about that.

MS. KITSON: Yeah, so as part of the study that

we're having our consultant look at, it's both storing the hydrogen above ground, which you could see when we go out after lunch to see the hydrogen home. And you'll see there's different storage tanks -- and it's like what -- the hydrogen filling stations use. In a smaller scale, obviously, and then also the below ground storage. There's a lot of industry data that's been done on below ground storage and salt caverns, which California does not have. But as an example Arizona and Utah do. And there's further studies going on currently with underground storage in other capacities that SoCal Gas is participating with Stanford and other industry -- national labs and other research entities. So that's something that's continually being evaluated. And that will be part of the study as we go, and I think as we move forward into phase two and three we're going to continue to get more information 'cause that's something that's still very new to the industry outside of salt caverns. I'm (inaudible) other storage perspective.

MR. BRITT: Faith, did you have a question or comment?

MS. MYHRA: It peeked your curiosity.

MR. BRITT: That's my job. Is to get you to ask questions.

MS. MYHRA: My question is around when it

comes to routes. And this is, you know, coming back to what Sidney was asking -- talking about earlier. You know, a lot of the traditional routes that we have laid down on the grid we've laid down, was made in a very different Los Angeles -- a very segregated Los Angeles. So by nature, it is still a very racist system that we function on every day. So when you are talking about going along routes that already exist, is the team like looking into well, you know -- is this really where we should be laying down. Are we perpetuating this system that's been here a long time and caused like, you know, unimaginable amount of damage to the city and the people in it. So I was just curious of what your all process is for that?

MS. KITSON: That's an excellent question, so. I know that I've been saying that quite a bit, but it's not the only thing that we're looking at. You know, so when we get these point A to point B demand centers; There maybe a better preferred route that are along our pipeline route that will be looked at because, essentially, we're trying to make the most efficient, you know, pathway. For when we -- when we find that.

FEMALE UNIDENTIFIED SPEAKER: Amy, can I just ask this clarifying question. You said that there was some routes that folks can look at, and I believe we're

going to be dropping that in the chat so folks can see some of those routes that --

MS. KITSON: Right.

FEMALE UNIDENTIFIED SPEAKER: Let's call them alternatives for now or -- I don't know what your calling them.

MS. KITSON: I would say super preliminary, right.

FEMALE UNIDENTIFIED SPEAKER: They're preliminary, right. So that would be helpful as folks are diving more into this structure that we have in place.

MS. KITSON: Yeah, absolutely. I always call them preliminary because that's what we put forth as a justification for even getting phase one approved of Angeles Link. And then we're taking that and diving in deeper.

MR. BRITT: All right. Anyone else have any thoughts on this subject matter? What about -- I'll ask one more question of Amy. I have questions so -- Constructability -- is a big issue in construction methods. We talk a lot about infrastructure and there's a lot of techniques in construction that have changed a lot over the years and how you build things is a lot different than how you used to build them. And things like open cut, trench vs. Trench-less, you know, our big deals. I know I work on our frameworks on the purple line where they're digging tunnels, you know, under Beverly hills of all places. And, you know, things that were wildly impossible a long time ago are very plausible now. So can you just talk about, talk about constructability and maybe some of the tools and techniques that might be considered as part of this process?

MS. KITSON: Yeah, that's a great point, Chester. And you gave great examples, too. Obviously, when we -- a lot of these lines to face point back when we were initially laid down we didn't have all these building and homes and everything around these lines so it was just very easy to just dig and open trench and lay down the pipe. That's not the case today, and it's very difficult with the different, you know, intersections and busy roads and freeways and things that we have, so. To Chester's point, there's different methods that we can use to bore in pipes. And it's a lot less disruptive to everyone that's around it. And you may not even know that, you know, that maybe, obviously, communicated to you. But it wouldn't be disruptive in your daily life, like, if you were working from home or around with your children. So, we are looking at all of those different methods and the different communities and what would be best -- the best method to do that. To have the least disruptions to the communities that would be in those areas.

MR. BRITT: All right. Yes, Sydney, please.

MS. ROGERS: Sydney Rogers from PESA, Parent Educators, Students in Action. Are you telling communities when you're going to be digging in those communities? How much warning are you telling them, are you giving them months in advance, 24 hours in advance, years in advance? Are you telling them how, how deep are you digging in those communities, how close your digging in those communities? Those kinds of things. You know, if someone's property is -- are you digging, like, hey, we're going to be digging like six feet from your property. Or, hey, we're going to be digging 30 feet from your property. Or we're going to be digging in this park, you know, next to the YMCA, you know, that kind of thing. Or, or is it being done at night, you know, while sleeping? Or we're doing it at 3:00 o' clock in the morning, you know, before you go to work? You know, those kinds of things. Like what kind of notification? Is it done online, where people don't have Internet? Or is it done through notification through mailings?

MS. KITSON: I'll do my best to answer that 'cause I'm not necessarily the one that does the notifications, and if anyone else --

MR. BRITT: I can actually chime in, if you want --

MS. KITSON: Yeah.

MR. BRITT: So, just a reminder. We're in phase one of a multi-phase -- potentially multi-phase process. So we don't even have the approval to get into the phase two yet. CPUC will make that determination at the end of phase one. So what we're doing in phase one is feasibility studies, and I think Amy mentioned earlier that at the end of this process, we might end up with one or two alteratives that have, kind of, been refined or narrowed down. The next phase will allow SoCal Gas, if they get approved to go into it, to do the full environmental process that would clear that. And the environmental process, one of the purposes of that is to figure out exactly all those answers to the questions that you brought up. Like, how would you construct this, how long would it take, how many phases of construction would there be, what kinds of impacts would be associated with that construction, what displacements might be needed in order to make this project work? A lot -- there's a whole list of

technical things that have to be done as part of that environmental process. At the end of that process, again, would be another approval process for the CPUC to approve to go into the actual construction of this project if it was to get constructed and funded. And that would then lay out a whole another outreach process, which would also then be very detailed in communicating exactly the types of things you're talking about. Road closures, detours, access, times of work, if there's any expected, you know, mitigation measures that need to be implemented to prevent dust, vibration, and all of the things that are common with construction. Those things will all be answered, and to specifically answer your question, there will be meetings held with the general public around those corridors way in advance -- both through the environmental process and once you get into the approval of the construction process where you would have multiple rounds of meetings and, you know, you would explain the process for construction, how long it's going to take. There would be probably interactive maps online that would show the process and a lot of details that would go along with that, yeah. So there's a very robust process in general I mean, all those decisions haven't been completely been made. I can say speaking, as an outreach professional for 35 years, I work on infrastructure projects all the time that go through that exact process. And, although, this is hydrogen and it's a little different in terms of it is. The process for communication is almost exactly the same. Yeah, yeah, yep. Anyone else have any thoughts? Luis.

MR. BRITT: She can walk all the way around or Alma could just hand you the mic.

MR. PENA: Check, check. So Luis Peña, LA Indigenous People's Alliance. Not sure if this was touched upon before. But it just kind of popped into my head right now is -- I can imagine the grid right now for gas is -- you know, very extensive. So, is the idea to is to wean off certain sections and introduce hydrogen or are you just gonna try to, like, I guess, you're talking about phase three or I don't know what phase that would be at some point. But in the construction process of the routing, like, if you're -- if I'm capturing this correctly, maybe you utilizing what's already being used for gas and you're just transferring into with hydrogen and then just weaning off certain sections already with hydrogen and then move on to another section and then maybe retro fit it or install new pipelines for hydrogen and then replace gas with hydrogen and then just keep going doing that in different sections in different regions? Is that the idea?

MS. KITSON: Yeah, I understand your question, thank you. So one of the -- the things that we are looking at in the routing is to -- for our new pipeline or repurposing. If we repurpose, then yeah, it would be switching from a natural gas to hydrogen. Likely, it will be new but it's definitely something we're looking at. I keep saying, "repurposing right-of-way" so it might be, you know, that might be an option with steel new pipeline in there, instead of repurposing the existing. But we are reevaluating all options at this time.

MR. BRITT: Yes. And then, again, the environmental process would be very detailed in whatever those decisions are and that would be communicated to the general public and the ability for you to understand it and weigh in with any inputs during that process. We also have someone online who chatted, Alex, you wrote companies often try to cal locate industrial facilities, pipelines, because it's considered easier and less disruptive because these are already polluted in industrial areas. But the communities that live near those sites are already bearing a disproportionate burden of our energy pollution. Can you talk about how you'll do things differently to ensure that we are not perpetuating the environmental injustices of the past and doubling down and already pollution burden communities.

MS. KITSON: Yeah, so that's a great question, Alex. I'll answer it -- and then I will -- within the routing and then I will also say that it will be covered in more detail on Friday in the environmental justice area as well. So we're committed to reducing the potential environmental impacts of both, like, we were saying earlier the construction operations particularly with an environmental justice communities. And we're taking that as you saw as one of the big factors that we're looking at as we're looking at these routes. And we're evaluating those routes with that in mind, and then, as I stated, the more specifics on how we're looking at that, is going to be talked at on Friday during the environmental justice portion. And that is something that we are talking about, as well, as we move forward. And if that's feedback from the group if you would prefer the routing and the environmental justice topics to be, you know, same day or talked or closer together so that we're not, you know, hunting to it an on a different day, we're open to that feedback as well.

MR. BRITT: All right. Jackson.

MS. GARLAND: Jackson Garland, Eco-Action Club. I'm trying to understand, just kind of like, I just kind of want to hear more about expanded on like reusing -- so are you reusing more of the routes just for the pipelines and then, like, constructing, like basically, like new pipelines entirely and limiting like reusing? And for a lot of this, too, because I -- this is definitely separate from hydrogen fuel cell. I'm making the assumption -- like -- I'm still trying to understand the, like, the efficacy of the transportation of hydrogen as well.

MS. KITSON: Yeah, so I -- so I'll start with the right-of-ways and the repurposing. So when we say that -- I'm trying to think of a way to explain it so. When we're looking at re-using our right-of-ways, there's a -- you know, land on the other side, and we have a pipeline we are currently using to both maintain and operate our pipelines today. So when we say we're looking at re-using the right-of-way, it would be either abandoning or removing the current pipeline and installing a new hydrogen pipeline. That's one of the things that we're evaluating. And the other thing would be re-using the pipe that's there and transitioning it from natural gas to a hundred percent hydrogen. And that may need retrofits in order to do that. Or depending on the material and what's in place after the studying it might be able to be transferred. So those are, kind of, the different options that we're looking at when we say in the repurposing area.

MS. GARLAND: And I know that just with -- there is some projects just like for example like Scattergood (phonetic) is trying to mix fire, gas, with, like, hydrogen fuel cell. Like 15 percent, like, is this gonna be something that's, like, going to be, like, eating just like Scattergood to keep it open with, like, hydrogen burning or just with like fossil fuel burning. I know it's, like -- everyone's considering economy. It just seems like a bad smoking addiction.

MS. KITSON: I will say -- I'll talk about it briefly but Yuri is going to specifically talk about Scattergood one when he gets into the demand area of the study. So they are -- Scattergood an is looking at using hydrogen as a way to transition to that, we do know that, but again, Yuri is going to go into more detail when we get to the demand study on specifically that.

MS. GARLAND: Thank you.

MR. BRITT: Thank you. Thank you, Jackson. Anyone else have any thoughts on this subject matter? I want to encourage you if, if you haven't made a comment yet to, you know, try to find a subject matter that we can 'cause we would like to hear from all of you. All of you present your own unique ideas and thoughts. And you all come from your own orientations of the different constituents that you serve and represent. And so, it's very helpful for us to hear from all of you, and I appreciate you guys being vocal and communicating your thoughts. So, those of you who haven't spoken yet, please give it some thought about what you might want to say. And we'll have kind of a collection thought process at the end, as well, where you can chime in if you need to do that as well. If there are no more -- oh, actually, there is a hand raised. Robert, has raised their hand -- so, your hand, I should say. So, if you would un-mute yourself, we should be able to hear you.

MR. VAN DE HOEK: Okay. Good, thank you. Chester, this is Robert van de Hoek, again. Just really quickly -- when we -- like Scattergood is an example, but also other places. When we go from whatever the use was to hydrogen is the footprint going to get -- the geographic footprint. Amount of space needed going to decrease. And as an example, you might not know 'cause Scattergood is not the gas company but -- will the, will the amount of acreage you need be less as you shift away from natural gas to hydrogen?

MR. BRITT: Just in general the use of hydrogen pipelines are going to require more or less space.

MS. KITSON: So tell me if I'm on track, Robert, and follow up if I'm not. So I think your question is, is the footprint of pipelines going to be less, if they're hydrogen pipelines?

MR. VAN DE HOEK: No, not quite that. I get that, that's probably going to be about the same, I think. But the, the stations where the electrolysis happens or where the different methods used to make the hydrogen gas. Are those facilities going to need as much space as they're using now or -- in other words, will Scattergood free up some of the space to be turned back into eco-logical habitat or other uses for the public?

MS. KITSON: Yeah, I'll take a stab and then Yuri is going to talk more about the reduction and demand very shortly. So, I think, we might be mixing a little bit of the two things. So the production of the hydrogen. If you can picture like solar farms as an example, you know, mostly in the desert or other areas. That's where the production primarily will be of the of the hydrogen and then Scattergood would be like a demand or a customer. And so, and I'm not previewed to what

that would look like for them if they started using hydrogen over natural gas. But hopefully that helps a little bit with that visualization.

MR. BRITT: Was that helpful, Robert? Or not? I think he turned off his mic. All right. You're talking Robert, but I think you re-muted. We either re-muted you or you re-muted yourself.

MR. VAN DE HOEK: Okay.

MR. BRITT: Go ahead, go ahead, go ahead.

MR. VAN DE HOEK: I'm now un-muted again. Okay, good. No, that answered -- that helped. Thank you, Katrina.

MR. BRITT: All right. Thank you. If there's no other comments then, we're going to go ahead and break for lunch, and I wanted just make an adjustment to the schedule because, again, we envisioned that we were going to have lunch a little bit later. But we finished our morning session a little bit quicker because of the fact that we didn't do the tour. So it is about twelve -- 11:40 now, and I'm going to suggest that we end lunch at 12:45, which would be an hour and five minutes. That way we'll make sure that you guys have enough time to eat lunch and then we can do the self-guided tour.

MS. MARQUEZ: I think that we're going to alternate it to about 30 minutes, Joe, to go to the tour. So maybe get back.

MR. BRITT: Right. So, I meant the overall time between like now and when we would restart the presentations would be 12:45, right. So if we give people 30 minutes for lunch and then 30 minutes for the tour, is that going to work?

MS. KITSON: Yeah, I think Gerry has to leave early, right?

MALE UNIDENTIFIED SPEAKER: Yeah, so I was suggest if we could just -- 30 minute lunch if everybody's okay with that so we can cut earlier.

MR. BRITT: Okay. I'm open to that. I mean, you're going to have a full tour Friday and actually if people wanted to do the tour after the meetings, you can still do the tour. The micro-grid is always available so then let's just keep to the schedule. Let's just say we have 30 minutes for lunch, we'll restart our presentations that way people online don't have such a big break as well. And then, again, at the end of the meeting, if people want to do the tour we'll have people available that can walk through that with you, if you'd like to do that. Okay. So then, what we'll do, is we will take lunch until 12:15 and there's food in the back. Please take as much as you want and more because we probably have more food than we have people, and we want to make sure that we use that and then we'll be back at 12:15.

MS. MARQUEZ: And then just real quick, house keeping. The rest rooms are over to your left. When you exist the doors they're over to your left, thanks.

MR. BRITT: Right, thank you. All right. That 30 minutes goes quick right. So we're going to go ahead and get started in our next second half of our session today. So if you can make your way back to your seats or if you're at home get settled in, and we'll start in just a minute or two. Okay. I'm a little worried about that lunch it was very, very good. But as a facilitator you never want to see a lunch like that because it brings you back to my days at UCLA when I would go to big lunches and I would have an economic class after lunch, and I'd be, like, I am so in trouble -- this is not going to work. We are going to switch presenters now and start talking about some different subject matters. We're going to be talking about production demand and economic analysis and cost effectiveness. Again, I think on our agenda we were going to do -- production first, but I think we're going to do demand first. Yuri, is that right? And then we'll, we'll get into production. Yuri Freedman is the Senior Director of Business Development. He'll be the one who will be making the presentations this afternoon and, again, look forward to good presentations and a good follow up discussion with the group. And we'll move through each of these. We have three more to go today -- I know it's a long day, and I really appreciate your guys's commitment to being here in person and online to support this process and to give us your valuable input. So with that, I'm going to turn it over to Yuri, and he is going to make the presentation.

MR. FREEDMAN: Thank you, Chester. And good afternoon, everybody. As Chester mentioned, I'm to try to provide to entertain you in the afternoon to make sure that, that lunch is not going to distract you from what I think is very interesting, very important material. And specifically, I'll cover three topics today. As Chester mentioned, I'll start with the Demand Analysis, which is in simple terms we're going to look at who and where and how much it will need the hydrogen we're thinking about transporting. Then we're going to switch and look at the production side. Same question only from a different side. Who is going to produce hydrogen, where is going to happen. And that naturally leads us to the third question. As in the third question is what cost of hydrogen is going to be for the customer? Because, ultimately, everything that we've

been working on it has to be affordable for the customer, for the company or individual at the end of that line they are receiving that. So we'll start from the demand side, and then I have a couple of slides to describe you the scope of what we're going to do over the next several months. Effectively, it is -- our task here is to estimate demand fair month of time in the future, which is 2045. We are going to look at this by end uses and end-users. And what it means is, if you think about the uses of hydrogen, there are many of them just like today there are many uses for natural gas. It's been used in power generation, in industrial sector and other sectors. Hydrogen is similar because it can also be deployed over very wide range of end uses and so we're going to examine them and then it will include places where natural gases used to be and it can be replaced with hydrogen tomorrow. But also will include some of the sectors where natural gases not used today. Specifically transportation, and we'll talk about this more. Let me -- well, the important point to take away from this slide is that we're going to look at many various sectors where hydrogen can be used. But we'll spend majority of our effort on three priority sectors. And the sectors are mobility, our generation and how to electrify industrial sectors. This slide lays out the

the rough sequence and the logical relationship between the various steps and analysis. Effectively starts from looking all across the range of the industries and asking ourselves where hydrogen can be used. And that's the Opera Chevron (phonetic). Then we're going to look at the volumes and the way that this sectors could use natural gas or natural gas, hydrogen. But we're going to follow this with a development of the demand model where we're going to assess total potential market, which is if, all at sector. Where to convert using hydrogen, how much demand will that be. That, obviously, is the upper end of the spectrum. And from there we're going to look at the we're going to forecast the transition of that segment of the market from emission intensive fuel today. If they're using natural gas or diesel or gasoline. We're going to forecast what portion of that is going to convert to emissions free energy. And then within that we're going to forecast between various alternatives of transition into emission free energy. How much we think is going to go to hydrogen. So it's -- you know, maybe a little bit simplified the way we're describing that, but that's the -- we're off high level logical sequence. The last Chevron at the bottom -- it's at the bottom but it's very important, maybe the most important. Everything

we're going to do we're going to compare with a real market data points. We're going to be talking to the people who are looking to adopt this fuel. And these people includes for example in mobility, this includes the companies who are developing the fuel cell electric vehicles. That includes various manufactures of (unintelligible) such as commons. It also includes the potential end-users. The entities that are at the end of the day, will be excepted to purchase this equipment. And it also -- it will include entities more importantly to California such as ports. Ports themselves don't own tracks; but ports are very important because they are clean air action plans. Are going to be drivers of conversion of trucks all in this containers from diesel to eventually quite likely fuel cell electric motor transportation. So that's the high level logical of the analysis. And again, if you talk about the key dimensions of it, one I just described. We're going to be talking to a lot of (inaudible) participants because our assessments are good. But given that we are forecast in this -- many years out, we need to collect as many data points as possible that will assure us that we are on the right track. Or if we are not, if we are going to need to correct our direction. We are also going to interface with a researchers and academic

parties. As I'm sure you all know, University of California has done and is doing a lot of work on de-carbonization. We have been working with them for a number of years, and we're going to seek their input and their opinion on the work they are doing. We also have been working a lot with national laboratories. And we are going to leverage those connections to make sure that we will get full benefits of the leading thinkers. On again, what and where and how much will be needed. And last but not the least, we're going to be seeking input from multiple parties including this very forum. Because we'd like to incorporate all the input from the broad range of the state agencies but also the non-governmental organizations into our work. So that's the very brief overview of our demand section. Let me pause here to enter back to Chester.

MR. BRITT: All right. Thanks, Yuri. So Yuri's presentation is focussed, obviously, on demand and the modeling and interview process to validate the market demand. Again, to remind ourselves of where we're at here, we're talking about a lot of work studies that are dealing with very specific subject matters. This is one of the key components to when we talk about a point A and a point B of routing. Demand is one of the considerations and we talked about how one work

study influences and should be considered as part of the other work study and that's one of the things that we're looking at here. Does anyone have any thoughts on the Demand Analysis that Yuri presented or the methodology, the modeling, the opportunity to do market validation with industry research academies and also public agencies. Any thoughts about that in general? Does anyone have any thoughts? Okay. So, the cookies are in the back, if we need sugar. I know that some of this is getting very technical. So I want to, you know, make sure that if we have any questions about it -- maybe if you just want to understand it better. Yuri, I mean maybe you can talk a little bit about the process -- let me just go back to that previous slide. Of going through the validation process with the interviews and how will those interviews take place and what kinds of things will you be discussing with each of these groups as you meet with them? Okay. I'm sorry. Sidney has a question. So we're going to go ahead and take Sidney's question first.

MS. ROGERS: Sydney from PESA. What are potential end-users, what are industry participants across the value of chain, what are key industry and subject matter advisors? Yeah, if you could explain that stuff, maybe that will get the conversation going.

MR. BRITT: Perfect. Great question, Sydney.

MR. FREEDMAN: Thank you, Sydney, for questions. So the area -- the end-users are people that ultimately are going to use the molecules of hydrogen, which we'll have to transport. I'll give you an example. Let's think about natural gas today. Natural gas today, has end-users and power generation. Power plants burn natural gas to make electricity. Natural gas today, has implications across broad range of industrial sectors where anything where you need to have a high heat. Today, you use fuels to burn natural gas; whether it's metal, fabrication or anything related to that often times, most of the time, it will be natural gas. These are just sound sectors where people use natural gas today. So think about hydrogen; what hydrogen could do tomorrow when it gets to be scalable and relatively affordable fuel. We can burn hydrogen in power plants just like we burn natural gas today. Because in burnt natural gas, methane CH4, when it burn it, it produces carbon dioxide, which is greenhouse gas. When it burn hydrogen, it produces water. That's the magic of green hydrogen because you make it from water. You then take a molecule of water, you apply electricity, and if apply renewable electricity, you make hydrogen oxygen. Just split H2O into H2 and O2; but when you use hydrogen, where I would use it, it would actually turn back into water. So, remarkably enough on the global scale, it's entirely sustainable. As long as you have the energy from the outside, which is the sun. Where it simply (inaudible) as long as the sun shines, the molecule of water on the global scale, comes back to you. Because you first split it into two, hydrogen and oxygen, then you bring it back to water. So, hydrogen can be used in power generation. You can burn it, and it does not create greenhouse gas emissions. Hydrogen can be used in a fuel cell electric vehicles. Which, is again, it's a form of electrification. You can electrify vehicles with battery, but if you have a long haul, heavy-duty truck, quite likely you're going to need fuel cell. It's still (unintelligible) it just takes fuel cell as opposed to battery. Because battery is rather heavy and it takes a long time to charge. Fuel cell vehicle can be charged or charged -- can be refueled in a comparable time frame that we use today in the field gas line. So some of the sectors -- we know the sectors where they're all around us. Power generation is one, industrial sector is the other one. Think about metal fabrication, where you need to heat the metal. Transportation is another one; so these are the end-users. In nature of the sectors of the people that are looking carefully at how to de-carbonize -- at how to de-carbonize power plant. How do you take a power plant and keep planting it and still don't emit greenhouse gases. Well, the question is for example, we have a turbine sitting in the power plant that burns natural gas today. Can we use this turbine for hydrogen? It's a complicated, technical, question because of different process. So there are people in power companies called Simmons (phonetic), Mitsubishi, General Electric and others while working on making their turbines compatible with hydrogen. These are the parties we're going to talk to. On the transportation side, the car companies, and we all know some of the names. Household names such as Toyota, Dimeler (phonetic), Hyundai. They are working on developing fuel cell electric vehicles and we're going talking to be talking to them to better understand what they see in the terms of technology maturity and ultimately reduction of cost to a level where it becomes affordable. So, you know, I could go on and on but these are just some examples of the end use sectors and the subject matter experts in this areas. I believe we had a third category, which I think I missed. And I'm sorry if I did. Well, think about it. The valley chain, which we call -- is effectively somebody needs to

make the molecule, somebody needs to transport this molecule to where it's going to get used. And then somebody needs to actually use that. That's quite simple called the valley chain and the custody chain, if it gets significantly more complex because nothing is ever quite so simple but the very basic level, you know, we want to talk to people, and we'll talk about this small reduction side are going to be making hydrogen. That includes the technology developers, includes project developers, including some of the renewable power developers because we'll need lots of new power for that. We'll be talking to the -- people who are making pipelines to make sure we understand the materials that we need to use for transportation. And then we'll be talking to people on the end use side, which is again, the equipment manufactures and the end-users. I'm hoping that goes some way toward answering the question, and I'm sorry if it's still way the long way, yeah.

MR. BRITT: Good question, though, Sydney. Enrique.

MR. ARANDA: Thank you. Enrique Aranda with Soledad. I have a question, Mr. Freedman, I understand the regional economy and our competitive advantage of being the port. How do we compare in terms of advancement and technology with others side -- I mean, you have 88 cities in the county. But in terms of metropolis, how do we compare with other geographic areas or communities -- or cities?

MR. FREEDMAN: Enrique, great question. And I think, I would say that in my mind, we in California have a remarkable -- (unintelligible) of several factors, which is quiet unique. On one hand, we have this abundance of renewable sources. We have solar and wind -- the world class resource. Another hand, we have the port of Los Angeles and Long Beach. We can combine basis among the largest ports in the world. And, obviously, by far the largest ports in the nation. So if you think about transportation needs, on your own but also marine and air transportation associated with that, it's massive because, I believe, about 40 percent of imports into United States comes from these ports. So this volumes is gigantic; but so is the environmental footprint of transportation used to haul all these goods. Because, you know, we live in the 21 century and we order things on Amazon. Well, this area track is going to have to bring the box from where it's being delivered, which is port of Los Angeles to the door. And there's a lot of fuel that's being used, and a lot of greenhouse gas that's being emitted. It's also very importantly; big air quality the impact. Diesel trucks are polluting our air having very strong impact on communities, often times on disadvantaged communities. So if you put together the opportunity to make green hydrogen at scale using this abundant renewal power, and use this green hydrogen to fuel, fuel cell electric trucks that we could use to displace diesel trucks. I don't know any other place in the nation where it can have the impact on so many people's lives at that scale. I frankly don't -- so I think it's a remarkable opportunity. If frankly doesn't come around a lot I think it caused some plans wasn't in generation, and that's why I think we're so excited about this.

MR. BRITT: All right. We have some comments that I want to read off the chat. Alex, you wrote combustion also produces Knox emissions, and it also contributes to global warming by increasing water vapor and bonding with other molecules to create GHG, as I understand it. So I don't know that's not really a question, but do you have any comments on that comment that Alex made?

MR. FREEDMAN: I think both comments are correct. So, Alex, well done. I will say that on the nitrous oxide issue, there's something that's called NOx. The manufactures of the equipment are committing to maintain their NOx emissions under they're threshold, which is to say today there is a regulatory cap. You cannot burn your fuel if you're going to meet more than one certain amount. The same cap is going to be maintained by burning hydrogen; that's one point. The second point I'll make, we have been working with scientists who actually have studying combustion believing there's a laboratory and University of California in Irvine -- by Professor, Vince McDonald. Combustion experts in California are looking very carefully at this topic, and between that expertise and between the commitment of industrial players, I think there's a fair degree of certainty that emissions of nitrous oxide are going to stay under the threshold where they are today. With regards to water vapor, it is indeed true that water, itself, has a greenhouse gas effect. Not nearly as strong as, let's say, carbon dioxide or other gases, but it does have an effect; I remember, because water cycle exists on this plant and has existed a long time ago. Which, we all know the water cycle, which begins when the water evaporates, creates cloud, then the cloud travels, then the cloud precipitates, then turns into snow into the water and then enters the ocean and the cycle repeats again. So the emissions of water from combustion of hydrogen, when

they get to scale, are going to be part of that cycle, if you will. So in turn, using new compounds into the atmosphere by doing that.

MR. BRITT: All right. Great. We also have a comment or chat from Andrea. What about floral polymers, which are vital ingredients in PEM and AEM machines electrolyzers.

MR. FREEDMAN: I think it's a question that recently got a good amount of attention. I think it's by far; not the only question. I think that like any technology, we're going to make sure that what we do use is not going to create, so to speak, more harm than what we accomplish with benefits. So I think this subject should be looked into as is the subject of NOx ever just broke up and many others. So I think, the rigorous assessment of environmental impact of hydrogen is absolutely needed. I emphasize that it has to be rigorous because, you know, in the absence of data, we will be tempted to jump to conclusions one side of the other. I think that the data and the analysis on the (unintelligible) is really important, and we think that the scientist of the state; should be focused on the efforts in that direction.

MR. BRITT: So, Yuri, can you just explain the question. Floral polymers what are those? And then PEM and AEM for the benefit of the group. Just to --

MR. FREEDMAN: Yeah, floral polymer is the sound of the material, which are being used in the process of making electrolyzers. The beginning -- well, let's take it a step back. What is an electrolyzer? It sounds (inaudible) I suppose. So, it's quite simple; the machine that zaps the molecule of water with power, and splits this H2O into H2O goes to the left and O2 goes to the right. They actually, if you think about this -- the opposite of a fuel cell. Because fuel cell takes hydrogen and then ends up getting -- putting out water. So this is effectively very similar; this is good chemical process governing both. Electrolyzers can be -- electrolysis can be done in a variety of ways. Some of them are cheaper than others; but then some of them can, actually, what we call cycle battery knowledge. What I mean cycle, you can ramp up or amp down the production easier, which maybe attractive feature if you're going to couple those electrolyzers with renewable's. Because as we all know renewable's are; as what we call intermittent -- they change rapidly. Just because -- just because of multiple factors we should have control. So then the analysis of different technologies of electrolysis is now underway. We actually, have a program at SoCal Gas, which supports scientists who do this work. I have to say this tremendous amount of best and brightest, who I explore in this right now, and again, I'll emphasize that the environmental impact of this technologies needs to be well researched and thoroughly understood.

MR. BRITT: And just, again, clarification. PEM and AEM -- what is --

MR. FREEDMAN: Oh, yeah, well, typically the two most common -- two out of most common methods are PAM, which is perphonics (phonetic) change membrane -- I'm sure that really explains a lot.

MR. BRITT: Well, at least it helps me understand what it is.

MR. FREEDMAN: It's membrane of the exchange products, how about that.

MR. BRITT: Right.

MR. FREEDMAN: And then the second one is alkaline. So, again, alkaline is somewhat cheaper, but it does not cycle as well as PAM. And then there are many permutations of those. Again, a lot of venture capital is going to finding -- building a better mousetrap right now because people see the opportunity is so big, and they all want to be producers, so technology to serve that market.

MR. BRITT: So Andrea also follows up with her chat regarding what we were just talking about. And it says it's worth mentioning Europe is considering banning it and then -- they provide a link, and then they also say they are similarly needed in the PEM fuel cells that are used in hydrogen powered vehicles potentially causing huge problems for that sector too. How would we prevent this from happening?

MR. FREEDMAN: I think we're going to prevent this from happening by carefully looking at the numbers and the data. That to me, you know, you are going to hear me say this a lot. As a former scientist, I firmly believe that problems are being solved by rigorous and analytical approach and well supported data. And in comparing this data, we're going to find out the extent of the various factors; and we're going to find ways to solve these problems. We have been, you know, as a mankind, has been doing this for a long time. This is not the first source of energy nor is it likely going to be the last. I think that, you know, none of the previous sources came without problems. I think this one is not immune to it too. I think this one is unique because it gives opportunity to use energy in an emissions free way, but it clearly has it's set of technology challenges that we have to study and then ultimately overcome.

MR. BRITT: All right. Okay.

MS. GRANT: Okay, Yuri, I have a question. Last summer, I think it was -- when people were asked not to plug in their EV's for a certain time period. If an open access hydrogen pipeline were to exist, how would that have changed that day or that week for tough to electrify sectors or for every day communities and people?

MR. FREEDMAN: Thank you, Emily. I would say that -- first of all, if you're referring to, of course, the event of last September when the state came quite close to losing power for significant parts. And the -- the heavy -- well, the fuel cell transportation, by it's nature, serves as energy storage medium. Think about the gas tank. Only think about the tank, which is of gasoline has hydrogen in it. This hydrogen cannot only be used to power the fuel cell vehicle, but actually can be used to power a home. And in fact, Toyota is making the fuel cell vehicle, which has this outlet in the back of the trunk where it can plug your device, and you can run your appliances on that hydrogen in this fuel cell because whether it's stationary or mobile, it is a fuel cell. So the unique role of hydrogen, in increasingly world of intermittent renewable's is energy storage. Energy storage is very important -- I always say that we stored energy for all forms that we've ever used. You know, when you go for camping, you look for firewood, you don't brings sticks one by one. You take a pile -- and the reason you do that is because you want to store this by the fire, so as not to go back for every twig. Well, the same reason is why we have -- we used to have coal piles by the plants. We have oil storage tanks in guest storage facilities. So every form of energy requires storage. Batteries can do some of the storage, unfortunately, the batteries can serve for hours. So if you need to store energy for several months, in large amounts, chemical storage is the best form of doing that because, unlike batteries, chemical bonds don't fray. They don't discharge, they stay, you know, the same in perpetuity forever. So chemical storage is where hydrogen can shine. Where we have sometimes in the seasons, which we call shelder (phonetic) seasons where we have strong solar production but not demise demands when the whether is mild like March or let's say October. We have over supply of power to a degree, as we actually pay out of states to take it -- we actually do that. Wouldn't it be nice to take that power, and convert it in hydrogen and store it for the days in August and September when we're desperately short of power and the surprise of power spike with impacting all of us wouldn't it be good to bring that power from shallower seasons to peek seasons. So that's maybe one illustration of how hydrogen can serve as a resiliency and energy storage device, and I think we will need more resiliency, if not less, in an emissions free world. First of all because renewable's are intermittent by their nature. And second of all, because I think we all observe the geopolitical events. I think I'm going to put premium on us making sure that we have our own sources of energy that we can rely on. I know it's a long answer but --

MR. BRITT: Does anyone else have any thoughts, questions? I have one more, Yuri, what role does academia play in your study of demand and validation of the Demand Analysis, as well as -- I've heard heard you mention scaling up. There's a lot of notion that, you know, the hydrogen sector has not yet really scaled up to the scale that it will need to scale up to and a lot of invasion will need to occur. So is there ongoing things in academia that you can tap into or market studies that are already going on in academia that you will, like, look at as case studies in your interviews with them, how will that process work?

MR. FREEDMAN: Chester, good question. I would say academic and intellectual element of this is really important, for at least two reasons. One is the, obviously, the academia is the best and brightest. You know, we in California are proud of the ECC system and rightly so. It's a world class institution with a lot of people that have garnered immense credibility in accolades for a reason. The reason being that they are rigorous thinkers, they can de-construct a problem, so think it through and map out a pathway solution because that's what structure thought is. And the second element of it that is really important, is that they are impartial. They are not holding interest to any particular stakeholder. They can debate and they do vigorously debate, and that's how science has been developing over centuries of millennium. So that's the scientific process and the integrity of the process. And its rigor is very important because they're trying to make decisions about events, which will take place ten, 20 years out. And so, on said predictions are hard especially about the future. I think that's having the -- having leading thinkers of the state. Many of them are leading thinkers in their fields. It's extremely helpful to make sure that we are going to do all we can to come up with the right -- forward.

MR. BRITT: All right. Well, that exhausts all my thoughts. So if you guys have any additional

thoughts, let us know. The next section is the counterpart to demand, it's production. So we talked earlier about point A point B in terms of routing, this is essentially what we're talking about, right. Point A would be the production, point B would be the end use of the demand, right. So, Yuri, is going to now make a presentation on the production side of things. And then, we'll have another conversation about that.

MR. FREEDMAN: Thank you. So we are at the risk of straining even further into technical terrain and going out talking about the production of hydrogen. I'll try to make it -- I don't know about light. But at least minimum to heavy. So the two -- we just talked about production of hydrogen from water. Taking water and splitting it into two making hydrogen oxygen. That's one, but not the only way to make emissions free. There's something called calcification of biomass. And the way to explain it is, if you look at biomass, which is to say, leaves, trees, pistachio shells. That actually has a lot of carbon and hydrogen in them. So how to separate the two? Well, there's a process called calcification, which is effectively in a simplistic form, just heating this to a temperature where carbon hydrogen break apart, and then you're going to have hydrogen again going to the left. Carbon, in a solid form, not in the CO2, but the solid carbon go to the right. By the way, that is a very promising pathway because we always talk about carbon as a liability. Would not it be nice to do is something useful with that. Because by the way, you know it's an aggression, but a small one. Our issues is not with carbon, per se. Carbon is all around us, not to mention we ingest it, we wear it, we use it in many different forms. And we don't have an issue with that. Carbon beginning from graphite, to diamonds and anything in between is not a problem. The problem is the -- form of carbon, which is carbon on dioxide, CO2. That's the gas we should focus on. So if you take the organic matter and split it into the carbon and hydrogen. First of all, the carbon is not our enemy. Second of all, we can find a way to do something useful with that. Whether it's graphite, graphine, (phonetic) diamonds or other materials. There are many ways that scientists are working on. Figuring out how to turn this liability into an asset. So that's what visification (phonetic) is. The reason I'm bringing this up, and then partially, Enrique, back to your point. Not only do we have the abundance of renewable resource in the state, we're actually the largest ecological State in the the country. Ecological means a lot of biomass that we have to find room for and find use for. And that's what classification of biomass, actually, can play a big role. Because on one hand, we can use this agricultural waste. On the other hand, we can make this green hydrogen without greenhouse emissions. So it, obviously, would be a win, win. It is a pathway way where technology that exists at some scale. Like everything else; it needs to be scaled up. So this is my long leaf to the description of the scope of our analysis because we're going to explore how we can make green hydrogen from water in the state, but also how we can make hydrogen from biomass waste. I'm done. Well, maybe -- it may be too many words in this title. Basically, the way to think about this -- we're going to examine what places in the state are the best places to make hydrogen, which for renewable's is quiet simple. It means where is the best solar and where is the best wind. It's also important so it would not be too far preferably from demand sources because, again, it's a trade-off. The best solar may be in the middle of the desert where you may have water constraints, you maybe too far from the demand center. So we're going to explore these trade offs, and we're going to identify areas where production of hydrogen is most promising. We're also going to more importantly cross-reference this and that's the lower ride hex -- with a real market activity; just like on demand side. We're going to be talking to developers of projects which are going -- which, actually, today. Spending their time and their money developing hydrogen projects. Many of these developers -- actually, developers of renewable projects, which we're building solar and wind farms, but then hydrogen is the next stage of that growth. So we're actually pretty excited about that. So back to our work, we are going to identify those referential production areas, we're going compare them with where we think demand is going to be, which is the previous topic we talked about. We are importantly going to consider how to make sure that this hydrogen production is indeed emissions free. And we're going to explore the protocols, the methods, the processes to make sure that hydrogen meets this criteria. Importantly, we're going to assess -- technologies just to meet the equation of the PAM, alkaline and many others. Basically, we need to understand how many ways are there that people are going to look to make hydrogen. Which of these ways are most promising technology. Where are those factories being built where people have built in electrolyzers to make hydrogen. That's going to be the scope of our analysis. The important element of that is going to be putting a number on the cost of production. Because at

the end of the day, it has to be affordable. So all this date is going to be distilled to come up with a cost of production. And that will be the input in the -- the cost effective analysis, which is something I want to talk about later. But for now, let me go to the next slide and make it a little bit more tangible. So at first -- you know, the first picture on the left. We are going to go around and look for the best place to make hydrogen. Next, we're going to assess how much of it can be made in terms of volumes. We're going to make sure that we interact with the market participants to understand whether what we find is actually agreeing with what is actually happening in the real world. And last but not the least, we are going to make sure we are comfortable with the methodology of measuring the greenhouse gas content of this hydrogen. Let me stop here. I know I said a lot, probably sounds this technical -- hopefully not too much. I would be happy to answer any questions.

MR. BRITT: Marcia.

MARCIA HANSCOM: Marcia Hanscom, with Ballona Wetlands Institute. So great picture you had up there with the solar and the wind, and I guess the question is -- why you're identifying eligible, renewable, resources and hydrogen generation technologies. But why, why add that in? In other words, what's the benefit of using solar and wind to make hydrogen instead of solar and wind going directly to the energy source?

MR. FREEDMAN: Absolutely. Great question, Marcia. And that -- let me take a couple of steps back to answer that. And again, I'm very much -- I'm looking at this like a conversation. So please -- you know, let's held as one. So I'll start a little bit from far away. What is the -- if we look at the world today, and let me ask a question. It's not the -- it's not the best. But the question is what percentage of energy today, we, on this planet use as molecules as opposed to electrons, which is to say, you know, we sound this with drive. We use molecules in some others we plug in we use electrons. So today, for the world, that the percent is actually literally 80/20. That's the reality of the planet we live on today four fifth of our energy we use today happens in molecular form. That, by the way, includes a third of the people on this planet that still burn wood as their main source of energy. About 2.8 billion people but all together, we use 80 percent of the energy we consume as molecules. It's a huge number -- so that's a fact number one. Second, second is not a fact but it is a forecast. The question then becomes as we transition to the emissions free future, what is this mix going to be? And the analysis, which I've seen, which was performed by Berry Environmental Consultancy, Bloomburg, New Energy Finance. Their analysis suggests the latest version that about 50 percent will still be molecules. And 45 will be electrons. So what it means, it means several things. First of all, we will need a lot of molecules and emissions free future, we can discuss why. But the answer is fundamentally because they provide us resiliency, they serve this energy storage that we can tap on immediately when we need that. Second conclusion, is, of course, a share of electrons. Goes from 20 percent, which is what it is today to 45 percent. That means doubling our electricity system. Everything has to double for that to happen. But putting that to the side, the direct answer to that question is that 55 percent of molecules -- this green molecules -- they are not yet at scale today. Because the molecules we use today, are mostly, if not entirely, emissions intense. That coal, oil and gas and their derivatives. We need to find molecules that can play a role of this energy storage medium for this emissions free world. Hydrogen is not the only molecule that can do that. But hydrogen is probably the most promising of the molecules. Some others are bio gas -- they talk about something called E fuels and direct fuels. And there are a couple pathways. But hydrogen is, actually, it's kind of unique in its (unintelligible) that you conserve so many different needs. Again, I know it's a long answer, but the point is that it's kind of a multistage thought process in my mind. The first question is that do we or do we not need molecules in the nations free future? And I have seen no analysis re-suggest that we don't. Analysis suggest that we do -- we need them a lot. Second is, what molecules of those -- what good molecules conserve that need and arguable hydrogen is at the front row of those. And then the question becomes how do we scale up to make it affordable. Because to make anything affordable, you need the economy of scale. That's how renewable's became from very expensive, turned to be very cheap, that's the same thing needs to happen with green molecules.

MR. BRITT: Does that answer your question, sort of? I mean, I guess one of the thoughts in plain English for myself to try to illuminate at what Marcia asked is, if you were to take that energy derived from solar and wind into the electrical form that it produces, you still aren't addressing the heart to electrify sectors, right? In other words, not every

sector is easily served by electricity, right. So you still need other sources of fuel to fill in the gap is that --

MR. FREEDMAN: That's part of it, but I was talking about something, which is much more kind of close to home to us. When the sun does not shine and the wind does not blow, we need to maintain our power supply. In emissions free future and in the warmer plant, which by the way evaporation water is going to get higher, they'll be more clouds covered. We are likely to have prolonged interruptions of renewable production. That just the reality that climate scientists are pointing us to. Batteries today, provide four-hours of storage. If you're going to have multiday power supply interruption, that is not going to do it. If you need to store power for the several months, which is what we need to do because on the day like -- let's say. Well, today maybe a hot day, but on the day in March, you over produce power a lot. Like I said, you sell it, and you pay people to take it. On a day in August, you do not have an (unintelligible) and last September, we came very close to the black out. We need to find ways to store large amounts of power for long periods of time. That is something we need to do in order to keep lights on, and I don't know any other form of storage that any chemical can do that.

MS. HANSCOM: So are you saying -- okay. I'm trying to get to the practical use of it. So I have a gas stove, but I could turn it into an electric stove. So for that, maybe that's the best use. But for the battery storage; it sounds like hydrogen might make more sense. In other words, you're, you're looking at a whole different array of things for hydrogen. And maybe, I guess the question is in your whole analysis. Are you going to be saying, well, maybe this is where we're really going to be focusing the hydrogen because it makes more sense ecologically, environmentally, economically, et cetera.

MR. FREEDMAN: Absolutely. We're going to conduct an analysis of alternatives. And it's going to compare the potential to direct, directly electrify and then use with hydrogen. And then we're going to compare some of them maybe better suited for electrification. So that's going to be done, not within this study; but we'll have a separate study, which is going to analysis alternatives. I want to make it, though, what I said a little bit more tangible. For the pilot in your gas stove to turn on, you let it power, right? You especially -- and if you convert a stove to a electricity, you need power. We are likely going to face prolonged power supply interruptions because if you're going to all renewable's grid. Sun and wind, unfortunately, are actually correlated sometimes in the sense when the cloud sits there, it is not move away because the wind does not blow and that makes the sun, you know, not penetrate the cloud. So you're renewable generations is going to be at least today intermittent. It's wildly understood. What we need to do, we need to store this energy for long periods of time to quickly produce a lot of energy when we have this (unintelligible) So, chemical storage is the way to do it. Today, by the way, we're doing it with natural gas. But molecules have the ability to immediately convert almost immediately to convert to power when you need it. That's important. I'll give you another example. Hauling those containers, you know, there is about many millions of containers coming to the port of Los Angeles, Long Beach. There are about 20,000 trucks, which are hauling those containers. So if you want to haul those containers using battery, electric trucks. First of all, if you need to bring it long distance, you end up hauling the battery and not my (unintelligible) because battery is so heavy. Second of all, your charging time is going to be extremely long, which is going to make it not attractive to the user of the truck because they need to run all the time. That's not a sector; but fuel cells are going to be very promising compared to batteries. Again, it's electric vehicles. We are electrifying transport. We simply looking at different ways of doing that. So maybe to bring it home, we are going to look at the sector by sector and then undoubtedly will be sectors with direct electrification makes sense. The likely will be sectors with fuel cells and hydrogen are superior technology.

MR. BRITT: Enrique and then Andrea.

MR. ARANDA: Enrique with SEA. Mr. Freedman, I think I had an a-ha moment. 'Cause I came in here today with the whole energy of the hydrogen problem, and I think the way you talked. Even the way you talked -- your study. I think I feel now that there's an opportunity for all of us to see this as a historic moment. And there's market opportunity to really look at or delve into how we have a new hydrogen economy and really how we can all benefit from it. So, I think beyond thought provoking, I think this is such an -- in particular, has really helped raise my conscious about, not the over problem, but I think the over all win, win. We have at a hand.

MR. FREEDMAN: Oh, thank you so much, Enrique. And I will just say that where there is remarkable

success in California. You know, (inaudible) and as a result of that, the price of renewable power went down by ten times in one decade. The one thing, which we could have done better, and I think we should do better with hydrogen. Most of the jobs on making solar panels are not in California. The only thing in America that are in China. We actually can have the manufacturing industry here because we have this embarrassment of reaches in terms of renewable resource. We have this biomass, we have this solar and wind. We have ports that carbonize and heavy tracks. We can make an industry just around that. It will be great high paying jobs. And I think the opportunity is really, really exciting from multiple standpoints. From social justice standpoints, from energy security standpoint; so I agree with you, I think it's a unique moment.

MR. BRITT: Thank you for that, Enrique. Andrea.

MS VEGA: Hi. Andrea Vega with Food and Water Watch. So given that SoCal Gas will not be producing the hydrogen themselves. I just want to see if we're going to get any transparency in the process of which companies SoCal Gas will be selecting from for production of hydrogen. I think it's especially timely given that just about an hour ago the news just broke out about a hydrogen tank explosion over in Kern county.

MR. FREEDMAN: Thank you for your question. And I'm not sure how the second part of the statement relates to the first, but I'll go back to the question you asked about hydrogen production. Circle gas today and circle gas tomorrow, will be the company that does not discriminate between produces on the -- because of our regulatory impact. We have the open access common carrier system where we provide service to customers that are interested in shipping molecules now assisting. The same exact approach is going to be, you know, mind use for hydrogen, which actually, I think, provides the biggest benefit to consumers because depth transparency and what they call unbalming (phonetic) which is to say, part is that made hydrogen should not be the parties that own the infrastructure of the pipelines because that creates obvious conflicts of interest. Then unbalming decisions have been made at the federal level. Frankly, for some industries, a hundred years ago, Standard Oil was broken up because of that. The natural gas act was enacted to make sure we have the natural gas market that's non-discriminatory. With even the same should happen for hydrogen market, but we circle gas are, as correctly said, not going to be a producer nor are we going to discriminate in any fashion between the producers or consumers that would be interested in shipping hydrogen or pipeline.

MR. BRITT: Amy did you have something to chime in?

MS. KITSON: Yeah, the second part of Andrea's comment on the incident that just occurred in Bakersfield. So we've also just been made aware of this unfortunate incident; and understand that the authorities are looking into it. Into the cause, and don't want to speculate at this time. Similar to any incident that occurs. We can say that -- I think, I may have touched on it or not as part of our safety setting. That looking at incidents both on the natural gas and hydrogen side is part of that study and taking lessons learned as we move forward and design our system so that we can strengthen and enhance our safety practices.

MR. BRITT: All right. Any other thoughts? Let me see -- I think we have -- Alex, chatted something that I'll read. Can battery storage theoretically be staggered so that four hours can become 24 if there were six interconnected batteries, for example. In other words couldn't enough batteries theoretically solve the multiday demand issue?

MR. FREEDMAN: An excellent question and the theoretical answer is, yes. The flip side of that answer is that the amount of batteries that you'll need to stack to store energy from let's say April to August, makes this economically prohibitive. To a -- a very high degree. Because think about how many four-hour intervals do you need to put together. And you're absolutely right, when you spend four-hours to charge battery then (unintelligible) not the battery. So add four-hour intervals in a space of several months, you're getting very poorly (unintelligible) system of gigantic number of batteries. The other dimension of that, and that is coming to the four -- a lot lately. Is that the amount of the minerals, and rare earth metals and other metals that you will need for those batteries, is going to be far in excess of what we produce today. And by the way, you know, that's already happening -- the metal shortage may impact us in the years to come, and we should be cognizant of that. I've heard ads of the largest mining companies say that our -- some of our assumptions on notification expect will require doubling production of corporate in the next ten years. So we should be mindful that any kind of franpop (phonetic) that we are creating through the post measures is going to create pressure along the supply chain. We are looking at this very carefully as part of our production analysis to make sure that hydrogen production is going

to be protected from this supply chain issues, but we all know that anything I try to -- quickly is going to have an affect.

MR. BRITT: Marcia, you have another comment.

MS. HANSCOM: So, Marcia Hanscom, Ballona Wetlands Institute. So that raises the question, you mentioned all the various minerals. Do hydrogen fuel cells -- I mean, one of the biggest concerns environmentally about all these electricity batteries are, like, lithium for instance. Do the hydrogen fuel cells also use that or is it different somehow?

MR. FREEDMAN: It's different in that there are multiple technologies under development right now, and we're supporting several of them. That they should look to make this process independent of rare metals. So -- that is something we should -- that people -- it's a huge market opportunity, by the way, as I'm sure going to appreciate people want to build something that's going to be independent of, you know, global issues. Of the shortages and that's activity, in which we are very proud to support and there's a tremendous potential in that. Again, I'm happy to provide you with a copy of our research and development report where we release some of the entities that we support -- it's public information. And the amount of brain power applied to that is really incredible. We have people from Cal Tech and MIT and others quite chasing this prize. So we have high confidence it's going to be addressed.

MR. BRITT: All right. So we have input from Andrea, which I want to read as a chat. Chemical storage is only one way to store energy. We have battery storage, pump hydro, compressed air, pinwheel, and many other ways to store energy. Will the study take those into account?

MR. FREEDMAN: Oh, we are going to look at this in -- within the scope of our analysis of alternatives because, you're right, there are many way to see store energy and people are coming up with new ways almost every, you know, every week, every month. So we are going to conduct an analysis of alternatives to store energy in our report -- in our analysis. Not within the production study but in a separate way of work, yes.

MR. BRITT: And then she also follows up and says, I would like to hear about how energy intensive and green hydrogen will be.

MR. FREEDMAN: The energy intensity of green hydrogen are -- is going to be something we are going to look at and that's going to be a part of our technology assessment. It's -- there are two questions to that, right. One is the just economics. How many kilowatts, full kilowatts of power do I need to make one kilogram of hydrogen? That's what they call efficiency electrolyzers and people are working on making this more and more efficient. Then there's the environmental question. Does this increase greenhouse gas footprint. It does not, if you use renewable power, but to the extent your power is not absolutely clean, of course, grows greenhouse gas emissions. So we're going to look at that within our technology assessments.

MR. BRITT: All right. Anymore questions, or thoughts? That was a really good conversation, Yuri. Thank you so much. All right, Yuri, has one more on deck. And then we'll have another member discussion and that will get us through all of our presentations today. He's going to be speaking now on High Level Economic Analysis and Cost Effectiveness.

MR. FREEDMAN: Tell me we're going to skip the break.

MR. BRITT: We're going to skip the break, yes, yeah. Should we do a five-minute break? Okay. We'll do a five-minute break, good point.

MR. FREEDMAN: You're driving hard, man. Yeah, this is --

MR. BRITT: I mean, they seem so interested. I don't want to break up the momentum. All right. I think we're ready to start back up again. Get into our last section. Again, I just want to reiterate just our thankfulness for all of you guys for sticking it out. It's a long day, and I know that we've gone through a lot of subject matter, and we have one more to go today. High Level Economic Analysis and Cost Effectiveness is a big issue related to any energy producing option and hydrogen is no exception to that. So, Yuri, I think only has one slide, if I'm not mistaken. So this is a very short presentation and then we'll have hopefully a good robust conversation about it.

MR. FREEDMAN: Thank you, Chester. So the economical analysis, again, ultimately all the commodities that we are using have to be affordable. It's going to be one of those three critical pillars where it has to be clean, it has to be reliable and resilient, has to be affordable. Affordability is going to be the focus of this study. The way we're going to do that, is fairly conventional because the way we usually look at the affordability of any source of energy, you calculate what they call the levelized cost. Levelized cost is when you look at what you need to build. Let's say you build something; you invest capital, then this plant is going to be an operation for

you name it, 20, 30, 40 years. Ultimately the owner of that plant is going to expect some economical return on their investment, which is going to be, you know, think about the initial investment. Then you have some sales of hydrogen, and then you have some operating expenses. If you encourage, you make that. So the cost of hydrogen -- the price of hydrogen that you get, has to be at a certain level for you to make money. When you -- put together multiple producers of any commodity, that's what creates market. So, obviously, every particular producer is a price taker. No one can set the price; price being set by the market. But market is ultimately is clearing out where enough people can make this in return, making it a commodity for it to be produced. So this what we call LCOH. A levelized cost of hydrogen is what we're going to calculate. Again, that is what simply the capital cost of your plan that you need to build. Operating cost, if you need to incur. And then the question is what is the price of hydrogen that you need to have in the market for to you get a return. We are going to delve into the topic, which I know came up several times today already is the alternatives. And the alternatives are going to be at several levels. The initial return is to ask, well, do we need hydrogen? Can you accomplish this objective in

examine various ways in which hydrogen can be transported, of course, with a very keen eye on safety and feasibility of those options. And last but not the least, ideally we want to produce every commodity as close as you can to where it's being used. Because that ultimately solves the transportation problem. It so happens that in Los Angeles area whether it's explained demand for hydrogen, there isn't a haul of a land to build those renewable plants to make hydrogen. But there is some land and there is some potential to make it here, and we're going to examine that. It's likely that the hydrogen market will evolve over time. In fact, the commission, the public yield commission and their decision have requested us to look into a localized hub concept, which is effectively building hydrogen echo system from something smaller, initially, to something larger when it gets to it's full size; so all of this is going to be the scope of the study. But again, to bring it all home, if there's one topic that I want you all to remember is that we're going examine the cost of hydrogen, the assesses affordability for consumers.

MR. BRITT: All right. So that was a -- short and to the point presentation regarding cost effectiveness. So does anyone have any thoughts on this last subject matter that we have? Enrique.

the sector by all the means? While them is direct electrification of course. The second one, is energy efficiency. Can you reduce your efficiency? Use less than this energy source? Then if you still need to use molecules, can you use other molecules. Can you use the bio gas, renewable gas, can you use synthetic fuels? So these are going to be the questions we're going to ask. If for a certain pathway, for a certain user, hydrogen seems to be a superior solution. The next question to ask is, how to bring it from the production source to the demand point. And you can do it in a variety of ways. Today, majority of hydrogen is being delivered from production to the refueling stations by truck. Which, is actually relatively expensive. My plan is significantly lower cost option, it obviously takes longer time to build, but once you build it in place, be sure well of what you transport results in lower cost and benefits to consumers compared to tracking and all the other options. But they will still be all for tracking. You cannot put pipeline in everywhere. So we're going to examine the options of tracking hydrogen. There are also interesting topics of hydrogen being transported. Let's say long distances as a -- ammonia or as a liquid hydrogen or something, which is called liquid organic carrier hydrogen. So we're going to

MR. ARANDA: Enrique with SEA. Yuri, you mentioned a big focus was on supply management and, of course, to the port of goods. It just made me think back over 20 years ago. A lot of us invested time and energy in supporting the -- quarter of being built. With public investment or 3 billion dollars to be put in to something that has utterly failed those communities and has not lesson any or led to any measurable reduction in emissions or mobile source of pollution. So I hate to compare apples to oranges, but I just -- what do you think of that comparison in terms of making this investment?

MR. FREEDMAN: Absolutely. I think, Enrique, again, the impact on communities and the value that this project can bring to communities are going to be very, very, very important elements of how they work. They may not be captured within this very study. That study is going to be focused on economics but the cost, not the dollar cost, but the true cost. As well as the true value of what we're going to do for people, we're absolutely going to focus on that. Again, to me personally going back to the air quality and the benefit to the community, which we can bring is very important. But so are the jobs and so are many other aspects, in which, we can actually impact people's life in a

positive way which, is something we should all can be proud of. We are definitely going give it very, very close attention in our work, which will culminate by submission of at all this data and reports to the public and dealing with the commission in the next year. So looking forward to having -- about all this data.

MR. BRITT: Thank you, Enrique. Anyone else have any thoughts? I'll ask a question, Yuri. When you talk about performing economic analysis to determine levelized cost of clean, renewable hydrogen, how do you do that? Like, what is kind of the methodology for determining levelized cost?

MR. FREEDMAN: Well, you know, it's probably not that different conceptually from decisions that all of us are making with our personal finances when we decide whether or not to invest or to put something, you know, to buy a new condo or to buy an appliance. You assess, okay. I'm going to spend that much money, I'm going to buy a car. You're going to spend money out-of-pocket, you're going to have some operating expense, which is quite simple to guess price and the tires and everything else that comes with that. You're going to get some benefit of it. The difference is that, obviously, when you drive; you do it for your own. Purposely, you don't sell commercial products, but the trucker that ships other people's goods -- does this very calculation. When you buy a truck, you say okay. I'm going to spend that much money, that's my fuel cost. How much do I need revenue per truck per day? So when the truck is fully de-appreciated, I got not just my money back; but I got some return on this investment. And if I don't get a good return, I'm going to be doing something else with my money. So that's fundamentally is the assessment of what would it take for the investment to be made to get a decent economical return, does that make sense?

MR. BRITT: It does make sense. We also have someone who raised their hand online. Andrea, if you could un-mute yourself. And then -- for people online, if you do ask a question. If it's possible for to you to turn your video on, just for the benefit of the group here and the room to be able to see you as you speak to us, that would be great. Thank you so much.

MS. LEON-GROSSMANN: Hi my name is Andrea Leon-Grossmann, and I am Deputy Program Director of the West with Vote Solar. It was just said that they're also looking into the study and interesting topics of hydrogen being transported, and I quote, "let's say long distances as ammonia or as liquid hydrogen or as something, which is called liquid -- the organic can re-up hydrogen." When it does say, "long distances", what is a long distance in your opinion?

MR. FREEDMAN: No, thank you for the question. You know, maybe, maybe I should first qualify my statement and say that for the on land transportation the predominant way in which hydrogen is being transported today, is tracking. We are, obviously, offering the pipeline solution that is in development. So these are, I think, predominant ways of transporting that and -- hydrogen is transported in a form of ammonia. And the ammonia market is the vibrant market -- is being transported in real cars and in pipelines. It really is not the function necessarily of long vs. Short distance. It's the function of what commodity do we need. For example, in agriculture ammonia is a very important precursor for the nitrogen fertilizer production. Therefore, ammonia is being shipped around. Conversely, for example for intercontinental as futurist as it sounds but there are projects exploring the possibility of transporting hydrogen between the continents. Or quite simply exporting hydrogen from North America to let's say Europe or Asia. That is clearly a much longer distance than the pipeline can do and people exploring the water born shipments of hydrogen either as ammonia or as liquid hydrogen or in the organic hydrogen carrying form. So yes, what I was referring to is that by going to take a look at the whole spectrum of those options, but as a practical matter for online transportation, I think tracking and pipeline are among the dominant form of transport. I'm hoping that, that answers the question. If it doesn't, I welcome further questions.

MR. BRITT: Andrea, did that answer your question or do you have a follow-up?

MS. LEON-GROSSMANN: Okay, yeah. So would SoCal Gas consider also importing gas to other states or to other countries?

MR. FREEDMAN: SoCal Gas today is proposing to develop a green hydrogen pipeline that is going to transport hydrogen from the sources of its instate production to the sources of demand in Los Angeles metropolitan area. I think it's important for us to understand the future potential of hydrogen market -- so that we can make the best decision for the right pairs based on our understanding of the future market, which has not yet emerged. And that's why we're going to look at the various options of hydrogen delivery.

MS. LEON-GROSSMANN: Okay, thanks.

MR. BRITT: All right. Thank you. Anyone else?

MS. MARQUEZ: I have a follow-up question.
MR. BRITT: Yes, Alma.
MS. MARQUEZ: To Andrea's question, will that increase transportation on trucks or would it be about the same?
MR. FREEDMAN: I'm sorry could you --
MS. MARQUEZ: You said the months of transportation for hydrogen would be through pipelines and trucks. With this phase and this whole process with Angeles Link, will this increase truck traffic or would it be about the same?
MR. FREEDMAN: Well, I think if, obviously, if you send a molecule by pipeline, you don't need to track that. So or maybe saying it a different way -- you know, some forecast suggests that hydrogen can account between ten to 20 percent of total energy use in, in the carbon free future. If that's the scale we're going to look at it, it's going to be on par with other energy sources -- then you need scalable solutions. And tracking, tracking there will be a role for it, but (unintelligible) does not scale very well. So hydrogen pipeline will, obviously, take trucks off their own because you will need less tracks to track hydrogen because you'll help pipeline delivering that. They'll still be some role for them, but it will be fewer of them on the road.
MR. BRITT: So I wanted to follow up on something we heard yesterday, Yuri, from the PAG about scalability and the need for doing that because of existing cost of hydrogen right now, and you're prediction of how scalability will drive down those costs. Can you just speak to this group a little bit about what we talked about yesterday about how you anticipate in using other examples of fuel sources over the past few decades, you know, how scalability has resulted in decreasing costs.
MR. FREEDMAN: No, thank you, of course Chester, I think that that's -- as we look at those cost carriers and making forecasts about the future, which notoriously hard to predict, which -- I think we get a lot of comfort from is that, we, in California actually have tried something like that and it's worked. What I mean is that, we provided support for renewable power and because of that the renewable projects got built at scale. And because of that, the price of renewable power fell by ten times in the course of a decade, which is quite remarkable. I think it fell more than anyone could expect it would and yet that's where we are. So, -- major success of the policy. And we think that the same approach should be replicated for those green molecules. We think that we should have confidence that policy, when applied at scale, drives the cost down. Because it does two things, first to building larger factories, which reduce the cost per unit of anything they make. And secondly, they all have all technology innovation. Like what we talk about today people developing better fuel mousetraps, better more resilient, more reliable, electrolyzers. So this is going to reduce the cost of hydrogen much the same way that scaling up of renewable power drove down it's costs in the past.
MR. BRITT: Great. All right. I do not see any new chats. I do not see any new hand raises, and I think I see some tired faces in front of me. So, unless, there's anything for the good of the order. We are going to now go to the end of our meeting, which is to do a quick debrief about what we talked about today and what our expectations are going forward. So we started this morning talking about plans for applicable safety requirements. There was the discussion about signage. Is there a risk of corrosion, or leakage in the life cycle of pipelines, how is communications handled in on-going emergencies. And the process chain, we talked about equity and storage. We also talked about hydrogen 101. The need to have a demystifying campaign, the the discussion about fuel cells. We went into workforce planning. There was the discussions about need for community benefit agreements, local hiring, agreements, formal outreach to oil industry workers about losing jobs, partnering with local training centers, Outlining new jobs being created, and other things besides that I did some capturing -- some very high level things. But preliminary routing, we talked about that. We're using pipelines, constructivability, equity and placing pipelines in disadvantaged communities. We talked this afternoon about demand, we explained the demand methodology, and the production. Kind of the point A to point B. We had good conversations about that and then we ended with our conversation just now about cost effectiveness. So, again, we've covered a lot of topics today. We are going to be meeting with you guys again on Friday. Hopefully, all of you can attend who are here in person and those -- some of you who are online. Maybe you can make an effort to come and be with us face to face. So there is some benefit, I think, of sharing bread and sitting at a table, having coffee, and being able to talk during our breaks. That is also going to be an opportunity to have the live demonstration house experience. With the micro-grid as well. So please if

you can't attend on Friday, we would encourage you to do that. Today is not your only opportunity to weigh in on the subject matter as we covered today. If you are -- if you're -- were not able to attend, and you're getting a summary of this, you still have to the end of July to provide input into the technical work studies so that they can be incorporated into the actual development of those plans. I think I pretty much covered everything -- oh, there is a -- Alma, a present -- I mean, not a presentation. An announcement that Alma will make about the post-survey that we would like for to you fill out as well.

MS. MARQUEZ: Yes and I -- first of all, thank you for some of you who have already given me some verbal feedback on today's presentation. I did want to say that we have a QR code that we have in the back that we'd love for you to scan and give us some feedback. But if there's anything in the general you'd like to announce now, that will be helpful. As, you know, we're all here in person to -- better the process and help you feel more comfortable with this and really get your feedback for, you know, what the purpose of this is about. And also, just to clarify, we do have parking in the back. I know some folks came in a little later and our staff came in but -- the parking with the cones, is for you. So you don't have to park across the street and we can get you in here on time. And then last, we are meeting on Friday 9:00 to 2:30 on Friday here at the same place. So we'll send you -- we can send you a follow-up e-mail to -- about today's meeting, but we'll send one again tomorrow. But if you can please join us, as Chester said, I think it's very valuable to to hear you and have you here. I mean, I want to thank folks that came here for the first time. Aive (phonetic), and Luis, who came here, thank you for joining us and being part of our group. As you saw, it was very helpful for you to give your feedback. Especially, as you're joining us for the first time in person. So thank you for taking your time out of your busy schedule, and I think that's all for my feedback.

MR. BRITT: Yeah, a couple more things. I want to give -- appreciation to our court reporter, who had to concentrate for six hours today. I know that's a heavy lift. So thank you so much for doing that. That will be part of our documentation that goes into the quarterly reports into the CPUC. As all of our meetings are. If you did want to do the innovations, little self-guided tour experience. Edith, I think will be right here. Edith on our left, she'll be available after this meeting. So walk over there, if you'd like to do that, if you're not available on Friday. I think with that, unless there's anything else for the good of the order, we'll just adjourn. And again, I just want to give my appreciation to all of you both online and in person for having a robust conversation and being civil and really building on each others comments to really provide good input over all unto the various topics that we covered.

MS. MARQUEZ: And last but not least for, folks that are receiving compensation for today, please make sure that we do have your registration for today as we're taking note of who was in attendance so we can process your compensation. So that would be very helpful. And thank you, Chester, for helping us have a good conversation today with everyone here and our speakers. I think you all did a great job and for the feedback received. So, thank you.

MR. BRITT: Thank you. All right. We're adjourned.

(Adjournment)

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I hereby certify that the foregoing transcript of electronically recorded proceedings is a full, true, and correct transcript to the best of my ability.

I further certify I am neither financially interested in the action nor a relative or employee of any attorney or party to this action.

In witness thereof, I have hereunto subscribed my name on this August 2, 2023.

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HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:	
ANGELES LINK COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP	VOLUME II

TRANSCRIPTION OF AUDIO RECORDING

Meeting via Zoom Videoconference

Friday, July 21, 2023

Transcribed by:

Daisy Reyna

Job No.:
42911LEE

HEARD BEFORE SO CAL GAS
ANGELES LINK TEAM

In the Matter of the Meeting re:)
)
ANGELES LINK COMMUNITY BASED) VOLUME II
ORGANIZATION STAKEHOLDER GROUP)
_____)

TRANSCRIPT OF PROCEEDINGS, held via Zoom Videoconference, commencing at 9:00 a.m. on Friday, July 21, 2023, transcribed by Daisy Reyna.

Via Zoom Videoconference; Friday, July 21, 2023
9:00 a.m.

MS. MARQUEZ: Good morning everyone, and welcome to today's CBO Stakeholder Group Member Workshop. This is the second for this week. So we really want to thank those folks that are joining us this morning here in person, and virtually. It is greatly appreciated.

As you know, this is a hands-on approach that SoCalGas is taking, so we really respect your feedback and want to hear from you from today's six presentations that will be discussed here today. So first, I'd like to introduce myself; my name is Alma Marquez, and I am the CBO facilitator for the Angeles Link Project.

And joining me today will be Emily Grant, who will also be co-facilitating with me for today's presentations for this workshop. Before we get started, I'd like to ask Sidney Rogers, who will be giving us our land acknowledgment.

MS. ROGERS: There we go. Oh, goodness. Hi everyone. My name is Sidney Rogers. My pronouns are they and she. I'm from PESA. Which is Parents Educators Students in Action. Land acknowledgment. We

respectfully acknowledge the indigenous peoples' on whose ancestral land we gather. Of the diverse and vibrant communities of Tongva, Tataviam, Serrano, and Kizh and Chumash people, whose generations have cared for these lands and make their home here today.

We honor and pay our deepest respect to their elders descendants. Past, present, and emerging. As they continue their enduring stewardship of these lands, and waters for generations to come. We acknowledge our collector responsibility and commitment to elevating the stories, culture, and community of their original caretakers of this region, and are grateful for the opportunity to live, and work on these ancestral lands.

We celebrate their resilience, strength, and unwavering spirit of indigenous peoples' and are dedicated to creating collaborative, accountable, and respectful relationships with indigenous nations and local tribal governments. Thank you.

MS. MARQUEZ: Thank you, Sidney. So to get us started, I'd like to go over some housekeeping rules. Just to remind you that we are recording today's presentation. Especially for folks who are joining us virtually, we will be recorded.

So we want to remind everyone that we do have a court reporter here as well. So if you could please

state your name and organization you're with, that way she's able to correctly transcribe everything that's being recorded here today. Also, we want to make sure that you understand, for folks who are joining us here virtually, if you can please unmute yourselves so you can speak, and raise your hand so that we can call on you for feedback. Also, remember to use the raise hand feature so we know you want to ask questions, and we can get back - get to you in a timely fashion. For folks here in person, we do have the wireless -- wireless microphones that we will hand you.

What we've been doing to make this easier, is -- if you could have your -- set your table name tag to the side that way we know that you want to speak. Okay. I know we have teachers here -- would rather us -- have you raise your hand, but no need today. All right. And so as we move forward with today's workshop, I just want to go over the agenda.

First, we're going to start with an environmental and social justice analysis that's going to be given by Sebastian. Then we're going to move on to the Hydrogen Leakage Assessment. And we do have a special tour that's called Innovation Experience -- that's going to be here on the -- on the premises across from the parking lot.

And that's going to be a 30-minute tour, and that's going to be at 10:35. So folks who are interested in that, please meet at the door so that the SoCalGas representatives can make sure that they see you, and you're able to walk on over for the tour.

Then after that, we have a Greenhouse Gas Emission Evaluation, then we'll set way into lunch and go into our next discussion, which is our Nitrogen Oxygen Emissions Assessment. And then we'll get some -- go into our next presentation, which is the Stakeholder Feedback Tracker Process that will be given by Insignia that are here today this morning. And then we'll break and go into Right-of-Way Franchise.

And then last, the Debrief and Wrap-Up. We'll also be -- I know that there was feedback given to us at Wednesday's presentation for some folks who are interested in hearing a little bit about water. So we may trickle that in throughout today's presentation as well. And Edith Moreno is our expert who will be speaking on that topic.

So again, I just want to say welcome and brace yourselves because it is a quite bit of a long day in a short way, I like to put it. And we look forward to getting from your -- hearing from your feedback. So with that said, I'd want to first kick off and do self

introductions, and we'll start with the folks here in person. So we'll go ahead and get started with Emily to my right.

MS. GRANT: Thanks Alma. Good morning everybody. Emily Grant, Publics Affairs Manager with Angeles Link. It's great to see everyone.

MR. GARZA: Good morning. Nice to see everyone. My name is Sebastian Garza. I'm a Project Manager with the Angeles Link.

MR. DANKER: Hi, good morning. Jeffrey Danker, Franchise Fees and Policy Manager at SoCalGas.

MS. RODRIGUEZ: Morning. Sonia Rodriguez, Safety and Health Manager.

MS. ROGERS: Hi. Sidney Rogers, Social Worker Internet PESA.

MS. VEGA: Andrea Vega with Food and Water Watch.

MR. ARANDA: Good morning, everyone. Good to be here again. Enrique Aranda with Esperanza (inaudible).

MS. ANDREWS: Good morning. Shawna Andrews with Reimagine LA.

MR. LOPEZ: Good morning. Frank Lopez Director of Regional Public Affairs for SoCalGas.

MS. LYKENS: Good morning. Alisa Lykens in

Safety and Environmental.

MR. KEOCHEKIAN: Good morning. Armen Keochekian with Safety and Environmental.

MR. CARRASCO: Good morning, buenos dias. I'm Andy Carrasco, Vice President of Communications Local Government and Community Affairs. I'll be talking to you shortly.

MS. MORENO: Good morning, buenos dias. Edith Moreno, Regulatory Strategy and Policy Manager, Angeles link.

MS. TRACY: Good morning, Jill Tracy. SoCalGas, Angeles Link Senior Director Regulatory and Policy. And good morning, and thanks for everyone coming in on this beautiful Friday, and for joining us virtually as well. Thank you.

MR. JOHNSON: Good morning, I'm Darrell Johnson, Environmental Services Manager for SoCalGas.

MS. MARQUEZ: And then we're going to go ahead and popcorn over to folks that are joining us here online. And we'll start with Andrea Williams. If you can please unmute yourself.

MS. WILLIAMS: Hi, everyone. My name is Andrea Williams, I'm the Executive Director of the South Side Coalition of Community Health Centers.

MS. MARQUEZ: Welcome Andrea. I see Jerry

Salcedo. If you can please introduce yourself, and unmute yourself.

MR. SALCEDO: Good morning. Good morning. Good morning, my name is Jerry Salcedo, Executive Director of the Southeast Rio Vista YMCA.

MS. MARQUEZ: And in no particular order, I'm going from what I see on my screen. Let's kick it over to Marcia. If you can please unmute yourself.

MS. HANSCOM: Good morning. Marcia Hanscom with the Ballona Wetlands Institute.

MS. MARQUEZ: Kristin Fukishima (phonetic). If you can unmute yourself.

MS. FUKISHIMA: Hi. My name is Kristin Fukishima, I use she and her pronouns, and I'm with The little Tokyo Community Council.

MS. MARQUEZ: Lydia Ponce.

MS. PONCE: Lydia Ponce, Society of Native Nations calling in from Suangna, infamously known as Venice, California. And I'm also with American Indian Movement.

MS. MARQUEZ: Okay. And I think we have Christopher Arroyo.

MR. ARROYO: Good morning, I'm Christopher Arroyo, and I work at the CPUC.

MS. MARQUEZ: Okay. I think I've called on

everyone that's a CBO. Am I missing anyone? If I did, I apologize. If you can please unmute yourself and introduce yourself. Oh, Andrea Leon, if you can unmute yourself.

MS. LEON-GROSSMAN: Good morning, buenos dias. My name is Andrea Leon-Grossman and I'm the Deputy Program Director of The West with Vote Solar.

MS. MARQUEZ: Faith Myra.

MS. MYRA: Hi, my name is Faith Myra, she/her, and I'm with Protect Plan Now.

MS. MARQUEZ: Alex Jasset (phonetic).

MR. JASSET: Good morning, everyone. Alex Jasset, he/him pronouns, and I'm with Physicians for Social Responsibility Los Angeles.

MS. MARQUEZ: Jesse Shelton.

MS. SHELTON: Hi. I'm Jesse Shelton, I'm a program coordinator with California Dreamworks.

MS. MARQUEZ: And last but certainly not least, Robert.

MR. FANDAHOOK: Good morning, and buenos dias. My name is Robert Fandahook (phonetic). And I'm calling from Sylmar, which is Northern LA area with Tataviam ancestral lands and wildlife there. And I am founder and environmental scientist, and geographer of Ballona Wetlands here in Los Angeles, California. Thank you.

MS. MARQUEZ: Thank you, Robert. And I believe we have everyone that are joining us here, virtually. Thank you. Okay. Now let's go ahead and move on with our next part of our agenda. And I'm going to go ahead and introduce Sonia Rodriguez who's with SoCalGas, will be giving us today's safety message.

MS. RODRIGUEZ: Hello, everyone. And thank you again, for the invitation. So today I want to present on the importance of staying hydrated. So cheers to everyone, stay hydrated. It's hot out there. Okay, so I want to start off by asking this question; So if you are in -- in Skype. Is it Skype or teams? Or what are we using? Zoom. If you are on Zoom please feel free to answer in the chat function.

What is hydration? What is hydration?

(Singing)

Anybody? Anybody? Oh wait, what's the jeopardy song? I forget.

(Singing)

No? No one? No one? No one in chat? Anyone? What is hydration. I gave you a hint right here. Adequate levels of water? Yeah. Well, very close. It is the act or process of combining, or treating with water. So water is second only to oxygen as essential to sustain life.

Water is one of the most overlooked aspects in our daily lives. Most people drink more coffee and soda daily than water. How many of you -- raise your hand. How many of you -- now think about it, drink more -- other drinks that are not water?

Just plain water? Coffee, soda, Kool-Aid. Did you know that dehydration can cause fatigue? According to the MAYO Clinic, the number one trigger for day time fatigue is dehydration. It can also cause unprepared or cold muscles and joints. So which -- one of the things that we don't realize is that because -- our muscles and joints are unprepared, it can lead to a higher risk of injury; right.

Of injuries such as sprains and strains. And it has been proven that hydration increases the efficiency of our circulatory system. Providing necessary oxygen, enriching blood to organs and muscles, and allowing for a peak performance.

Another thing that dehydration causes is low blood pressure, and that's why you sometimes feel tired. So further consideration, it takes very little loss of body water to create a significant negative impact on our body. So as you can see from this slide, it just takes a small percentage to put -- put us vulnerable for injuries, but also right now that, you know, we're

experiencing a heat wave and it's hot out there, heat illness. We're more susceptible to that.

Especially when we're not acclimatized. So -- I have a couple of questions for you guys. Are you ready? Are you ready to participate? Virtually too. I want to see you guys -- I want to see -- too bad I don't have prizes, but knowledge is a good prize. Okay.

How do we prevent dehydration? Anyone? How do we prevent -- we heard it over here. Drink more water. It's simple. Drink more water. All right. Second question; I know you guys hopefully drank at least a cup of coffee this morning, maybe. Stay hydrated.

Second question; How much water do we need? Do we need:

A) 8 cups per day.

B) half your body weight in ounces.

C) no one really knows.

D) 12 cups per day.

Or, E) I don't need water.

You say 8 cups? Okay. Anybody else? C? No one really knows. C? B? Anybody in chat? Anybody? Do we have any responses in chat? Did anybody say D? Nobody said D?

All right. So actually, the answer is really

not on this list. The answer is actually over 12 cups per day. The Institute of Medicine recommends that women, listen up ladies. Women -- we should be consuming 11.25 cups of water per day. In comparison to men; men, you need more water. Men, they require 15.5 cups per day. Okay.

So did you know 3 out of 10 people drink the proper amounts of water on a daily basis. This means that 70 percent of us -- that's a big, huge percentage of adults are chronically dehydrated. I mean, that's a strong word; right? Chronically. The average American drinks 2.5 cups of water per day.

Next slide. So here's my reaction. Say what? We only drink 2.5 cups of water in comparison to 11 cups for women and 15 cups for men. That's a huge difference. So we are chronically dehydrated. So how do you know if you are dehydrated. With three simple things. Ask yourselves these questions.

Are you thirsty? If you are thirsty, then you are already dehydrated. Don't let yourself get thirsty. Make it a point to drink water. Have you taken a bathroom break? Simple fact. If you are not going to the restroom every couple of hours, then you are dehydrated. And then very important, what's in the color? Well, yellow is a very important color in this

situation for dehydration.

So, when you do go to the restroom, check. Check and see. If you are below the red line there, then you are dehydrated. So next thing, tips to add more water to your daily lives. So here are a couple of tips. Very simple tips. Try to drink 2 cups of water as soon as you wake up in the morning. Before your morning coffee, if you're a coffee drinker -- or a tea drinker. Remember coffee and tea can dehydrate.

Try to drink water every hour or -- or -- or before you have a meal -- an hour before you have your meal. Drink water with your meals. When you are craving sweets, you may be also dehydrated. So drink water. You might be thirsty. Keep water in your hands of reach. And have fun. You know, maybe buy one of those bottles that tells you, you know, at this time you have to drink this -- this much.

This much however time. Or contest with your friends, coworkers, family . To encourage each other to drink more water. So as a reminder, water -- water is the driving force of nature. According to Leonardo de Vinci, and I agree with that. So cheers everyone, and drink water. Stay hydrated. Thank you.

MS. MARQUEZ: I see a hand raised by Robert. I don't know if he wants to add to Sonia's safety

message. You're muted, Robert.

MR. FANDAHOOK: Okay. Can you hear me?

MS. MARQUEZ: Yes.

MR. FANDAHOOK: Great. Thanks, Alma. Thank you for the great presentation on hydration. Very informative. I just wanted to add a little -- as a scientist biologist. I just wanted to add a brief little bit of trivia.

All of our different animals on planet earth have different hydration needs. As a quick example, desert animals have very interesting kidney systems. Our mammals in the deserts, like our camels, it's quite essential, doesn't have to drink for -- for days because it stores the water.

Kangaroo Rat here in the American desert have a -- have a special kidney urination system that allows them to not have to drink water ever. Humans, and pigs, and cows are closely related in having to urinate every few hours. And that requires us to drink water constantly. As it was nicely pointed out, and it shows our origin to be in the tropics, in a rainforest type of environment origin. So indicating why we have water available, and we're always drinking it.

So even though we've moved as humans to different parts of the earth, we haven't lost our

origins evolutionary to being a tropical animal, nor have pigs, or cattle -- dairy cattle, or -- that may require lots of water and water tropes to drink constantly, also. FYI, little ecological and evolutionary addition supplement for you. Thanks.

MS. RODRIGUEZ: Thank you, Robert. That was very informative, thank you.

MS. MARQUEZ: Thank you, Sonia Rodriguez for your safety message for this morning. We'll definitely all drink to that. Thank you. With that said, before we move on to Andy, I do want to say we have a few more folks that have joined us online. Jamie Patino, if you can introduce yourself with your name, and what organization you are with. If you could unmute yourself, Jamie.

MS. PATINO: Hi, greetings. Good morning. My name is Jamie Patino and I'm here with Los Angeles Indigenous Peoples' Alliance. I'm happy to be here today.

MS. MARQUEZ: Welcome, Jamie. And then we have Ida Vega. If you could unmute yourself, and introduce yourself.

MS. VEGA: Hi, good morning everyone. Ida Vega with Elms Family Services.

MS. MARQUEZ: And we have Rashad. If you can

introduce yourself as well. Unmute yourself.

MR. RUCKER-TRAPP: Good morning everyone. My name is Rashad Rucker-Trapp (phonetic). I'm with Reimagine LA Foundation Executive Director.

MS. MARQUEZ: Thank you everyone for joining us. And with that, let's go ahead and turn it over to Andy who is going to give us our welcome.

MR. CARRASCO: Absolutely. Good morning everyone. I'm Andy Carrasco. Vice president of the longest title ever. But that's okay. Really what it comes down to is our external affairs and external connections with our communities. And that means all of you, who are here both today.

And those who have joined us virtual from across our service territory. So thank you for being here today. I'm just here to just say thank you and welcome you back to our second day. It's been a very intense week. It's been a very productive week, and my ask is, continue to lean in into this productivity. I think we all learn best when we get to hear each other, when we have space for each and everyone.

Because it's about perspectives. It's about the ability to bring in where your sitting from and the company -- and the communities that you represent. The constituents who are looking at you to bring their voice

to the table, and we want to continue to have that with us here today. We are looking at a very intense day today. There's quite a bit of topics I know the CBO group is very interested in.

I got -- I got a chance to listen to Wednesday's meeting and it was very engaging. I'm not going to be disappointed, I'm just kind of thinking ahead of what the comments and the appreciation of where you sit that will add value to the discussion. So my ask is, please continue to have that engagement, and collaboration. We're going to be covering quite a bit of interesting and very pointed environmental, and land use topics.

And I think that's going to be very important. We have our subject matter experts, as you can tell. This esteem group of folks who have joined us that are different from Wednesday. And they're going to bring their perspectives, and give you a sense of what those feasibles -- feasibilities studies are going to look at.

And this is a time to engage in that respect. I also will tell you that we've had these questions come up, you know. We are talking about phase one. We're talking about feasibility studies, versus full-blown studies that are going to come later. So let's put that into perspective so as we look at these feasibility

studies, we are looking at it through that lens.

I will ask and end with one thing, because for me, community is key. And I did get a chance to take a look at a quote from Cesar Chavez. And he said, "We cannot seek achievement for ourselves and forget about progress, and prosperity for our community".

And that really means we got to be holistic in our approach, and having these workshops and having this CBO is part of that engagement. So with that, thank you for having us. Thank you for being here.

MS. MARQUEZ: Thank you, Andy. So with that said, as Andy mentioned, let's get diving into our first presentation. And it is the environmental and social justice analysis. I think this is going to be -- I think, very familiar to some -- most of you here who are a part of the CBO's. It was for me. So if you guys could -- I really look forward to your engagement in this discussion. And I'll go ahead and hand it over to Sebastian Garza, who is going to give us this presentation . Sebastian.

MR. GARZA: Thanks, Alma. Again, great to see everyone here, in person and online. Andy, thank you for your comments about leaning in. I'm tired, you know, day four for us. I'm sure everyone else is tired. But we're really hoping to get some good feedback from you

all. And we're excited to present this information to you, and the environmental justice analysis is very important to this project and very important to the gas company. And I know it's very important to you all, and we're really looking forward to hearing your thoughts and your comments.

I'll be doing the environmental analysis portion of the presentation. My partner Alisa, is going to lead us into the environmental justice portion of the presentation. And I'm going to turn it over to you to kick us off. Okay. Thanks.

MS. LYKENS: Good morning, everyone. I'm really happy to be here with you all today. Just a little bit about me before I get started. Just to give you a perspective of myself and -- my career has been in public service, up until five years ago, when I joined Insignia Environmental. I'm an environmental biologist by -- by training.

Other than my life at the federal lev- -- at the federal energy regulatory commission, I -- I served many hats there, listening to stakeholders -- stakeholder outreach was one of the requirements we needed for (inaudible) of the proposed natural gas projects that came before the FERC.

I did -- I've been all over the country

listening to stakeholders and their concerns, meetings with Native American tribes, with other community groups. And I know that the just like the CPUC, the FERC is very interested in ensuring that outreach -- that the appropriate outreach is taken.

So -- but I've been in the Insignia for five years, and in the five years time that I've been here, the environmental justice has been something that's been developing, as you know. In both of the states, and in the federal level. And we've been able to work on some projects for FERC. On the federal side and look at the different energy projects. And so we're bringing in our knowledge and experience from the federal side.

Plus, Insignia being -- is not -- it's been in California for 19 years. Specializing in environmental review rather than citing in CEQA. So together with the CEQA, you know, this experience that we bring in the feasibility stage is really paramount. So I'm really happy to be part of the team.

And I hope I get to talk to some of you during the lunch and the breaks. I appreciate your time this morning, and listening to my story . So what I'm going to do today is -- this is the slide I'm going to present, and I know there's a lot of words in there and information. So what I want to do is kind of break it

down for you a little bit. In a minute I'm going to share with you the tool that's listed in the top there. The CalEnviroScreen tool.

Some of you are maybe familiar about this already, but I'm going to give you a little tour of it. So it might help explain some of the terminology better, and give you some definitions.

And then it will also give you websites. You'll have the access -- you can see the websites, and you can go on yourself and play with the information. Because it is actually somewhat user-friendly. And it's got very good directions. The directions, I think, are pretty clear. So we'll be doing that in a minute. But before we even get there, because we are in a very preliminary stages, the very first thing before you can even move forward with and, you know, analysis is you have to map the proposed -- or the planned facilities on the RGIS data information. So that's the mapping data.

And we're going to be using the same data stat with the EG analysis, as we are for the environmental feasibility studies that Sebastian is going to talk about. So we're all working from the same data, the same information of where those facilities may cross through the communities.

So with the very first thing that you want to

do is, once you have those shape files prepared and the project is planned out, to start looking at the impacts that you might have and the benefits. Use available environmental justice screening tools. Which are available. And these are based on GIS mapping like I just said, and the US Census data. So every 10 years, the federal government does the census, and hopefully we all participate, and this information is broken down by the federal government by the census bureau into a census tracts.

And even within the census tracts is broken down further into census blocks. So this is how this tool works, in looking at affected communities. It's from the reporting from all of you, as citizens, reporting back to who lives in your home. And so, this is important just to know that's where the data is, and that's the data that's set into these mapping programs.

And so it's a lot of information, I know. But really this -- the important -- the objective of this study really is to make sure we can determine the benefits to the communities. We, obviously, will identify some impacts and -- like this slide says hotspots, but I'll get to that in a minute too. Let me go ahead and get started. Give me a second to get set up here. Thank you.

All right. So this is the CalEnviroScreen. This is one of the screening tools. Like I said, the information is embedded in the program. So the next step is that our GIS team will go in, and fuse and shape maps with the project facilities laid out. Pull the information from this Cal screen. And the data will be inserted onto the mapping. And then, we'll be able to use that mapping. But I wanted to kind of show you what's included in the data. I just talked about the Census Bureau information. So let's -- let's continue.

You can see this is the website, it is administered by the Office of Environmental Health Hazard Assessment. This is actually -- this page is the website. So it's not the program itself. But it gives you a lot of information about the program, the map -- different mapping tools. And then down here, there's a data dashboard.

So there's certain statistics, or -- or information you want to know about; a population, or census, or city. Maybe the demographics of who makes up that -- that count -- that area. You can look the this information. And they have a really cool story map on race/ethnicity based on the CalEnviroScreen information.

So that's all available there for your use. But right now, I'm going to jump into the actual

application. So this will be -- this comes up, and this tells you right away what this is. I'm going to highlight this. So you can read that. It says: "CalEnviroScreen is a screening tool used to help identify communities disproportionally burdened by multiple sources of pollution and with population characteristics that make them more sensitive to pollution."

So off to the left, you can see there's a little user guide. It tells you how to -- to click on and look for its -- the information you are looking for.

I thought it would be kind of appropriate -- let's have some fun with this. And I have the address of this resource energy center. It's right here. So let's see what kind of communities are around us, where we're sitting right here. For those who are here in person. O9240. Oops, it's not -- here it goes. Here it is. See how it just popped up as soon as I had it in there. And there we are. Look at that. Let me back up a little bit so we can see some more.

All right. So I backed up enough for you to see the census -- the census blocks and census tracts that I was talking about. So this is -- if we -- the community that we're sitting in is census block 6037551102. And that to the government is how they can

get information about that -- the people that live, or work in this particular community.

And if I click here, it tells me that's where you are. And if I click down here on the actual census tract -- and let me pull this up here. It will tell you that there's 5,427 people that live here, and this is the definition for this particular data set. There actually three -- actually there are three different data sets -- I should have said, for CalEnviroScreen.

So this is the very first one. This is more inclusive of all the percentiles and statistics. So let me explain a little bit of what this is. This is the results for each indicator, range from 0 to 100 and represent the percentile ranking of census tracts.

Relative to other census tracts. So when you see these percentiles that I'm going to show you in a minute, that's going to mean that they fall either, you know, really high towards the 90's, or lower within -- within the rest -- when you compare it to the rest of the census tracts. Oops. And these are some of the -- right of way you can see -- oh, I'm sorry.

You can see the pollution burden percentile's pretty high. This is just a little snapshot right now where you can -- that we can understand, and we can take on from that information. Some of the exposures -- so

these are some of the issues that Darrell is going to, you know, be talking to us about later.

Ozone, particular matter. Ozone is not so high but the particular matter is fairly high. He also talks about traffic, and then environmental affects. He'll tell you the different kinds of environmental clean up sites and groundwater contamination potentially, hazards waste, etcetera. And those the percentiles. Incentive populations. I know this is important.

The health and impact assessment, you know, consider those with asthma, low birth weight, cardiovascular disease. And socioeconomic factors. Education, linguistic isolation, poverty, unemployment, and housing burden.

And this is pretty cool, too. You can just click on here and it'll tell you the makeup of the communities. And then the last one is an L -- talks about age. Click on that. The majority of that -- the people who reside in this census tract are between 10 to 64. And children age 10 or less. So this will tell us a little bit more information about the group of people that reside.

All right. So this is -- I wanted to show this particular model because it gives, you know,

understand of how the census tracts work in the data. And then if you can imagine what we put that pipeline through there, or whatever the facility is, then we can see the census tracts that are affected, and then this information pops up.

And we get -- we collect a lot of data. So that's the basis of how this works. How you do the screening. And then there are other maps in the CalEnviroScreen that I think you'd find interesting. I'm not going to spend to much time of those, but I want to show them real -- to you really quick.

So let me go back. Oh, here. Let me show you -- this is -- this one that if you really want a quick snapshot of the top 25 percent of all disadvantaged communities in California, this is where you go. And we'll just really quickly see if this is within the top 25th percentile.

So it tells us -- I'll come back where it was. What happened? All right. I don't know what happened there. We'll try it again. But anyway, there is a screening in here. And I will tell you, I've done -- I don't want to go back. But it does -- this area does fall within the top 25 percent. So I'll stop there and move on to the next methodology.

The next methodology is a federal level

methodology, and this is the -- the reason that we're using both the state and the federal tool is because this climate economic screening tool considers other factors. For example, energy, climate, different kinds of -- categorize the burdens a little bit differently than the state of California does. So by using both -- both of these programs, we'll be able to kind of utilize all the data and get more information about communities, and see how they are impacted.

So I wanted to share with you this climate tool website. Because I think it's really informative, and you can really see -- sorry, I don't have a mouse. It would have made a lot easier. And this also -- the federal tool definitions are different of what a disadvantage community is versus the state. So again, there's a lot of different factors, a lot of information here. But again, this website is available for you as well to take a look at and try to -- to grasp.

All right. So let's go back -- let's go back to the sharing. PowerPoint back -- oh, thank you. So now that I've kind of explained a little bit about how the mapping works, I'm hoping this flowchart makes a little more sense as I go quickly through it. So once we have identified our disadvantaged communities, this information will be downloaded into a lot of data that

we'll be able to sort through.

We're going to identify the communities or hotspots that scored really high in the threshold that I just showed you, and we're going to compare to the state, the federal levels, and even around their own -- the other tracts in the given area. And then our analysis will include potential benefits and impacts on the communities.

It will evaluate mitigation measures to eliminate or reduce impacts. We will be talking a little bit later about the routing and citing, and so a lot of this information that's gathered for this project will be reviewed, and then as alteratives and routing feasibility, if we feel like the route -- high point route may be particularly impactful to a community, there's ways to -- you can reroute it, you can find it -- you can move it to maybe -- to parallel a road instead of going right through the community.

You might be able to re-site it, find another location where it makes sense, or you can even reduce the environmental footprint and do a new reconfiguration of the facility so it has less foot fingerprint, and less impact. So there's just different ways there -- physically that you can address the facilities.

So once the report is finished, it will be

included with the rest of the feasibility reports and provided solicited feedback for you, for the CBO, and PAG stakeholders.

So and I think with that, I'm going to conclude. Thank you very much.

MS. MARQUEZ: Thank you, Alisa. I think we do have a question from Enrique for this presentation. We're going to allow some folks to kind of ingest some of this information, and ask some questions. Enrique.

MR. ARANDA: Thank you, Alma. With all due respect, I think -- I think SoCalGas has done an incredible job in matching expectations and really being responsive to our convening in June. However, I find this -- your presentation very offensive to me as of color.

Most of us have been active in the environmental justice movement for over 25 years. And not only have we taken off polluters, like XI, we've taken on regulatories agents like EQ and D. In 2001, I believe, we fought AQ and B on Route 1402, that permitted emissions levels and particle matter to a mortality rate.

There was permitted mortality rate, and that's just unacceptable. And we see the this coming pipeline with the same death, or life impact, or importance. And

what I mean about that, is when you speak about GIS and art view, and you speak about data sets, we'd like to know how you can extrapolate the data in terms of our life or death reality that we face like communities like Southeast LA. Communities like Wilmington that are impacted, not just by mobile sources of pollution, but stationery source of pollution that have gone away for too long.

When you talk -- we talked last time, I guess Tuesday, about the curation of routes, and we began a discussion about how the status quo citing of rails for the pipelines, are -- represent -- in terms of colonialism, represent death, to a lot of us and our families and our communities that are living or subjected to living in these types of conditions.

So going forward, I thought we were going to have a social justice dialogue. I thought we were going to have a speaker. Maybe an academic, like -- there's so many I can think of. USC comes to mind, Doctor Pastor. We can speak about environmental injustice and how we can get it right. If we're going to have such a public investment like LA Link, we need to do it once, we need to do it right. From beginning to end.

And this subject -- and the importance of social justice being -- the majority of CBL's here,

being what we're about day in and day out. I just find it very offensive and hopefully we can reconcile this fall, Paul. Thank you.

MS. ROGERS: Hi. This is Sidney from PESA. I think it's really important to have public forums in engaging the public in communities, when it comes to this kind of stuff. Really talking to communities of how much living -- living -- living close to these kinds of stuff and how long they've lived -- lived -- lived to these that rerouting them would -- would impact their communities.

And just taking -- taking it away would do -- how much --how much -- how much would it impact, as opposed to taking it away completely. Rerouting it might -- might do 20 percent of the impact, as opposed to taking it all the way, would do 80 percent of the impact. You know what I mean? And if SoCalGas could have that kind of impact, think of the kind of work that could -- that could really, really have -- have on that community. As opposed to thinking 20 percent of, look what we did. As opposed to taking it all the way, and we took it to another community.

And really engaging the community of -- of -- that have been living close to this playground for 20, 30, 50 years and some other -- some other company had

put it there and left it there for a long time. And -- and it's time to have these kind of conversations now. Instead of going well, we did the work and it's time to move on now. As opposed to having meaningful forums, and hearing from the community. This is just something to really, really think about.

MS. MARQUEZ: Andrea, I think you have a question.

MS. VEGA: Hi. Andrea from Food and Water Watch. I just want to say, you know, we're not even an hour into this so far, but it has been deeply frustrating. Looking at the data, our communities are much more than just data points. I want actual honesty from SoCalGas on what you would consider if you essentially sacrificed zones.

So can we actually get transparency on this process, and can we get -- I really want to elevate the comment from Enrique, of getting like a third party academic to step in and do these presentations and actually have a dialogue rather than being talked at.

MS. GRANT: Can you guys hear me okay? Hi , Emily Grant with SoCalGas. We think that's a great idea. We'd love to hear names and suggestions of folks you would like to hear from. That would be really, really helpful.

And this whole conversation, this is exactly what this is about. Catching our blind spots. So we really appreciate the open honest feedback. This is exactly what we need to hear. So let's maybe talk offline if you have -- or just shoot me an online e-mail about anybody you have, that you can suggest that we can bring in. We're absolutely open to that.

MS. MARQUEZ: And maybe Alisa, you could share, before we move on to a comment from Lydia online, of how this too is going to benefit, but also using alterative processes that are out there. Maybe hearing from folks here of what we're missing. Because this is just, I feel like, the beginning of this process. But we're incorporating other process, or maybe your organizations have something you use in place that identify disadvantage communities that are not part of the CalEnviroScreening.

Because we know there are, you know, some folks are off by point one percent because the air quality is not as bad, you know. So there are some communities that are, like, in the gray area that are not even reflected in this tracting system.

MS. LYKENS: Yeah. So I -- let me just kind of -- kind of say that, you know, this -- this platform using the tools, they're just tools. They're just a way

to start the process, and take a look at what the data is. And then, I think that by this process here that all of us doing today and in the future, getting comments and feedback, and talking to you, we understand the communities.

You're here, tell us, you know. Using that information plus the comments that we receive from you, that will help us get the report to actually -- actually address your concerns and, you know, based on the initial findings of the CalEnviroScreen.

So it's just an initial tool. It's not the entire process. The entire process is not going to be based just on the tool. But it is a starting point for the routing. When we put the routing on there, to see the communities that are affected.

And then from the feedback that we receive from the stakeholders, and comments that we receive on the report all throughout these processes, it will help us work with the other -- the other people -- pair the other feasibility reports and the other technical areas. And look at alteratives that might benefit which, you know, benefits include not just job creation, but there are other benefits.

Hydrogens would remove some emissions that once in operation versus the natural gas and the another

commodities that are out there. So it is a waiting game. And so I want to the remind you that we are really early in the process. So thank you very much.

MR. LOPEZ: Frank Lopez with SoCalGas. Thank you for your comments. I really appreciate your honesty. I don't want to be dismissive of your comments. I have to step away, but I wanted to say something. As she mention that -- this is preliminary analysis; right.

This is phase one of three phases. And I think as we start to get closer to identifying more specific routes, and alignments, and identifying the communities that could be impacted; I imagine that as we move into phase two, as in we move to phase three, we will be doing more quality research as well as we go into the community and speak to the individuals themselves about the potential impacts and get feedback.

So this is -- we're very early in the stage. We're just trying to map where these communities are. I'm familiar with Dr. Pastor. Dr. Pastor actually developed the CalEnviroScreen; right. So we're using one of his tools in this session. So I just -- I want to acknowledge it and say I completely understand where you are coming from. There will be more opportunities to engage with communities directly, we're committed to

that.

MS. MARQUEZ: And I believe we do have a question from Robert, who has raised his hand in the chat. Robert, if you can unmute yourself please.

MR. FANDAHOOK: Thank you, Alma. Yes. My name is Robert Fandahook, and I'm an environmental scientist again, with Defend Ballona Wetlands. But I was also a geographer trained, and mapping, and demography, and the census really depends historically on the field of geography. So I understand this, but most of all, I wanted to just support the very first speaker, Enrique, and -- and also what Andrea has said from Food and Water Watch. This is very disturbing.

And I'm a white Anglo Euro-American, but I came here as an immigrant, and I lived in a lower income area of Sylmar, also. And I -- English is not my first language, and I've always felt -- even as a white person, I've felt down trotted in various ways in my schooling and education.

In terms of transparency, I'm struggling with -- here I am speaking in English, and Enrique spoke in English, and Andrea spoke in English, and you know, and we gave an acknowledgement -- a land acknowledgement. But -- and we -- and we -- some of us said buenos dias, those two Spanish words. But there's -- we have a

really -- and we're talking about, we as representatives here in this gathering with this corporation, and we have the United States a representative government because we can't have every single individual speak, nor whatever individual would maybe to want speak or able to speak because they don't speak English very well, or don't have confidence.

How do we -- how -- here we are struggling in an all English speaking meeting, and I'm not sure -- in LA in particular, is the most diverse city in the United States with more than 110 languages spoken here and -- and we have the largest -- we know the Navajo people, for example, live in Arizona and New Mexico, and the four corners of Utah, Southern Colorado, but outside of the Navajo Nation, the largest number of Navajo indigenous peoples are in California.

Primarily in Los Angeles and San Francisco. Two large urban areas, and many of them still speak Navajo. They speak Navajo language and communicate back to their families in Arizona, and that's just one example. The largest Samoan population, out of the Samoan of the Pacific Islander peoples, is in Los Angeles and they live in highly polluted area.

The highest Hawaiian native peoples population outside of Hawaii, is in Los Angeles, and the list goes

on and on. I just recently learned how many people of Zacatecas are in urban Los Angeles, and they speak three languages. English, Spanish, and their native Aztec language. The best of the three languages they -- and they are an indigenous tribal peoples displaced from Zacatecas here in LA and they're not heard.

And I'm feeling this to be -- my native language is Dutch from Holland, and the largest Dutch population outside of Holland is in New York, because of the history of New Amsterdam being the former colony. But -- and now I'm talking about colonialism and imperialism.

But Los Angeles has, historically, had an extremely High Dutch-American population which is one of the reasons my parents bought me as a baby to Los Angeles to be with other Dutch people.

But this just goes on and on, and I think that of all the federal government agencies that are doing the best on this topic is the National Park Service. Believe it or not, is responsible for culture and they have a vision and a plan for having 100 National Park Sites in Los Angeles for the 100 cultures and languages, and it's not embraced yet. But it's coming. And that's going to overlay on all of this.

If we're going to talk about pollution, the

National Park Service is a leader and understanding that. Air quality is obviously the focus, but there's also visual pollution of where the siting's are of the plants. Noise pollution, light pollution. Trees, and habitats with animals that gravitate to when you have trees planted of different kinds. And water is barely mentioned under the pollution category. I understand that air is the focus, but it just came to my mind in thinking from my opportunity to speak for a few minutes, about education and bringing in the arts, to this topic.

I was thinking about this French artist who put up on Interstate 5 and the Grapevine these large yellow balloon-like structures to show the footprint. I think we need an art thing that is above ground, and choosing yellow as its color to show where all the buried pipelines are in Los Angeles running.

So along our streets and everything, we have all these yellow native recycled materials that would be like an art project, showing a physical presence of how Los Angeles is cross -- crossed in grids of pipelines going this way and that way. Whether it's water, sewage, gas lines, and so that it's all buried and out of site, primarily.

And some of our oil wells have decorative architecture around them, so we don't even know that

there -- pollution -- that there's an oil well buried that hidden behind these four walls of a nice architectural structure. We have -- we have so much being hidden from us, and I think we need to have an art exhibit at the beginning of this whole process.

I know it would cost some money to do that, but it would also employee a lot of people who could be involved in the creative things, and this line of yellow piping or cart made -- maybe made of -- I don't know what it would be made of, but it would physically be -- would be visible physically to all Angelenos everywhere to show the structure. I know I've been long-winded here. So thanks for your patience in listening. Thank you.

MS. MARQUEZ: Thanks, Robert. Yes, thank you for that feedback. Yes. We do have part of this presentation that we still need to go through. So thank you for your feedback. And as Frank and Emily have mentioned, you know, this is a process that we're taking everyone's feedback, and making sure that we're streamlining it and making more accessible for everyone that makes sense, especially with these topic.

I do want to acknowledge that Lydia has put in quite a bit in the chat. And Lydia, we will make sure we record that and we will be following up with you with

that. But to answer Robert, we do have translation available for folks. We do have an organization that represents the Oaxacan community, that's a large concentration here in LA. Quiz part of the CBO, they have not been able to attend. But we do want to make sure that we are representing as many communities as possible, and that's why you are all here. Because you are representing the LA basin. And we are trying to be as inclusive as possible, and want to make sure that we're not leaving anyone outside.

So I hope that answers a little bit your feedback you sent us, Lydia. But as I mentioned, we are recording every comment that we are receiving. That's why we have a court reporter here, who's putting everything in writing and where our goal is to run a full transparent process, and we will not censor you in any way whatsoever. So please be sure of that. And we really appreciate your feedback, and your honesty because that's going to help us run a pure and transparent process.

So with that, I'll hand it over to Emily, and then we'll move on to our next speaker.

MS. GRANT: Sorry -- sorry I'm trumping at the bit. Emily Grant, SoCalGas. We did have translation services for our first few meetings. And when Lee

Andrews Group has been doing such a great job in connecting with you all, they're asking the question whether or not folks need translation services. So those are available.

Please do communicate that to us, so we'll find a way to make sure that we have accessed information in any language that any of our participants may need it. Or as we dig deeper in the community and move further along into the project, please do make us aware of any languages that we may be missing or translation services that we can provide. We have access to that and we'll absolutely do it.

MS. MARQUEZ: Thank you, Emily. And with that, we'll go ahead pass it over to Geoff Danker who will lead us to the next part of this presentation.

Yeah. Just to acknowledge we did have a comment from Lydia asking where the indigenous -- where are the indigenous on your map. So we want to make sure that we get back to you on that question, Lydia, and make sure we speak to you offline to make sure we are including -- and Geoff is going to further answer that question now.

MR. DANKER: Yeah. Hi. Lydia had a comment in the chat about where the indigenous communities are in the map that was shared. Just wanted to highlight

that CalEnviroScreen is one tool that we are utilizing to understand our communities. It's a state based tool that's widely used in agency proceedings, and stuff like that.

I completely empathize and understand your thoughts of that we need to humanize those numbers and put real faces behind those numbers. But just want to highlight that we do have tribal lands mapped on our public web page, as part of our climate adaptation program. And so that will include layers on CalEnviroScreen, as well as tribal communities, as well as some other criteria. And then if you can click on some of those communities, it will actually spit out some social economy statistics if you want to dive deep into specific communities.

But just want to highlight for Lydia, that engagement with tribal communities is absolutely part of this project, and the CalEnviroScreen is just one of the tools that we are utilizing to understand the communities we're working with.

MR. GARZA: All right. Let's see. Can you go back one more. Now go forward one more. There we go. Okay.

So hello again, everyone. Sebastian Garza; SoCalGas project manager on the Angeles Link Project.

We're going to pivot now to sort of a more traditional environmental analysis that we're going to be working on for this project.

So I'm going to walk through sort of the objective, and the scope of this analysis, and kind of how we're going to be conducting this analysis. So -- so really, the objective of the general environmental analysis is really just to identify existing environmental conditions within our proposed project areas. And really we're going to make sure that, you know, our -- that we're demonstrating compliance with all applicable rules and regulations. Environmental rules and regulations. So really, the scope of this environmental analysis is going to cover a few different -- a few different items.

The first being the potential pipeline routes, and all the associated facilities, like above ground regulation and compression facilities. The second item is the potential third party production facilities, and we talked a little bit about that in the previous meeting we had on Wednesday. And thirdly, the third party storage facilities.

So we'll be look running at all three of these project components using a desktop environmental analysis and we already touched on RGIS and mapping

tools, and essentially that's what we'll be using. A very similar tool to conduct these environmental analysis. As of right now, we don't have any intent of doing any fieldwork. This is really just feasibility study to identify the existing conditions. Next slide please.

Okay. So how is this going to be done, I already kind of touched it on the desktop nature of this analysis. We will be using a lot of mapping tools. We're going to be collecting publicly available data sets. Geoff already mentioned the tribal lands data sets that are available. We'll be incorporating that. We'll be incorporating biological natural resources information. We'll be looking at blue line streams.

We'll also be including -- we'll also be looking at -- excuse me, confidential data sets including California national diversity database, data sets, and also cultural resource database. Again, we'll be using GIS and also aerial imagery to overlay these different data sets against our proposed project areas. And using that to identify any potential impact areas.

And really, the idea, again, is to identify those conditions and come up with ways to avoid or mitigate any potential impacts. Next slide. Okay. So I will say that this is not a CEQA review or NEQA

review. We are not there in this part of the project. We do expect, at some point, to have that process for this for this project. However, we do not have any lead agencies, or lead agency identified at this time or are we -- nor we're seeking permits at this time. So I just want to let everyone know that, you know, that is going to be later on down the road as we move forward with this process.

But I did want to cover off on some of the topic, subject areas, that we'll be looking at for the more general environmental analysis. And again, if you're familiar with, you know, the CEQA review or NEQA review, this should look fairly familiar to you. So some of the areas we'll be looking at are aesthetics, agricultural, and forestry resources, biological resources, cultural and tribal resources, energy, geologically and soils, Hazmat, hydrology and water quality, land use and planning, noise, and transportation.

And that is the environmental analysis in a nutshell. I will pass it off to Alma for comments and questions.

MS. MARQUEZ: Any questions on Sebastian's presentation? And I don't see any hands raised in the chat at the moment. So it looks like you're going to

have a thorough overview of all these topics you just mentioned -- all these subjects.

MR. GARZA: Yeah. We'll be utilizing in the Insignia Environmental to help us with this review. They've done Cal, you know, work in California for many, many years now. They're a trusted partner and again, we'll be doing a desktop analysis on these items as part of the feasibility -- phase one feasibility studies. And as we move forward, obviously, we're going to get into more detail in each one of these.

MS. MARQUEZ: Question from Jill Buck. Jill, if you can introduce yourself. I know you joined us. And then if you could unmute yourself.

MS. BUCK: Yes, hello. Thank you so much. My name is Jill Buck. Sorry, that I couldn't join in person. I'm located in Northern California, and I couldn't make it down this time. But I'm the founder and CEO with the Go Green Initiative. I've worked with SoCalGas for many years. In fact , you know, I have someone on my board of directors from your parent company Simpra.

And SoCalGas has allowed us to do some really good work in the Compton Unified School District. And that's really the lens through which I'm viewing the material that you are -- that you are presenting today,

and, you know, we are very concerned about the impact on children's health and their exposure to environmental pollutants.

And so that's why I asked the question just wondering, if proximity to school sites would be considered. And thank you so much for inviting me to be part of this group. Thank you.

MS. MARQUEZ: Thank you, Jill. And I'll let Sebastian answer that question.

MR. GARZA: Thanks Jill. Yeah. I'm trying to jog my memory. There's an assembly bill that requires outreach to schools, and hospitals, and forgive me I don't remember the number off the top of my head. But yeah -- AB1937 or 57. One of those. But in short, yes. We do outreach to schools, we do outreach to hospitals. I believe senior housing, things of that nature. So, yes. Outreach to those folks would occur in this process.

MS. MARQUEZ: And I do want to welcome Raul. If you want to introduce yourself, and say which organization you are with.

MR. CLAROS: Yes, thank you. Good morning. My name is Raul Claros (phonetic), I'm the Co-founder of Reimagine LA Foundation. We're a 501(c)(3) that as an umbrella organization to 43 other local grassroots

non-profits, across LA County. We're not your cookie cutter type of foundation. We're boots on the ground. We're made up of a group of historical committee organizers, specifically from south LA council districts 8, 9, 10, as well as the Pico Union, K-town area council districts one. And in the Northeast Valley, we have a network in council districts 6 and 7. So the Northeast San Fernando Valley.

We're just very thankful to SoCalGas. One, for hosting this space. Being inclusive of the black and brown communities that we represent. You're not only doing it here, you've been doing it in the ground. As many of us know, the bills that we get, we're very appreciative when we open up most of the time, the gas bill being the cheapest bill that a lot of our communities get.

And since my time at the Red Cross, as a former Executive Director of the Northern Valley's Chapter, that's how I got connected to SoCalGas as an agency, as an entity, and a lot of -- Enrique -- and a lot of mutual friends shared spaces in that collaboration between SoCalGas and the Red Cross.

And it was there where I challenged SoCalGas to start working with some of the smaller mom-and-pop non-profits. You know, down at the grassroots level.

To really make that investment into communities of color where a lot of our -- constituents didn't even know about a lot of the great programs that you all have had.

And so I've seen that vast improvement over, specifically, the last 24 months of you opening up this type of space where usually black and brown people are not at table. And if they are, they're speaking for our communities, not living in our communities. They're coming down from more affluent areas, and don't even take into consideration real black and brown folks really still living in the hood that can't afford some of these high-in-the-sky, Sacramento, kind of led conversations.

And so we just appreciate having a seat at the table. My colleague Rashad Rucker-Trapp has been joining in all week virtually. So I decided to tag in and come down here on a Friday. I got a little lost. So my apologies for being a little late to discussion. But I just wanted to bring that to the table just from a real life, real time perspective. From a boots on the ground agency that is usually the agency that's working with the real folks that are doing the work, that don't have a grant writer, that don't have the community relations officers. So we happen to fill that space. Right.

So we wanted to give you guys that testimony this morning, and we appreciate the space.

MS. MARQUEZ: Thank you, Raul. I don't see any hands raised in the chat at the moment. So just to be respectful out of your schedule and your time that you are giving us today, we do want to go ahead and take a break and prepare for the tour. So the -- for folks that are online, we'll resume at 11:00 -- at 11:00 o'clock, 11:05 let's say. So we can prepare for the experience tour. The innovation experience tour. Oh, Sebastian, you want to say one more comment? Sure thing.

MR. GARZA: Sorry to interrupt, Alma. I just want to address Marcia's comment in the chat -- I'm sorry. Thank you.

So there's a comment by Marcia about tribal lands, and on the mapping tools it's typically only federally recognized tribes, and just want to acknowledge we are aware of that, Marcia. We'd be really interested in, kind of, out of the box ways of contacting, sort of, the non-federally recognized groups and the non-federally recognized families that are out there.

So any ideas from this group, from you Marcia, would be greatly appreciated. Thank you.

MS. GRANT: Emily Grant, SoCalGas. Another reminder too, that feedback is being recorded in many different ways. So everything that's said today, we have a court reporter obviously, the zoom meeting is being recorded, and then we have Insignia, who you're going to hear from later, who is also tracking comments, as well as we are too. So everything that's put in the chat, everything that's said verbally, we're taking that feedback in.

So just want to remind you, don't feel like you have to think that you dropped something in the chat, or said something here today that's going to get lost. It's not. We're tracking everything. And we're going to sort it out, and it's going to be part of the feedback that we use to move forward with the studies.

MS. MARQUEZ: Okay. And we'll take one last comment from Raul, and then we'll wrap up for the --

MR. CLAROS: Yeah. So that's kind of when I walked in, when I think we were discussing maybe -- I don't know what we're discussing language, or just representation in the indigenous community. And I'm happy that the Oaxacan community is being acknowledged. We're currently working on the Oaxacan corridor, going down Pico Boulevard. And so the Oaxacan community is very dear and near to my heart.

Growing up in the Pico Union, K-town area where a large con- -- you know, concentration of Oaxacans and Central American lived there, and the Mayan community from Guatemalan, Central America that speaks different languages.

So we're willing to offer our support to this body and helping you reach more languages, more communities. We have a very close relationship with a lot of tribal leaders, and indigenous communities. So whatever we can be of service to this body to help bring more of that representation, that's what we're excited about being here, is that we hope we're tapped to do more. So just wanted to share that to the discussion.

MS. MARQUEZ: Thank you, Raul, for your -- giving us a hand in this process and acknowledging that this is an area we need to grow and explore and be more inclusive of. So thank you for your comment.

So just in a few minutes, if folks can take like a five minute break, and we'll be going to the innovative experience. Folks online, we'll go ahead and log back on at 11:05. So please don't disappear. Come back, and we want to continue to hear back from you.

And also to acknowledge we do have some more folks that have joined us online. I believe we have about three new organizations that are joining us.

Jill, I know you are one of them. I'm not sure if you want to go ahead and introduce yourself.

Oh, it's a 30 minute tour, so we'll introduce you when we get back. So thank you and we'll see you in a few.

(BREAK)

MS. MARQUEZ: Okay, everyone. From the tour, I hope it was a great experience. According to what we have here in our tour language that we gave you. And again, I just want to reiterate that this is a process. We are in phase one of this Angeles Link Project, and we are taking all of our feedback and comments and recording them, and making sure that we're not forgetting it and not ignoring it, more importantly.

And we are learning from you, and what your experiences are, and bringing them to the table. That's why we are all here around this table to make sure that we're being as inclusive as possible. And with that said, and to be respectful with our agenda, I want to go ahead and move us forward with the next part of our agenda which is the Hydrogen Leakage Assessment. And we have Darrell Johnson who will be our presenter for these next studies. Darrell.

MR. JOHNSON: Thank you, Alma. First, just thank you all for your attention today. Kind of want to

give you a little background as to why I'm going to talk about hydrogen greenhouse gas, and NOx, or nitrogen oxide admissions. I'm the environmental program manager for California -- Southern California Gas Company. I've been with the gas company for about 23 years.

Prior to coming to the gas company I worked at South Coast Quality Manager District. I started off as an inspector doing everything in the industrial section, task force, you name it. Went to rural planning and development, and ultimately the chemical/mechanical division of engineering. After working in the chemical/mechanical division of engineering for a number of years, I came over to the gas company.

And I only lay out that foundation so that -- I kind of want to summarize some of what I'm doing today in the sense that, I am actually going to describe the approach for assessing, you know, hydrogen leakage and assessing the amount of potential greenhouse gas and then assessing the potential for NOx, right.

And the reason that I've kind of say that they're all inner related in a way, my approach for each will be very similar and that's kind of the reason why I wanted to give you a little background, even though your agenda separates them, I kind of want to -- I want to give you the opportunity to ask me any question you --

you want to ask. I just think that I don't want to show you similar sides, and be redundant where I can maybe discuss our approach, and then answer any questions you might have, if that makes sense.

And I did hear some of, you know, the comments and concerns earlier about, you know, this overall effort. I just want to -- to kind of reiterate from -- from at least my standpoint, and the company's standpoint. This is a feasibility study. So we're actually examining the feasibility, or possibility of even doing it. There's no decisions have been made and even when I assess these gases, hydrogen, greenhouse gas, or the potential for these gases and NOx.

It will be an assessment, not necessarily identifying impacts to an area or, you know, a group; right. So if we're -- where this is assessment is going to depend on all these studies like, you know, production, demand, the planning of location, all of these things will, you know, fit into the assessment and what we're going to do in the process is evaluate.

Is there a potential concern or impact or consideration that we need to make before moving forward to the next stages. So I wanted to kind of lay that foundation because I think it's super important to understand that we're just evaluating the potential, and

that you guys have a real opportunity, and we have a real opportunity to interface with you to make sure that we consider all the things that should be considered in the process, right.

So I kind of want to lay that foundation. And also share -- and I talked to a couple of folks already, I'm from the community. I grew up in South-Central. You know, I was just talking about Sean about towels and getting some food on Fifth Ave on Florence because, you know, I'm going to a spot she recommended for me this weekend, as a matter of fact.

So thank you for that. So I'm not -- I'll move on. Thank you. Just to give you an overview of our approach, right. So we have an objective from the scoping plan to identify the potential for leakage -- hydrogen leakage. And I don't assume -- I'm a geek, like, you know, I'm a civil engineer. I don't wear a pocket protector, but I might have been accused of wearing one once upon a time.

So I want to kind of break it down a little bit, so I don't get my geek mode, and if I do please check me. So if you have any questions you don't understand I'll take the time and make sure you do. So hydrogen -- we always say the word hydrogen, right. Hydrogen is one hydrogen molecule. When I talk about

hydrogen leakage, I'm talking about -- or the potential for hydrogen leakage, I'm talking about hydrogen gas. Which is two hydrogen molecules, right. And when we put hydrogen into a system it will be in a form of hydrogen gas. So I wanted to start there.

Hydrogen is the most abundant element in the universe, right. And because of that -- I want you to remember that, because when I start talking about greenhouse gas and NOx, you'll see why I kind of wanted to kind of have a general discussion, because they're all gases. They're all in the atmosphere, and they're all related. And they all have the potential for various interactions.

So and one of the things we've been mandated to do, is to do an assessment for the potential of hydrogen gas leakage. We have a little bit of experience with that. I won't say a little bit of experience. We have a lot of experience with that, and you guys may be aware of the work that's going on with the State California Air Resources Board that mandates us to do reporting of our methane emissions from our infrastructure, right. The carboline gas rule.

Well, I would say that if I had a crystal ball, that if hydrogen goes the way that, you know, the general direction is pushing it, there will be

regulations very similar to the carboline gas regulation for hydrogen, which will mandate requirements for, you know, inspections, maintenance, best management practices, leak detection concentrations, and thresholds.

We have those currently under the carboline gas with methane. Which is CH4, which has four hydrogen molecules. It's just a different gas, and that's the reason why I kind of want to level say, all we're really talking about here is gases and the potentials for gases to interact in. I'm going to get into that more deeply.

But for right now, I just want to say our objective is to, you know, identify the potential of leakage associated with production storage and transmission. The project, right. And we will -- and also look at mitigation measures to prevent leakage. We already know a number of mitigation measures that work effectively for gases, like methane, right.

It could be a specification of the equipment, you know, regular inspection and repair. There's a number of opportunities that are already in place for other gases that, I think from a mitigation standpoint, will also be employed for hydrogen. So we're going to -- basically, we're working with Stantech, and the University of California of Irvine. And our approach is

this, we're going to look at every resource that's available today that's out there on hydrogen, right.

We're going to take that research and we're going to set up a calculation approach. We're going to prioritize that calculation approach, and identify what makes the most sense.

And then from that calculation approach -- from that calculation approach, we're going to basically determine the methodology to scale it from a unit level, right. So we're going to identify the sources of potential leaks, right. Whether that be valves, flanges, threading connections, pipelines themselves, compressor rod packing.

Whatever the potential for leakage in the hydrogen domain for this project, we're going to examine what's available from a resource standpoint, from a science standpoint, from known information whether that be, you know, government regulations, etcetera, and so on. And we kind of have a great head start in that we are already doing the same thing for methane, right.

And what we'll do is we'll take that information, we'll take our assumptions, and our estimation process, and we will calculate emissions from the entire group of potential sources that this project will affect. That being, you know, hard to electrify,

industry, you know, the storage and transmission and productions section. We're going to look at that and come up with an overall assessment of the potential for hydrogen leakage, right.

So I kind of wanted to paint that picture, and also kind of give you some foundation in the sense that we are -- our process is really going to be the same across. Most of our efforts is really to examine the research, examine the available data, examine the studies, and the emission factors, determine the methodology.

When I say the methodology, you know, does that mean miles of pipe times and emission factor, does that mean data disk of already collected in the field and determine to be the appropriate emission factor. What's available. There's the a lot of research going on as in -- in relationship to hydrogen now.

If I paint a quick picture, I started the Greenhouse Gas Inventory Program For Southern California Gas Company in San Diego gas and electric, in 2003. That's exactly 20 years ago. The IPPC, which is the International Panel of Climate Change with the United Nation Organization in Association with the World Resources Institute, they decide what the global warming potential of different chemicals are, right.

Since that time, they've have had six assessments, and the global warming potential for gas like methane has changed. And the reason I say that is we're going to examine those kind of things for hydrogen as well based on the science that exists today. The emergent -- emerging science, right. But for this group, I would say that we are going to put the best assessment that's possible based on information that's available today.

And in truth, we understand that technology changes at the speed of light and that assessment may change as information changes, but we're going to do the best we can with the information and the scientists here today. So you can go to the next slide, next slide please.

So this is kind of what I just discussed, we're going to identify the potential calculation approaches, we're going to determine the best calculation approach, and then we're going to determine the calculation methods for the selected approach.

So it's really the data, the availability of data, the equations, the you know, the known collected information. We're going to take the state of the art information to use our -- our -- to determine our assessment. We're going to scale that at the unit

level, right. Again, whatever the equipment is, we're going to determine the emissions for a type of equipment, and scale it up so we could look at the whole universe and potential impact of the project itself in the production transmission and storage areas.

So that's the overall plan for hydrogen. The hydrogen gas, and assessing potential for hydrogen leakage from that. And if you have any questions, I'll answer your -- any hydrogen questions you might have right now. And then I'll kind of share a little bit more about greenhouse gas and how hydrogen might be related to greenhouse gas.

MS. MARQUEZ: Just to kick it off, Darrell, can you give us a little bit more background on differentiating between GHG and NOx versus leakage?

MR. JOHNSON: Oh, I was -- I'm definitely going to get into that. I was going to segue, but I'll do it now. So you know, we're talking about chemical elements, hydrogen being number one on the periodic table, and the lightest element in the universe, right. So that's hydrogen and two hydrogen molecules is what hydrogen gas consist of, right.

So hydrogen in it of itself is not a greenhouse gas. It -- however, I said all the chemicals are related and, you know, they react with one another.

Scientist believe that hydrogen may have influence, a chemical influence, on other greenhouse gases. And I don't want to get deep. I tell you, you stop me because I can become a geek. Hydrogen and hydroxyl oxide, which is OH, the two of them make water. OH and H is H2O, right. But OH is an oxidation out in the atmosphere, right. It actually limits the impact and lifetime of a lot of greenhouse gases. The traditional greenhouse gas is -- when I say greenhouse gases I'm talking about methane, talking about NOx, SF6. There's a number of greenhouse gases, carbon dioxide, and they're all naturally in the environment, right.

So if you add or increase the amount of one chemical in the environment, it will and has the potential to impact others. But the benefit as we talk about greenhouse gas is that the whole point of this project is to decarbonize the pipeline. Why? Because CO2 is the number one greenhouse gas. It represents 70 percent of the greenhouse gas in the environment, right.

And it is -- and when we talk about -- I should take a step back and say, what are greenhouse gases, right. We already talked about gas in it itself. All that greenhouse gas is, is a gas that is in the atmosphere, and when the suns light and the sun is full

of radiation, and that energy impacts the earth every day. Some of these gases are able to absorb that light or radiation from the sun, and in absorbing it, it basically stays in the atmosphere or reflects back on to the soil. And in the end result what does that do? That warms the planet, right.

Warming the planet is good. And I say that to say, because it would be a cold place if there wasn't natural global warming. The only problem is, is that we have the anthropogenic, or manmade contribution of, you know, since the, you know, 1800 -- the industrial age. We've been creating new devices, internal combustion engines, and these activities have added to the load of gases in the environment increasing the warming process.

That's global warming in a nutshell, right. And the reason they call it greenhouse gas and the term greenhouse gas effect, I'll simply put that, you know, if there's a greenhouse gas -- a greenhouse is basically a glass house built for plants. The sun comes through that glass, and that glass absorbs the radiation from the sun, and it warms the house.

That's why they call it the greenhouse gas effect. Because that medium, the glass itself, is absorbing the radiation from the sun and warming that house. Keeping it warm. It's analogous to what the

various molecules that are called greenhouse gases do in our atmosphere. As the radiation from the sun comes down, some of that radiation is absorbed, and it's absorbed in the form of heat, okay.

So that's, you know, what greenhouse gases are. Hydrogen is not a greenhouse gas, but as I explained, because it's a chemical in the atmosphere, they're evaluating its chemical reaction with other gases. That's yet to be determined. The IPPC hasn't given greenhouse gas a global warming -- excuse me, hydrogen a global warming potential. There about five studies that we're evaluating as part of our assessment better have gone on in the last two years that I've done research in that area. And we will be speaking to that in our assessment.

So that's hydrogen, and that's greenhouse gas. Now, why is the hydrogen pipeline and the greenhouse gas important consideration for us? Because hydrogen, like I said, the most prevalent greenhouse gas is carbon dioxide, right. When they talk about decarbonizing the pipeline, the most prevalent greenhouse gas in the atmosphere today is carbon dioxide, but all gases have a global -- not all, but mo- -- greenhouse gases have global warming potentials.

One of the other gases that is, you know,

concerned in that contribution is methane, right. Natural gas is 96 percent, 94 to 96 percent methane. And so natural gas has a global warming potential, 100 year global warming potential of 25.

Some say 100, some say 80. Depends on the assessment, and we go based on the regulation. And we are using assessment 4, which is 25. So what that means is the global warming potential of methane and being 25, that means 1 molecule of -- of methane is 25 times more potent than 1 molecule of carbon dioxide, right. So the warming potential is greater, right.

That's the reason that everybody in the planet is trying to decarbonize things, right. If you remove carbon dioxide, CO2, and you remove methane, CH4, from the equation, then you remove some of the most potent greenhouse gases from the equation. Thereby lightning the load to the entire atmosphere. And I hope -- and if there's any questions please jump in, because I've been running with it. I'll pause.

MS. MARQUEZ: Okay. I think we have a hand up in our virtual group here. And it's from Faith.

MS. MYRA: Hi, thank you. I'm glad you brought up OH, and the IPCC report. So from my understanding is the IPCC report did not find that there was a problem with hydrogen being an indirect greenhouse

gas. Because it is a greenhouse gas, it's an indirect greenhouse gas as opposed to a direct greenhouse gas. And they didn't study it at all. So it's not that they didn't find that it was a problem, they didn't study it.

And the next one is going to include those effects but it's not going to be until 2028.

So I, you know, there's like Princeton and Noah are looking into what are the effects going to be long term. And I appreciate that you all going to do a study. To be honest, I'm not as interested in a private industry study as I am in, you know, a more -- a more independent study on this. But if this research continues and they find out that it does have a severe impact, is SoCalGas ready to switch gears?

MR. JOHNSON: So Faith, thank you very much for the question. I just want to clarify that I -- I didn't say we were going to do a study. I said we're evaluating six studies that have taken place between 19 -- excuse me, 2021 and 2023 that have tried to approximate the global warming potential of hydrogen, right.

One of the most recent studies has even tried to normalize five of the studies. And -- and just to clarify, I said that we will be -- part of our research is evaluating that information for our assessment. So I

hope that clarification helps.

MS. MYRA: Yeah, and then the second part of my question is, what is SoCalGas's plan, if we're finding out this isn't really a viable option for the community at large?

MR. JOHNSON: I don't know that we have a plan on all the things that we are going to do or not to do. This is an assessment, which will help us determine if there are issues, and that's the whole reason for the evaluation of greenhouse gases, and hydrogen leakage, and other considerations like NOx.

MS. MYRA: Okay. Thank you.

MR. JOHNSON: Thank you.

MS. MARQUEZ: Okay. I don't see any other hands up in the chat. Are there any questions here from our in-person members?

MR. JOHNSON: I just want to --

MS. MARQUEZ: Go ahead, Darrell.

MR. JOHNSON: I want to say like -- I want to finish the NOx piece because they're all three very important. And I don't wanted to de-leverage any concerns that might be out there. And so -- and you know, this really as opposed to going into my presentation I'm really trying to paint a picture, everything is important , right.

But the potential for hydrogen leakage is an important assessment. That's why we are doing it. The potential of reductions, and increases, and the information that provides clarity on both is important, right.

Because we know we're going to get reductions in greenhouse gas, we're also examining if there's any potential for increases. And we're also examining what mitigation opportunities for hydrogen gas, what mitigation opportunities for greenhouse gases are out there. So I just want to be clear before I moved on to NOx, right.

And, you know, NOx is a concern because NOx is a contributor precursor to ozone. Most of Los Angeles is non-attainment for ozone. NOx is also a precursor for particular matter, 2.5 microns. So PM 2.5. And it's one of those things that we look at when we do any type of combustion equipment. We have to receive a permit, and it has to be the best available control technology.

What we're going to examine the potential impact of NOx as well. And just, you know, painting the picture so that most people who don't know really what NOx is, because we throw a lot of names out there, a lot of terms and I just want to make sure I do my best to

explain what these terms are.

NOx is commonly associated with nitrogen monoxide, which is NO, and nitrogen dioxide which is NO2. The combination of both of them are commonly termed NOx. So NOx is nitrogen oxides, those are two oxides from nitrogen. Not to say that they're the only oxides from nitrogen. Nitros oxide, N2O, is laughing gas and it's out there, it is a greenhouse gas.

We're going to look into NOx as it relates to the storage transmission and in user swipe. Try to get an idea -- an assessment as to what the potential for NOx is in those areas, and what potential mitigations are out there for those areas.

Again, this is not a new area of study per se, hydrogen can be a new area of study for, you know, in the time frame, right. It's only been considered in the last four to five years. And I want to kind of take one step back and say; so how is NOx created , I think that's an important understanding. NOx is generally only created through combustion, right.

NOx happens naturally in the environment. I'll tell you, NOx is a part of the natural chemistry. Every time we have a lightning strike, when we have one, like I don't know, throughout the planet like every second or every other second. I don't remember the

exact statistics. But every time we have a lightning strike, the temperature is high enough, it actually creates NOx.

So -- it -- we -- naturally we have nitrogen and oxygen gas. N2 and O2. It takes a lot of heat to make NO or NO2, right. That reaction takes place through heat, right. In the form of industrial operations combustion, right. When we combust fuels at high heat, the normal air that we breathe right now is 28 to -- excuse me, 21 percent oxygen, 68 -- 78 to 79 percent nitrogen.

So there's a lot of nitrogen in the air we're breathing right now. So when a high temperature event takes place, like combustion, that nitrogen in the form of just regular air, is going along for the ride. But that high temperature basically causes a chemical reaction that forms NOx. Hydrogen, if we were to combust it, combust at a high temperature. So we're going to look into the potential for NOx in hydrogen combustion situation. However, we're also going to look at mitigation measures.

One mitigation measure would be not to combust hydrogen. There's a lot of potential out there. But saying that to say that this methodology of looking at the research, coming up with the best calculation

approach, determining a method to make that approach scalable, and then coming out with an assessment.

We're going to do that with hydrogen gas, we're going to do that with greenhouse gas, and we're going to do that with NOx. And since there's so related in a chemical standpoint, I thought it would just be easier to talk about the various gases. And then the most important part that we're trying to share with the group today, is that we're here to do an assessment.

If there's any information that anyone here in the audience or in the phone, or in the group at large has in consideration for research, for mitigation efforts, we want -- you'll be helping -- we're all on a the team. We're here to help each other.

So if you have information, please share with Emily, Emily will seminate it to me, and I promise you we will consider that in evaluation of our calculation methodologies and approaches. And in general, that is my presentation as it relates to hydrogen gas, greenhouse gases, and NOx. And I'm open for -- I'm here all day. I'm open for any questions you have.

MS. MARQUEZ: I don't know about all day, Darrell, but at least until 2:20. We'll be here 'till 2:20. Just kidding. I do see a hand up and I -- it's from Robert. So Robert, if you can unmute yourself and

ask the question for Darrell.

MR. FANDAHOOK: Hello. Good afternoon now. Robert Fandahook. Thank you very much for the nice presentation, and I really appreciate that you referred to it as nitrogen gas every time that it is nitrogen gas. But there was once or twice where you just said nitrogen when you were referring to nitrogen gas.

MR. JOHNSON: My apologies, Robert.

MR. FANDAHOOK: No worries. No worries. I did the same thing with -- earlier when we were talking about other gases too.

The thought here is that nature on our planet earth, we are a nitrogen atmosphere. Astronomy -- astronomers remind us of that. It's 80 percent of the air atmosphere is nitrogen. And that's a lot of nitrogen we inhale in every breath and exhale. And our lungs can't use it, and so it just goes in and out and it's a triple bond. It's like a diamond bond, like carbon with a triple bond or a quadruple bond or whatever -- with diamonds. You can't really break it apart, unless you know, nature -- is like you mentioned lightning.

And that's just a tiny little nitrous oxide that's made that -- made that way. And so when nitrogen is broken apart in plants, beginning in our evolution

and in our animals -- amino acids, it's the part of the energy along with phosphate that, you know, and it's imbalanced. And we really need to think of nitrogen, not nitrogen gas -- actually nitrogen, we need to think of nitrogen gas as positive and we need to think of nitrogen combined in our bodies and in plants as -- as important.

And we have to really be appreciative of those certain bacteria that formed a relationship with some of the plants in our world so that it can take that triple bond of nitrogen gas, and turn it into energy in plants, you know. It's the legumes, the bean family in particular. Something George Washington Carver was very aware of in his chemistry and bonding studies Iowa.

And used to realize he could take dead soils from cotton, you know, dead soils from cotton in tobacco farming that were totally wrenched of all their nutrients. He could plant members of the bean family that being soybeans and peanuts, and he could turn it into a living soil again. And that's all because he understood -- he understood the chemistry and bacteria of fungi that -- that is in the ecosystem.

So just a couple of positive words about nitrogen, but we do have to be alarmed when it's -- when humans create nitrogen, nitrous oxides, and make it into

a pollutant. So maybe we can get to a place where we won't have nitrogen oxides in our atmosphere anymore. And Yeah. Any ways, little science popularized there to supplement your excellent presentation. Thank you.

MR. JOHNSON: Thank you, Robert. I'm glad to know that somebody else is a little bit on the geek side like me.

MS. MARQUEZ: Okay. So is there any other follow up questions for Darrell, because we could break for lunch right now so that we could continue on with our proposed agenda, and return with Darrell with any other follow up questions. Or we could let Darrell wrap up right now and then head to lunch. The decision -- we could make a communal decision here. Should we just let Darrell wrap up and then we could go to lunch? I'm seeing some -- Darrell --

MR. JOHNSON: Thank you very much for indulging me in your attention. I appreciate it.

MS. MARQUEZ: And also a reminder, that we did send you the studies that we're going over today and it's also been dropped in the chat. It was sent over to you on July 6th. We'd be happy to get you that copy again, if you'd like for folks that are in person here today. And before we break, we did have another person join us, Thelmi Alvarez, you want to go ahead and

introduce yourselves we'll make sure we break bread with you as we go towards lunch.

MS. ALVAREZ: Sure. Put me on the spot, Hi, everyone. I'm Thelmi Alvarez, I'm the Director of Climate Services For the Watts Labor Community Action Committee. WACLC here in Watts. Nice to meet you all.

MS. MARQUEZ: Thank you Thelmi, and I would never put you on the spot. But I just wanted to make sure you were introduced. Thank you, and we'll go ahead and come back in 30 minutes. So we'll come back at about 12:15. We did want to offer -- yes. Hold on.

MS. GRANT: So really quick. I think you remember in our June meeting, we surveyed the group to see which of the study descriptions or which of the studies you wanted to review at these workshops. Water was not one of them that made the list for this group, but we're still happy to talk about it.

So we can approach that in a couple of different ways. Because we noticed that -- what day is it, Wednesday's meeting, that water was brought up a little bit. So we don't want to turn a blind eye to that, if that's something that the group wants to discuss.

So we can do it in one of two ways, we can have a working lunch where Edith would be happy to go --

because she oversees the water study, she'd be happy to go over water with you during a working lunch, or as you have questions that pertain to water, ask them when they kind of peek your -- okay, so, no pun intended, but we'll sprinkle the water conversation throughout the day if that works better for group.

Is that what I'm seeing? Yeah, Andrea. Let's get you a mic so zoom can participate. And we'll put -- drop it on the chat as well, folks on zoom, how you feel about water. Because we heard it a couple of times, and we don't want to ignore it.

MS. VEGA: Yeah. So Andrea Vega with Food and Water Watch. I think maybe a third option would be, can we have a separate meeting, workshop, just focused on water. I think that way we can really have a more flashed out, cohesive discussion on it.

MS. GRANT: We can talk about that. We can do an optional kind of session with Edith. I'm on the spot here. But --

MS. MORENO: I will say that the purpose of this -- of all of these meetings is to get input on all the scope. And so there really wouldn't be enough time to fill a day that would just be focused on water. Again, which is why our presentations are so short and that we shared all the study descriptions with you all.

This is -- these workshops are to get input on scopes. So I don't know if you want to add anything else, Jill.

MS. TRACY: Yes. So Andrea, in response, you know, all these presentations are really meant to be very brief point in time. 10 Minutes and then another, perhaps, like, 30 minutes to get your feedback. And that's why we probably like to address it. It was the lowest ranked study of all the studies where we polled you at the June 22nd quarterly meeting.

And so we do want to be mindful of everyone's time. The good news is that we are running a little bit ahead, and so if we do want to take a brief lunch, we can keep the same format, because this is really not to go over a compre- -- you know, we have a milestones in Insignia. We'll be having a presentation about the study milestones between the scopes of work, the technical approach, the preliminary findings and data, and then the draft reports all into June of 2024.

And so there's pretty significant feedback tracking system that we're going to be presenting on. And right now, we're at the first milestone and that is the scopes of work. And so if we think we can fit in -- it would be the same presentation that the planning advisory group had -- was it yesterday, and so maybe we can do that.

And then if you have further questions, Andrea, we have a whole feedback system and a tracking system that we're going to be presenting on, and then we'll be able to get your feedback at that time. Does that sound good?

MS. GRANT: So we can tack that onto the end today, so if there's folks just to be respectful to everyone's time, if people need to be leave we understand that. But we can put water onto the end of the presentations today. And also a reminder too, that you do have all the study description; so even if it's not a topic that we present on today, you can still provide -- use the study description to provide written feedback by July 31st.

MS. MARQUEZ: So let's go ahead and break for lunch, and resume back at 12:20. Thank you.

(BREAK)

MS. MARQUEZ: All right. So our next part of our agenda is our Stakeholder Feedback Tracking System. And here with us this afternoon, we have Armen who is with Insignia, and he will go ahead and get us -- will be our presenter for this next topic in our agenda. With that, I'll hand it over to you Armen.

MR. KEOCHEKIAN: Okay. Thanks, Alma. And good afternoon everybody. Armen Keochekian with

Insignia Environmental. I'm going to break up the day a little bit by talking about something much lighter than what we've been talking about today. So we wanted to spend just a few minutes to talk about what we're doing with all this feedback you guys have been providing at these meetings and the feedback you'll be providing on the milestones.

And give you a certain comfort level that the time and energy you guys have been putting in isn't going in vain. So you know that the meetings have been recorded, they're transcribed, the zoom transcribes it, the court reporter transcribes it, and then there's an audio recording. And so we're going to be introducing a little bit of redundancy, and I want to explain why we're doing that.

We set up this common tracking system in order to help track the comments that you guys provide through this phase one system, and I'll describe that a little bit. I'm not a database person or an IT person. I'm actually for the past 20 years, I've been doing environmental compliance management of natural gas pipelines.

But myself and the number of the folks here provided input on the database on how to set it up so we can make sure we can get the most information out of it.

There's four -- four milestones with the phase one feasibility studies. You heard that a few times today.

I just want to reiterate that these four milestones are specific to the feasibility studies. So right now, we're at the first milestone which is a study descriptions. Those went out to folks, I think last week. The study descriptions are just a very high level, brief summary of what the studies are going to be discussing.

The next milestone is a methodology, or the technical approach, now I will provide more detail on how we're going to go about doing these initial studies. And you'll have an opportunity to comment on those. And then after that, when the data is collected, and we have the preliminary findings, that will go out to everybody and you can take a look at that and provide comment before the final, or I should say the draft reports are prepared.

So each -- each milestone will have one comment period. And there's four milestones for each study. There's 16 studies. So there's about 64 different opportunities to comment on the reports. Comment periods are typically -- are going to be about a month for each deliverable. Somewhat variable, depending on how the schedule goes, what the study is,

and how complex it is, and when these meetings occur. But generally a month for each one.

This -- the comment period on the first milestone -- the scope of work, the study descriptions I believe closes at the end of this month, so the 31st. And we may group those with multiple reports into one comment period depending on, if some of the reports are finished faster or they take longer. And then we have a couple different mechanisms for submitting your input or your feedback.

The first one is these meetings. Everything that you say is recorded, and we consider it as an official comment. One of the things we're going to do, and I'll show you next -- there's a lot of discussion going back and forth during these meetings which is really great discussion.

And we're going to kind of go through that through the transcript and take out the specific things where you guys have requested that we look into. And so that will be called out separately from the rest of the discussion, which will make it easier for us to track.

We have a designated e-mail address we set up just for this group, just for you guys. And a physical mailing address if you want to mail in comments. And we'll distribute those to everybody. And then we're in

the process of developing an online form, where you can just go online, you'll have a link to an e-mail address and you can enter all of your information in there and it will be really easy. You'll go right into our tracking system and that way nothing is missed.

We put together what we're calling the FTS, which is the Feedback Tracking System. It's a database for collecting information. We're sitting in the second box from the left. The process starts for each milestone -- SoCalGas distributing a package for you guys to review. We'll set up the review period.

Again, for the first, one we're in that kind of 30-day review period time that they've established for the first -- the first milestone. And then, you guys will have that time to submit your feedback, your input through one of those mechanisms. And once we get that information, if you did it through e-mail, it will partially populated and go straight into the database. If you did it through an online form, it'll be completely automated.

We'll go into there, we'll review the comments and we'll start adding categories to it so that we can track these and disseminate the information to different subject matter experts. So if your comment is on biology for example, we would identify it as biology.

If it's a global comment, we would identify it as global and so on. And we'll have other tags for each of the comment such as when the comment was submitted, when the comment was addressed, if it's still kind of in the queue.

It's something that can't be addressed at that time this time, we'll identify that as well. So there'll always be kind of like a live status. After the subject matters experts have gotten in there, either address the comment or come up with a response, the status of the comment will be tagged as well. And then the information is going to be summarized and provided in the CPC's quarterly -- in the quarterly report that goes to the CPC.

So conceptually, it's very simple, but we realize we need to be diligent about these comments. There could be a lot of comment coming in, and we want to make sure not only are they addressed, but you guys know, you guys will be able to see and know where that comment ended up. So that's really all I had to say about the tracking system. I'm happy to try and answer any questions if there are any.

MS. MARQUEZ: Okay. Do we have any questions from our folks that are joining us here in person? I think -- oh, Thelmi, we need the microphone for the

folks that are joining us via zoom.

MS. ALVAREZ: Hi. Just a quick question. Thelmi Alvarez, WLACLC. I know that as we are learning about the descriptions of the studies, we're also getting a lot about the methodology, what is different about those two milestones?

MR. KEOCHEKIAN: Well, so the study descriptions are just intended to provide idea of those studies that we are actually going to do. To describe what they're going to do. At the next step, we're going to provide the metrics in each study. For example, Sebastian, was talking about some of the environmental studies how it's a desktop level study, and so that methodology will describe where we're going to get that data from and how we're going to take that data to make these kind of preliminary assessments or conclusions.

I don't know if there's anything else on that. But --

MS. TRACY: Yeah. So the Thelmi, I think it would be helpful if Darrell might want to explain the methodology -- or I'm not a civil engineer by any means, between like maybe, how you would calculate a JHG emissions analysis, and what that technical methodology is.

And then the inputs and the outputs -- and

then we would want your feedback as to whether or not there are additional data sets, sources, or things like that, that you could provide us feedback on. And then we would consider that feedback as part of the loop, and provide either a justification as to why we could include it, whether it would premature at this stage, or whether or not that that's a source that maybe, you know, regulatory agencies recognize or don't recognize. But I don't want to speak for Darrell.

MR. JOHNSON: So Thelmi, so basically once we develop the approach and the variables within the approach that -- the whole concept will be something that we share with you, and if there's a consideration, or a path for it, or a direction that, you know, you all or anyone thinks that is not being considered; or there's information that you have that we haven't highlighted, that's an opportunity to describe the approach.

Describe the process in the approach. And then get some feedback about that. Really again, the whole concept of this is to have an opportunity to take each stage of what we're doing, the assessment, the research, the assessment, and then as we look at the technology -- for example, if we have mitigation technology that we're going to consider to utilize in

our approach, and if you were to say that, you know, there's something else that we haven't considered, that's an opportunity as we sit down and share the elements that have come from our research and have, you know, moved forward to the next level from the technical standpoint. Yes.

MS. MARQUEZ: Great question, Thelmi. I think we have another question from Andrea --

MS. TRACY: Oh, Alma, before we go, I want to --

MS. MARQUEZ: Oh, sorry, Jill.

MS. TRACY: -- just say the next milestone is going to be the preliminary findings and data. So that's really kind of where we get into the meat and potatoes, where you'll actually see preliminary findings and data. And then the next milestone will be the draft reports.

MS. VEGA: Hi, yes. Andrea with Food and Water Watch. I just wanted to give some feedback on the time for the comment periods. I see that you have on there approximately 4 weeks. It does seem rather rushed, given that for some of the states or local agencies, whether it's CEQA or LADWP. Comment periods are usually between 60 to 90 days.

So is that something that SoCalGas is willing

explore of extending that comment period, especially since for some of the CBO members, we are passing this also on to our own research and policy teams before submitting comments.

MS. TRACY: So Andrea, thank you for your comment. So the milestones are just generally 4 weeks. And you might notice from the study descriptions that we sent on July 6th. They're quite brief. They're one to two pages in length. The 60 to 90 days that is for reg-- for -- typically for CEQA and NIPA regulatory rule makings, there's usually hundreds, if not thousands, of pages of technical data. That is clearly not what we're looking at right now.

Right now we're just looking for comments on the scope, and then the technical approaches will likely be very similar to one to two pages in length for each of the studies. But to your point, I think, that the draft reports will actually be more information and more data, and so I'd like to maybe take it back to the technical working group for our studies and see if we can provide more time we have.

Like allocate more time at the end of the year, because we want to be cognizant of the fact that a lot of people will be on vacation. They'll have, you know, family at home or visiting during that time

period. So we did allocate more time during that time period. And that's when, I believe, we issued the preliminary findings and data.

But to your point, we are going to be -- we are targeted to issue our draft reports, I believe, in the first quarter of next year. And maybe we allocate more time to allow for them. So thank you for that.

MS. MARQUEZ: I see a hand raised from Robert. Robert, if you can unmute yourself.

MR. FUNDAHOOK: Okay. Hello, this is Robert Fundahook. I think -- this might be novel and provocative, but I would like to see the different participants -- community member comments that they submit -- submitted at first as a kind of a draft to all of us. So when we can each of us, as community members, see where -- where each of our, you know, where we're all linked together.

And then after we provide some feedback to the various people community members and groups comments, they're put together and so that who -- whoever is looking at this, you know, in the government later in the NIPA or CEQA process, sees the -- sees the dialogue, you know. Otherwise, we kind of the traditional way to do these is the unit directional. We just send our comment directly to you, and then to you as the company

or corporation during the CEQA process, and then that's how it kind of ends for our participation.

But we don't get to write, like, say there was -- Enrique spoke first today and he wrote -- he wrote out what he said, I'd like to write behind him, I support, I embrace, you know, what he says. And then that way they -- everybody gets to see more transparency.

Because you're kind of like, once we submit our letters and comments, we're out of the picture, you know. Because now it's just up to you to -- to do it. It's kind of provocative what I'm suggesting, but it would be, viewed I think, by people in the government as wow, this is very embracing and honest more. Thanks.

MS. TRACY: So Robert, thank you for your provocative comment. Somebody actually had a very similar suggestion yesterday, and so we committed to creating group e-mail distribution lists for both the CBO, and the PAD groups, and the members.

Everyone will have the option to oped in or oped out. Because we want to be respectful of peoples privacy preferences, but we'll have group e-mail distribution lists so that you guys can all communicate on that e-mail distribution.

So for example, Robert, you send in your

comments -- and also I'd also like to just let you know, you don't need to wait until the 31st of July to send in your comments. This is inter process. We're tracking all of your comments this week. Or Insignia is. Thank you.

And so -- but -- we will have by probably Monday, we'll have the e-mail distribution oped in/oped out e-mail set out. And then you'll be able to use those so that when with you do send in a comment, it will be to the whole group, and then -- so you'll send it to Insignia, you can CC your group e-mail distribution, and then everybody will get it at the same time. So you don't have -- it won't be going into a black hole, and you won't see it again.

MS. MARQUEZ: And I think you also raised another good point is that, I know that in the June meetings, folks asked if we do have a roster of everyone here, and just a show of hands, who would want to do something. Because again, this is your private information. And so if you don't want to share it, that's completely up to you. But I just want to see if there's still an interest for that.

By a show of hands, so it looks like the majority of the folks would like that. And I see hands raised online. So we are going to also move towards

getting a roster together for folks who want to be a part of that. Because this is phase one. And there's three phases to this project. So you know, we're in it for a long run because of your participation.

And so we'd like to encourage some interaction from folks as well. As we mentioned, this is a transparent process, and we're not trying to hide anything in any means whatsoever. That's why we truly encourage you to come in person, because we want you to engage and we want you to speak to each other on this project.

So thank you for your show of hands. And it looks like folks are interested in having that as part of a potential hand out that we send you in the post workshop for today. And I believe I see Marcia's hand up. Marcia, if you could unmute yourself please. Oh, I think that is a thumbs up. Because you do want to share your information? And I do see a comment from --

MS. HANSCOM: That's -- that --

MS. MARQUEZ: Oh, go ahead Marcia.

MS. HANSCOM: Why I had my hand up. Just to say, I'm willing to be part of the roster and I'd like to see others as well.

MS. MARQUEZ: Absolutely Marcia. I do see a comment from Andrea, also, those that are on zoom and

their affiliation, I saw a former assembly woman on Wednesday. But she didn't introduce herself. So we are introducing the CBO's, however, that was another person that was part of the meeting that's also part of this group and is listening in, and giving us feedback as well.

And I don't know, Jill, if you want to make another comment on that with the other folks that are -- there are other folks that are online from SoCalGas as well who are listening in, and making sure we're taking notes of everything that's being said. Okay. So I don't know if you have any other thoughts to wrap up this section, Armen?

MR. KEOCHEKIAN: No. I mean, I would just say, you know, there is this kind of feedback loop in that we're doing this process for each of the milestones, and so that -- the month before week comment period is important because, you know, on my side, waiting for that period to end to go to the next milestone and see if we're incorporating any of those comments.

And so in the scope of work we -- we'll take those comments and see if that affects the methodology. So in CEQA and NIPA, if that ever gets the project, you know, if you're ever at that stage, the lead agency has control of this comment process. And you wouldn't see

this. You wouldn't have opportunities to comment in the middle of a CEQA process. So this is a very different, and it does give opportunities, I think, for all of us to get involved in all the different stages.

MS. MARQUEZ: Okay. And I did see that we dropped the e-mail where folks can e-mail you directly with feedback on the studies, and that e-mail is ALP, which stands for Angeles Link Project, phase one study -- _study_CBO_feedback@insigniaemv.com, okay. So that's been dropped in the chat, and you all will get that in a follow-up information as well for this workshop. And Jill, I think you had (inaudible) in the comment?

MS. TRACY: Thanks, Alma. Armen, could you go through the lower white and black boxes in the bottom? Just so folks understand, kind of walk them through kind of the whole feedback loop, because I want to make sure that folks understand that there's this tracking system. You're going to have multiple opportunities throughout the phase one process to provide your feedback.

It's going to be transparent to your other CBO members, as well as the PAD members. And there's going to be broad categories developed, and so if you can just maybe walk people through that. I just want to make sure that people are familiar with the whole process. It's very -- it's unique, this is not something that we

took off the shelf.

We developed it specifically as a result of your feedback, and so we want to make sure that you can benefit from it.

MR. KEOCHEKIAN: Sure. And I talked about this a little bit, but we're just kind of going through the boxes from the left that the process really starts when SoCalGas circulates a milestone, like, in a deliverable. So the first one was that scope of work for you guys to review that was sent out last week. And then the comment periods established.

So when the package comes to you on the next -- that are coming out, there will be a comment period, or date where they are requesting the comments by. And then you have during that time period, to come up with any type of feedback or input you want to provide. There's different methods for providing that input like what I talked about e-mail, you know, physical mail, an online form, or in this forum.

And then we get the information, it's either automatically goes into our database or we manually type it in to the database. And then that's we kind of when we go to work -- back in and try to organize all the comments, and organize them by discipline area, and timing of when the comment would be applicable. And so

we spend time in the database organizing that.

That will help us with the comments to move them forward, but also help us if we ever need to go back and look at the comment. And then Insignia will be coordinating with the SoCalGas subject matter experts. So we'll get people who need them, who are working on the studies, or who have expertise in the area, and then provide responses and those responses will go into the CPC's quarterly to the CPC.

So that's kind of the comments. You know, I just kind of mentioned that CEQA and NIPA and how our agency would do it is way to the far right of where this process is. Way down the road. So this is really just in the early phases in trying to get the comments on these studies so we can get an them incorporated early on.

MS. MARQUEZ: And Armen just to wrap up, how much feedback have you received this week so far? It's a fun fact, I think, for our folks to understand.

MR. KEOCHEKIAN: We're going to try to do some estimates from our notes and from the input. And we're getting -- it's been about 100 comments in meetings. So with four meetings this week, we'll probably have about 400 comments for this meeting for consideration.

MS. MARQUEZ: So we are definitely keeping

Armen and his team busy. So thank you for keeping it coming. It sounds like you have your work cut out for this week.

So are there any other follow-up questions for Armen and Insignia for this topic? So -- if not then we can go ahead and move on -- oh, I see one hand from Robert. And then with Robert, we'll wrap up this session and move on to your next presentation. Robert, if you can unmute yourself.

MR. FUNDAHOOK: Okay, thank you. My name is Robert Fundahook, and Armen, thank you. I was thinking big picture here for a stakeholder, in a way. And I was thinking about if the United States was a Third World country, you know, say we were located in Africa as a nation and we were starting to do a new, you know, having a natural gas company thinking about hydrogen gas and locate -- and we were in Africa, we would likely see other nations be interested. And the united nations as a body as well, with environmental justice, social justice as going back to the beginning of our meeting today.

So -- but because we're not a Third World country and we're not in Africa, and we're the United States, and we think of ourselves with self-importance, sort of narcissistic the way we are in the United

States. We're the powerful, you know, we don't -- so we don't invite the united nations into our process of -- we don't invited the National Park Service. And there's some designations like some world heritage sites, which could be for nature, or historical cultural things.

And given that Playa Del Rey gas field in the other Montebello gas field, and the Aliso Canyon Area. I'd like to see them -- I'd like to ask the gas company to approach the united nations for world heritage status sites of these places from both a historic -- part of our misguided history of our country.

You know, where we went towards gas. Notice I didn't call it meth -- I didn't call it methane, and I didn't call it hydrogen gas. Hydrogen -- I'm saying gas. So I'm referring to methane gas and hydrogen gas, both. And I think that we should be approaching that way.

And earlier I mentioned the National Park Service. Every single one of -- I don't know if you know this, but Los Angeles County has approximately 100 cities in our County. And every one of our cities has one or more historic sites. Sometimes a home, or sometimes another kind of building that's on the national register of historic places.

And it's managed by the National Park Service

out of Washington, D.C. So I'd like to see a thought or a discussion about the National Park Service being the federal agency in charge of NIPA, and then actually overseeing the state process too. Because the National Historic Preservation Act, which is under the National Environmental Policy Act guides all the 50 states, including California of course, on how to do historic preservation. And most of our cities -- 100 cities in LA County, they have historic sites that the city -- that the small cities have designated, but they haven't asked for a designation by the federal government as a national register or historic site.

And so I think any of our pipeline projects are, obviously, going to impact a national park service property somewhere in our county. And it's provocative again, and it's not provoking and meant to be positive in terms of having honesty ethical discussion and what would bring indigenous peoples, and all the minority cultures of LA and the languages. It would bring it all together. And there isn't any other federal or state agency that could do the job of the National Park Service which is under the United States Department of Interior.

And kind of what proves this to us is that Deb Holland -- President Biden picked Deb Holland, a Native

American of New Mexico -- taught us the pueblo culture to be our secretary of interior. And she oversees the National Park Service and she's put people in charge of the National Park Service who are of minority. We have an indigenous American who is the director of the National Park Service at the moment as well.

So we have a really golden opportunity if we were to -- it would require the surrender of the gas company a little bit to not be like dominant, and say we're going to go that route. Just -- I think it's thoughtful what I said. Thank you.

MS. MARQUEZ: Thank you, Robert. I believe Sebastian has a response for your comment and question.

MR. GARZA: Yeah. Thank you, Robert. I mentioned earlier during the general environmental assessment presentation, we will be looking at cultural and tribal resources and that includes historic resources and prehistoric resources.

So that information will come from confidential record searches at the individual information center. So we will be addressing the existing prehistoric and historic sites that you are talking about. So thank you.

MS. MARQUEZ: Okay. And I think we -- I see Lydia's hand up. And just to remind everyone, we do

have a couple more presentations. So let's just make sure that we are referencing the actual topics, and presentations that we're discussing to keep us on time with our agenda. So Lydia, if you can please unmute yourself.

MS. PONCE: Yeah. Thank you. Thank you. In reference to language justice, I'd like to say that BIPOC, black and indigenous people of color, are not a minority. We're actually a minority in power. We're majority in population. And it just strikes me great discomfort to hear us continuously referenced as minority.

How about just people. We're people. And we're here in the process to help lend this information, and present it to people who cannot be on these calls in these zooms at great length of time during the day. I appreciate everyone's efforts, however, we can speak for ourselves. Thank you.

MS. MARQUEZ: Thank you, Lydia, for your comment. Okay. Just to keep on time with our agenda. We're going to go ahead and move forward with the Right-of-Way and Franchise Analysis, and that will be Geoff Danker who will lead us through that presentation.

MR. DANKER: All right. Got it up there? Good afternoon, everyone. How's it going? So just to

kind of bring us on to another topic. My name is Geoff Danker. I'm the Franchise Fees and Policy Manager at SoCalGas. I've been at the gas company for about 10 years. I've been working on environmental and land use issues my entire career. Which is about 15 years.

A few years before, I was doing CEQA documents and environmental review of large infrastructure projects. So I've worked in land use for a little bit, and the entire time in the wonderful state of California. And so I'm here today to discuss land rights with you guys, and franchise agreements this lovely afternoon.

Just curious, and I think we got some people online. How many of you guys out there have heard of a utility franchise agreement? All right. That's a little inside baseball. How about an easement? You guys ever heard of an easement? All right. Very helpful. So I'm going to discuss a little bit about our land use rights that we have at SoCalGas currently, and a little bit about what's going to be happening over the next several months as we embark in this study effort. So next slide please.

So to introduce the topic, as you guys are most likely aware, cities and counties, municipalities own and maintain their own public right-of-way. To

deliver gas to our customers currently, our infrastructure often traverses this public right-of-way. And think of streets, alleys, sidewalks, anything that the city or the municipality themselves owns and maintains.

We have agreements in order to occupy that space. And so municipalities; they grant SoCalGas, and also Edison, and San Diego Gas, and Electric and PG&E, the right to use these streets. And think about use as occupy or rent. We have the -- the municipalities grant the utilities the right to occupy space in the streets that they own and maintain for the right to transport gas.

And so -- the -- I know we talked a lot about the California Public Utilities Commission in the last couple of days, that's our main regulator at the state. They award utilities in the state, what they call a certificate of public necessity, which grants us ultimately the right to provide service to our customers.

But also the inverse of that, is that we must provide service if a customer is to request some sort of utility service. It's called the obligation to serve. And it's kind of -- the charter of kind of why the utilities exist and why they're granted this certificate

of public necessity. Now cities and counties understand that. They know that they can't necessarily stop us from delivering gas, but they understand that they also need to maintain and operate public infrastructure that you, and I, and all taxpayers have paid for in terms of the maintain of streets, sidewalks, public alleyways, all that.

So what we do, and what other utilities in the state have done over the past 100 plus years, is we enter in what they call franchise agreements. Franchise agreements are long term contracts between the utility and the municipalities, and they set forth the rights and obligations of the utility and of the granting municipality.

And so they -- they -- there's some standard provisions that are included in all of our franchise agreements, but there are also negotiations that happened between the utility and the municipality, and so can -- can include provisions as well that we need to research and need to understand.

And so I do highlight that we have been operating in cities and counties under this kind of mechanism for franchise agreements for a really long time. There was a franchise act of 1937. That's almost 100 years old, that -- that basically provided a

framework for how cities and counties can enter into franchise agreements with utilities that are operating under the certificate of public necessity. And they include, really, key provisions that are -- that are key for the community members around these projects.

They require us to compensate the municipality for this right to rent or to occupy. And this is done either with an equation that uses the amount of infrastructure in an municipality, or the gross receipts actually taking place at point-of-sale within that municipality. And so we compensate each municipality for this right.

But that's not it. We still -- we still need to notify. We still need to pull permits. We still need to tell the city where we're going to be, when we're going to be there, who's going to be working on the project. After, with understanding that most of our pipelines are underground, we have obligations to fix the streets after we excavate.

And so our franchises have provisions that we need to repair our excavations to return the street to its good condition as existed prior to the excavation. If we hold, we guarantee those repairs for the life of the repair. So if it fails, or if the repair is not adequate, we come back and do it again, until it is

adequate.

And we work with city engineers, public works directors, and everyone in our cities and counties to maintain these streets. These public assets to the highest standard possible, and to meet the obligations of these franchise agreements.

And so, I'll take a deep breath because these are a little wonky and inside baseball, any high level questions on franchise agreements, or kind of the contractual agreements between utilities and cities? Yeah. Oh, need a microphone.

MS. MARQUEZ: Edna.

MS. ROGERS: Thank you. This is Sidney from PESA. Does each city work with SoCal to -- to work with these permits and -- and the structure and all that stuff? And the fixing of the -- of the streets and stuff?

MR. DANKER: Great question. So, yes. Yes is the short answer. There's certain aspects of design that are under the purview of the California Public Utilities Commission. Like the material, the size, kind of like the design of the system. But cities and counties have a lot of say on the time, place and manner.

When you're going to do construction, what the

notifications are like, who you're going to notify. They inspect our permits. So we still need to go through a permit process so they understand where the excavations are, what the impacts are. And then they also inspect our work. And so they inspect -- the city inspector, or the county inspector, will be onsite to make sure that we're meeting permit obligations during construction. They do a check-in after to make sure that we closed out the permit, and we did all the restoration activities and clean up activities properly.

So, yes. City and counties are a very close partner on all projects that we do. There are very technical specifications that are more under the purview of the CPUC. If that makes sense. Engineer. Okay.

MS. MARQUEZ: Did that answer your question, Sidney? Okay. All right.

MR. DANKER: Okay. So I'm -- I'm just to finish up this slide. We are in the preliminary stages of evaluating the potential availability of franchises to accommodate potential routes. We have existing rights through franchise agreements. And franchise agreements are the public right-of-way. So public streets in counties -- throughout our entire service territory.

But as you guys know, we're large. We go

Mexico to Fresno, everywhere in between. This is hundreds and hundreds of cities that we will need to review these contracts with -- 14 counties? 13 counties? 12 counties. Sorry, 12 counties that we need to evaluate -- sorry I count San Diego because we have a franchise with San Diego.

And so, yes, there are existing rights out there, and that'll be the first part of our phase one here, is to go through all of those contracts to understand the rights we have, understand the timeline, understand the specific provisions in those, and to the extent possible, to utilize the land use rights already in those franchises.

MS. ROGERS: This is -- okay. Sidney, again. I'm sorry, as I'm listening, the word streamline keeps coming into mind. Of like -- is there a way to streamline the permits, streamline the process, streamline of all of this of like -- is there a way to streamline all this stuff so that -- so that it's not taking such a long time of working with different -- different cities and stuff.

Because I know -- because I know when things go wrong, the Anursha (phonetic) people, you know, I'm thinking, when I'm driving and I'm doing these detours, I'm like, why is it taking so long to get through this

stuff. And I'm like, what ya'll doing, right. I'm, like, trying to get to work, what's going on here. And I'm hearing -- hearing it's takes this long to get through this stuff, you know.

As a consumer, you know, if we can streamline T-Mobile to get my cell phone, why can't we streamline this other stuff. You know what I mean. So my mind goes streamline, streamline, streamline. You know what I mean. So I'm already thinking, can cities work with each other to streamline these permits, streamline this stuff as well. You know what I mean, I'm just -- that's just my mind --

MR. DANKER: Yeah -- no, you bring up real --

MS. ROGERS: Streamline, digital, you know, e-mail this stuff, you know, get the forms on. Get a Google form going on. Here. There you go. You know what I mean. That's what my mind is automatically thinking. Alma is shaking her head. You know my mind automatically thinks like that.

MR. DANKER: You bring up really good points. And our goal is to utilize existing land use rights to the extent possible. And hopefully that lands itself into streamlining, or just basically an understanding of the rights are there and what the impacts are. And so that's part of the preliminary analysis we're taking --

that's going on right now.

And that's -- that's goal number one. And that's -- that's what we're focusing on. In the instances where, you know, maybe there's a provision that doesn't allow this or that, or we need a provision, something like that; we are also investigating if new provisions or new measures may be needed for these land use agreements, these public land use agreements.

That will undoubtedly complicate and slow down the process a little bit. But land use rights are very serious and a very legitimate process. And as someone that's done projects in California my whole career, even when things are supposed to be streamlined, you know, affordable housing, next to transit, you know, it still takes forever and permits take forever.

But the goal to the best extent possible, is to utilize the existing land use agreements that we've had for a long time, and that we've operating under. But the investigation is ongoing right now to better understand that.

MS. MARQUEZ: And Geoff, on the same topic, we do have a question from Andrea who asked, do you always get permits beforehand, or do you ever get them retroactively for all projects?

MR. DANKER: Yeah. Great question. If

there's an emergency, a lot of the time we go out there and we fix the emergency. And sometimes on -- I'm going to mess up my codes, but the more serious leaks, one -- A1 leaks, will go out, do the work, make sure the community is safe, and retroactively tell the City what we did and go for permits. The vast majority of our work, pipeline maintenance, pipeline replacement, pipeline testing, we pull permits before the work. Was that accurate?

MR. CARRASCO: Geoff, if I can, I think there's two categories, and this is Andy Carrasco, SoCalGas.

There's two types of work. There is what you're referring to, Geoff, as the majority which is preplanned work where we know we have projects and we go with the City and do permits. The other one is unplanned work. Where the emergencies take place. Where we need to address immediately.

There are provisions in a franchise, and we do talk with the municipalities and they are aware that these are possibilities, and we work through those provisions and get back to the municipalities immediately after the work takes place.

Because they are going to do the same thing as if it was preplanning, send out an inspector, make sure

that the streets are in the conditions that they were, and are expected to after the unplanned work has been completed.

So I just wanted to draw a picture between those two categories.

MS. MARQUEZ: Thank you, Andy. Go, Geoff. Yeah.

MR. DANKER: All right. So our scope for the franchise analysis, and I talk about the franchise agreement as public land. The land that the cities or counties themselves own, and maintain, and it's important because of the next slide. But this public land analysis, the evaluation includes an extensive analysis of the existing franchises, which are in the hundreds, to accommodate potential routes and future franchises, or provisions and franchises that may be needed to facilitate proposed routes.

And so at the next update, we will have some progress on that and kind of where our existing franchises stand and potential provisions that may need to be included.

So to add a little more detail on this review, we're also going to investigate the types of SoCalGas projects in applicable municipalities, an assessment of our rights in the existing franchise agreements, what

are these 20 page contracts actually say. And that also includes an investigation of city and county charters.

Some city and counties will have franchise charters, or franchise ordinances. We'll need to get into the details into kind of what the City or County are saying.

And then the last one is, you know, like I said, to the extent possible, we're going to try to see what the existing land use agreements provide, but then we'll also going to have a preliminary investigation of what may be needed, if we don't find everything exactly how it needs to be. I'm changing it. No, it's someone else's slide.

So to talk about private land; SoCalGas, we have private easements and right-of-way's that grant SoCalGas the right to construct, and operate, and maintain pipeline facilities with private property owners or private lands owned by others. And so, this is at a much larger scale. We have tens of thousands of private easements, or right-of-ways, in private land uses that for years have allow for the safe operation of pipeline systems within our service territory that are within lands owned by private entities.

And so included in this phase one analysis of our land use rights, we're also going to conduct a high

level evaluation to review the availability of existing easements to accommodate potential routes. Very similar to what we just talked about on the franchise side, which will take place kind of in the City and County owned lands. We have to do a similar investigation on the private easements, which can be many.

But we need to understand what these easements say, what they allow, and if any potential modifications may be needed in the future. And so we're kicking off those right now. The next workshop, we will have an update on that preliminary analysis and kind of what the existing land use rights provide. Both on private and public lands.

And then can, hopefully, have some more detailed conversations about what might be needed moving forward. But that's -- that's all I got on franchises and public easements. Happy to take any questions, or comments, or discuss anything you guys would like.

MS. MARQUEZ: I will go ahead and get us started with a question, Geoff, that I think would be important with our group here.

What efforts will be made to mitigate any potential negative environmental or health impacts on communities effected by the presence of pipeline facilities on private properties?

MR. DANKER: Should this be an environmental answer? Is that an environmental question?

MS. MARQUEZ: What efforts will be made to mitigate any potential negative environmental or health impacts on communities effected by the presence of pipeline facilities on private properties.

So you mentioned private properties and you're working with private properties to help streamline this process; so how will that be communicated to the communities?

MR. GARZA: Well, okay. So when we talk about potential impacts from the environmental perspective, again, we're assessing the existing conditions for our potential project, that really, the best mitigation measure is avoidance. So if we identify an existing condition, our preference is to engineer around that and avoid that. And that's from the environmental perspective.

MR. DANKER: Yeah. My thought was that, on the preliminary analysis too, was to -- to the extent possible, avoid consequential areas like that, or areas that have the potential to impact communities. And that's this investigation of what's the easements are, and where they are is going to assist, ultimately, making those routing and route decisions because the

land use impacts are really important.

And that's something that we want evaluate early on, if there are potential impacts. What could be done to avoid it, and then if that's ultimately the route -- if that's ultimately the route -- sorry, I'm losing my train of thought. But yes, that is -- that is the plan.

MS. MARQUEZ: Okay. And I do see a hand raised by Robert. Robert, if you can unmute yourself please.

MR. FUNDAHOOK: Hello. Thank you. Robert Fundahook. And thanks for the presentation on this topic. I put my question kind of in chat, but it's a little bit -- explaining maybe better by out loud saying it because I'm interested in the -- when you have a right-away, or an easement and it's under a city street or a state highway, and you have to -- you have an emergency leak because the pipeline is underneath the street.

I'm interested in the -- the cost -- does the City, if it's a City street, does the City say -- have to first give you, okay, you can go in, and then they tell you the estimated cost? Does it include the inconvenient, does the City tell you have to pay this amount of money for the inconveniences of rerouting the

peoples time, and driving on the street because they can't use it for a while, and they have to go around.

And then, is that percentage of fixing an emergency leak -- is the digging down through the street, and down 10 feet, or whatever, 10 to the ground -- and I know it depends on the geographic length of the leak or the problem.

Is it the monetary cost of the excavation part of it small, negligible percentage?

Like one percent or is it a -- there must be a range, I guess, to a percentages or just some general cost. You know, if you can elaborate on that with the easements and right-of-ways.

MS. GRANT: Hey, Robert, it's Emily Grant, again. Thank you for the question. I'd be happy to talk with you about this offline because it's really interesting. But I think for now, in the interest of time we're going to stick to comments that pertain to the studies for Angeles Link. But I'm happy to have this conversation with you, if you'd like.

MR. FUNDAHOOK: Okay, thank you.

MS. GRANT: Okay. Thank you. We do have your comments, though. And I think we have one more comment in the chat from Andrea, who is asking about notifications, and what our policy is for maintenance

work. And Andrea again, I'm trying to read through your chat here at the same time I'm responding.

But this looks like this isn't about the Angeles Link study. This looks like this is a natural gas question. And again, we're kind of happy to take those questions offline, but we want to, in the interest of time, stick to comments on the studies. Thank you.

MR. DANKER: And, yeah. I wanted to clarify something.

I said our preliminary results are going to be available at the next meeting and I meant to say fourth quarter. I got a little ahead of myself, but the preliminary results from the land use analysis will be available in the fourth quarter of this year.

MS. MARQUEZ: Okay. So do we have any other questions pertaining to Geoff's presentation, just to keep us on time and be respectful of the agenda.

I don't see any raised hands here and I don't see any more in the chat. So with that, let's go ahead and move forward with our water presentation from Edith.

MS. MORENO: Just checking, do folks need just a quick two to three minute stretch break to get up or -- I know we're losing folks.

MS. MARQUEZ: Or do we want to power through?

MS. MORENO: I'm looking at you, Sidney.

Power through.

MS. MARQUEZ: Power through.

MS. MORENO: Streamlining.

MS. MARQUEZ: It's all you, Edith.

MS. MORENO: Okay. Good afternoon, everyone. Edith Moreno of Regulatory Strategy and Policy Manager working on Angeles Link.

I will be talking about our water evaluation study. And actually, I don't think it's officially part of this stick. Can the team switch it over? Thank you. While we're working on putting up the correct deck, I'll just -- we'll just start by briefly introducing, giving you a little bit just kind of more background information about who I am, and what brought me to SoCalGas.

So I'm originally from Southeast LA. I know there's a couple of folks that are representing SELA; so shout out to everyone, but specifically, I'm originally from Southgate. I traveled east to go to college. I got a degree in Geology and Hispanic Literature and Culture. Then I came back and -- came back to California, and I got a masters in Environmental Science and Management. And I actually specialized in water resources and management. So I started my career as a consultant doing clean water act compliance, and then

made my way into the energy space, where I started working for San Diego and electric as a water resources specialist.

And then I jumped north to join our sister utility, SoCalGas where primarily I've been focused on clean energy policy and transitioning away from fossil fuels.

Can I have the clicker or -- thank you. And then last thing I want to say -- and I'm sorry for the court reporter, but I am more than happy to give in future meetings, present my information in Spanish. So I feel very comfortable, and so if there's a request or folks want me to go out into the community and talk a little bit more about the work, I'm more than happy to make myself available to this group.

Okay. So let's get into it. I have two -- two slides. And so first and foremost, what our study is going to be focusing on a high level is evaluate the availability and options that we have, in terms of water supplies that are available to produce clean breathable hydrogen. And just -- I'm calling myself out a nerd, but I do have H2O here on my table, for folks who are online -- but this is actually on my desk, and so I brought it to work with me today kind of as a show-and-tell.

And so there are two key components to our water resources evaluation, and so the first box on the left here is -- is step one is, what is the water that's available out there. And then two, what are the challenges and potential opportunities that are associated with the water source types that could impact positively and both negatively the production of hydrogen. So this is where I'm going to spend most of my time, walking you through kind of the series of steps that we are pursuing in our evaluation.

But first on the left is, essentially, identifying the water universe of what's available. And so not all water is made -- is the same, right. So what kind of water could be available for hydrogen production. And so we are focused and -- or essentially, we are committed to making sure that water that is used for this project is not exacerbate, you know, drought conditions in California.

I recognize that, you know, California and water resources is a very precious and a very sensitive topic, and so this is top of mind while we are doing this evaluation. And so some of the sources that we are potentially including in our assessment is recycled water, wastewater, water that has been used in manufacturing and it's usually called brand water. And

so, often times a lot of this water needs to be treated before it goes out into the ocean.

And so you know, we all flush the toilet every day, and so that water all ultimately goes somewhere, and often times goes to a water reclamation facility, a wastewater treatment plant. Some of that gets treated, and is then used to make recycled water, and then some of it gets treated, so it meets certain standards so that it can be discharged into the ocean, other lakes, streams, and other large water bodies.

And even some of it is used to recharge ground water. And so again, Step one is just to evaluate all water resources types. And the availability of the different types of waters that's available would be validated through agency outreach. So specifically and a lot of folks are familiar with metropolitan water districts, so we're having a lot of conversations with various water agencies in our region.

And so in the middle column, the next step is, okay we've identified kind of what's available, and then we would then estimate how much actually is available. Is there X amount of water available that we can get from wastewater treatment plants, or is there potentially recycled water sources that we can tap into.

And then we would evaluate how much it would

cost to acquire this water, and then eventually clean it up. And so today, you know, the water needs to be really, really clean for it to be put into an electrolyzer that would then create hydrogen.

And so you know, there will be water treatment cost that would be evaluated in this -- in our study. And I want to -- yeah, just clarify in acquisition cost, we would be including the cost of water itself, and then the cost of -- of potential conveyance that would be needed to deliver water to a producer.

And then finally here on the column on the right is, we will be prioritizing all the different sources, or consultant -- will be essentially evaluating any potential challenges, or with accessing, right. And they might say, well you know what, this water may be a little too dirty, and maybe it's just a little too expensive; and therefore, it might not be worthwhile cleaning it up and, you know, it's not economically viable. Or there can be some opportunities to -- there can be a win, win scenario.

So one distance, and I just learned about this -- out in the Inland Empire, there's a brine line canal system, that often times a lot of the manufactures or big industry, and I think even some agricultural run off is collected into this canal. And then the manufacture

agency out there, the water management agency out there currently collects all that water, and spends a significant amount of money to treat that water before then it, ultimately, gets discharged into the Pacific Ocean.

And so a win, win scenario in this case would be that a hydrogen producer can then take that water instead, and then save the water agency some -- some money. And then finally, at the end of our evaluation, we would prioritize, right, we would -- our consultant would help us give recommendations on what are the best sources that are most suitable to use to produce hydrogen.

So again, just to quickly summarize, again, is identify the universe of water that is available, how much is available, what it's going to cost to get it, and then finally, do an evaluation or prioritization exercise, and give us recommendations on what's the most suitable water supply source for hydrogen production. Well, I'll stop there.

MS. MARQUEZ: Wow, Edith, you're the only one that really stuck to -- to your 10 minutes. I'm impressed. So this is again, something that was added in today's presentation as part of a topic. I think just to get our discussion take off --

MS. MORENO: I thought you were going to say to get our feet wet.

MS. MARQUEZ: You would say that, Edith.

Why is SoCalGas doing a water study when you would only be transporting the hydrogen, not producing it?

MS. MORENO: That is correct. And so, right. Water resources will feed into a study that Yuri Freeman (phonetic) went in -- went into in some detail on Wednesday. And so that is, you know, our water inputs are going to then feed into our demand study. It's also going to help us prioritize, right, where there's water, then this is where we would probably might want to build a hydrogen pipeline. So we're -- that's part of -- one of the reasons on a very high Level.

MS. MARQUEZ: Okay. And just in general, I work for WELL, Water Education for Latino Leaders. And that's all we talked about was water and educating elected officials on how to make better water policies for throughout -- for like throughout the state of California. So water as we all knew was a scarcity, you know, that's something we all value. That's very important to mother earth especially here, since we are in a dry area.

I understand that there will be some studies

on recycled water, you know, that's part of this conversation. Because I know that was the first thing that alarmed me when I was hearing about this is, you know, that is part of the studies and I think that's good to know you're going to evaluate all these different types of waters that could be used for this process; is that correct?

MS. MORENO: That's correct.

MS. MARQUEZ: Thank you. We have a question by Sidney. And then we'll go online.

MS. ROGERS: Yes. Sidney from PESA. So when it comes to the water in pipelines, will the pipelines be pumping water as well?

I'm kind of confused. Or would you be taking the water, putting them in the trucks to take to the pipelines for the hydrogen?

MS. MORENO: That's a good question.

MS. ROGERS: Yeah.

MS. MORENO: So to clarify. It's the conveyance. So how we're going to get the water to the place wherever we're zapping and creating hydrogen. That would eventually be explored in a future phase of our work. But again, right now this is just an evaluation. Is there enough water, or different types of water available to support hydrogen production.

MS. MARQUEZ: Okay. And I believe we have a couple of questions from Andrea, and her first question is, are you considering sea water desalination too?

MS. MORENO: Right now, it is not included in the scope of our assessment.

MS. MARQUEZ: Okay. And her second question is, what recycled water would you consider using?

From what treatment plant?

MS. MORENO: So I want to clarify. There is a difference, and I know it's sometimes used interchangeability. So wastewater is just water when you flush the toilet, it goes to the treatment plant. And then recycled water, in the state of California, has -- there's a lot of requirements, and there's a lot of regulation Health and Safety Code requirements. And so it's health standards.

And so there are various water reclamation facilities that -- that treat the water to the tertiary standards that are needed to be qualified, or to be recycled water. And so right now all -- there's only one type of recycled water, there's one category, there's only one set of regulations. And so we are evaluating recycled water as a source.

MS. MARQUEZ: Okay. And I have a question from Andrea.

MS. VEGA: Hi. Andrea with Food and Water Watch. For the hydrogen that's currently onsite here, where was the water source from for that?

MS. MORENO: It was mentioned during our tour -- and for folks that were not able to join us, right now, it is water that the City of Downey provides us.

MS. MARQUEZ: So that's probably recycled water from the City of Downey? Because I know we do have our own water that we produce here. We buy some, but we also have our own water district.

MS. MORENO: It is portable, but I want to clarify that it is a small demonstration and so there -- the amount of water that is used to produce electricity is really not much. Just to put that into context, it takes about 9 liters or 2.4 gallons of water to create 1 kilogram of hydrogen. And I think that tank out there was 7. Correct me if I'm wrong. But I would have to -- again, it's not -- not a lot of water that is used on a day-to-day basis.

MS. MARQUEZ: Thank you for that question, Andrea. Do we have any other questions from anyone here or online?

I'm not seeing anymore online questions. Okay. Oh, I see Robert's hand. If you would unmute yourself. And again, this is on -- to comment on this

presentation.

MR. FUNDAHOOK: Yes, on water. The 9 gallons that you mentioned, the minimal amount for the -- that you are using to --

MS. MORENO: It was 9 liters.

MR. FUNDAHOOK: Oh, 9 liters. 2 or 3 gallons, okay. 9 liters. That would be -- that would be Downey, or I think is -- you're on the MWD; so that would be Colorado River Water?

Perhaps blended with LADWP water from the Sierra Nevada?

For those liters of water?

MS. MORENO: I can't confirm. But I know the Metropolitan Water District, and others, water from various sources. And so I know a lot of, you know, very transparent on where our water comes from, and there's a report. And so -- I'll just leave it at that. Again, I don't have that information in front of me, Robert.

MR. FUNDAHOOK: I think that is. But, okay. Thanks.

MS. MARQUEZ: Okay. Thank you, Robert. So I think we don't have any other questions from our participants from our members here. I don't see anymore from our chat. So I think we're at the point where we're going to wrap-up today's workshop.

And again, I want to remind me that this is phase one and your feedback, as you know with Insignia here, is being collected in different forms. Through that e-mail, through Emily, through myself. Please feel free to give Armen more homework. He's already at four-- we want to get him to the 400 threshold. Just kidding.

But I do want to encourage, again, that this is the process that we want encourage to have folks submit your questions, and make sure that if you have any follow-ups, we did send you the studies in advance; so if you can please review those, and continue to reach out to us to continue this process as we are in the midst of the phase one process for Angeles Link Project.

I do also want to add that we have until the end of the month, right, to receive some feedback from everything that was shared. At today's meeting as well as Wednesday's workshop. So feel free to please continue to review those materials, and send us this feedback. That is very important for us to have.

And last, I just want to say that we will keep you posted on all the debrief materials we have from today. The recording is available to those who want it as well. If you need to share it with your clients and residents that you represent, I will be more than happy

to share that for you.

And last, I think Emily has one comment. But we also have a post survey on the back that's a QR code. We want to make these -- these convenings as comfortable and easy for you, so any comments that you have today would be greatly appreciated. I know I heard some folks say, you know, if we can have these back-to-back. If we should have future workshops that way, you know, they are not separated.

I know I received some of that feedback from some of you as we were having lunch on Wednesday. But those -- those kind of comments the SoCalGas team is taking very seriously, any kind of feedback that you have for them, and helping this process be a lot more accessible for you through different means. And with that said, I'm going to go ahead and pass it over to Emily.

MS. GRANT: Thank you, Alma. Marcia, I see you have your hand raised?

MS. HANSCOM: Yeah. Thank you. Marcia Hanscom with Ballona Wetlands Institute.

One of the questions I have that somehow is still not getting answered, and maybe you could put this in your hopper for how to answer it.

But what we keep hearing is that -- I mean,

we've heard it at the last meeting -- last month's meeting, that you were not going to be using the gas storage facilities. The current gas storage facilities for the hydrogen. Yet, we've heard in the community, both in Playa Del Rey and Aliso Canyon, that you are going to be using that -- those facilities.

And maybe it relates to the fact that you got to use 70 percent of the methane gas, I know you all call it natural gas, all of these gases are natural. But methane -- the methane that you store there, and so maybe you're saying okay that's why we have to keep these open, even though both of them have been very dangerous. And clearly dangerous.

So the question I have is, I mean, every time someone has said -- asked a question about methane, and your pipelines that you use currently, you said, well, that's not Angeles Link. But it does seem to be that you need those pipelines, and the storage facilities for Angeles Links, since 70 percent of the quote "blend" is from the methane.

So it just seems to me that you're parceling out part of the project, which is the Angeles Link. And that all of that has to be considered communicatively, if we're going to, you know, if your going to proceed. And that should be part of the feasibility, it seems to

me.

MR. JOHNSON: Thanks, Marcia. That's a good question. I'd like to try to clarify a little bit, if I could.

So when you say the separation between the Angeles Link Project and this feasibility study, the Angeles Link Project has no blending consideration as part of it. So those storage fields, and the gas system that's the current SoCalGas system, are not a consideration, if you will.

This is a 100 percent hydrogen project. It's not a project that has even been fully defined. This is a feasibility study. But the scope of the project as a stands today, is to take renewable green hydrogen and have a 100 percent hydrogen only system. So whereas, you know, we were speaking earlier in the hydrogen experience, that would be a totally different concept.

You are referring to hydrogen blending. Which in some point in the future it may be a consideration, but it's not a consideration at this time for this project. And I hope that clarifies it a little bit. You're on mute. Can't hear you. You're on mute.

MS. HANSCOM: Yeah. Thank you. I can't unmute unless they ask me to unmute. So my -- so, no. It makes no sense to me.

Because I was -- I've been informed, you know, I went through that workshop that a lot of your staff and your contractors went through that says it's really not safe to have 100 percent hydrogen.

So my question is first, is it -- is it safe to have 100 percent hydrogen in these pipelines?

I don't know. I mean, all the researches that I heard speak at that workshop didn't seem to sound like that was the case. But then, secondly, I mean, what are you going to do with all these hydrogen if you can't use it as 100 percent?

So then it makes no sense to have a project that's 100 percent hydrogen when you can't -- all that uses have to have some kind of quote "blending".

So, no. None of that makes sense to me, if you're not going to have -- I mean, it seems to me you can't really separate this out. That would be a piecemealing of sorts for whatever project you're going to use this for.

MR. JOHNSON: Thank you, again, for that inquiry. So two things.

One, again, I think when you are thinking of safety and percentage of hydrogen, you're referring to discussions around hydrogen blending and the potential for embrittlement in existing systems, which is not what

we are talking about. So I just want to say, the blending piece that you are referring to is not the Angeles Link Project, and the consideration for blending would be another study.

But for this particular study, and to answer your second question, where we're talking about 100 percent hydrogen. That's the reason we're in a feasibility study, we're examining the research, we're examining the equipment that will be when it's near term, or is currently available for 100 percent hydrogen.

And then finally, even if we have 100 percent hydrogen within our pipeline, it would be for the in-user to determine their capability of utilizing that hydrogen.

So there are multiple considerations in the scenarios that you suggested. And I just wanted to try to be, you know, this is about being transparent and being open. There are, you know, one thing is that we have our existing pipelines SoCalGas, the blending is not a consideration, or future potential of any blending is not a consideration of this Angeles Link Project. That's the first and foremost.

So any safety considerations around the concept of blending is not part of Angeles Link in that

regard. The blending that was discussed in the hydrogen experience is because blending does take place in that experience because it's an example of what's possible. We want to show that it is possible for future consideration, and for use with existing compliances. So that's a demonstration project.

To show the potential of blending in the future. First and foremost, and then secondly, this is 100 percent green hydrogen because we are trying too decarbonize the pipeline and receive the benefits of not having CO2, and methane in the pipeline.

Again, I hope that's helpful.

MS. GRANT: Thank you, Darrell. I think that's an important difference with the hydrogen blending workshop and our existing infrastructure versus Angeles Link and 100 percent hydrogen. So thank you for clarifying.

Briefly, just to wrap-up, I want to take a second to thank a couple of people in the room and introduce a couple of people.

First, Terry Dowel (phonetic), who I am putting on blast here, if she can just raise her hand. We owe her a big around of an applause for coordinating lunch and breakfast every single day. She did a fantastic job. And that is huge. So thank you, Terry.

You deserve a lot of credit.

And second, I also want to introduce Doug Chow, who put together all the presentations. So I don't know if you ever tried to put together 6 hours worth of presentations over 4 days, it's not the easiest thing anybody has ever done, but Doug and Edith did a fantastic job. So thank you.

And then I also want to take a second to thank the fantastic staff of both Ariano Associates and Lee Andrews Group. So Ariano is over here and Lee Andrews Group is over here. They coordinate all of the materials, get you all of your pre-materials, your debrief materials and everything. It's just a lot of coordination that goes behind the scenes. So a big round of applause for them as well.

They do a great, great job. And so lastly, hopefully you recognize, we're getting another water plan, our sea legs here a little bit. So the cadences of the meetings, I think, moving forward are going to be that we're going to have quarterly meetings. And then in between the quarterly meetings, we'll have these types of workshops.

So we can do a deeper dive on some of the materials you have received. So with that being said, we're obviously in a workshop phase -- we're wrapping a

workshop phase right now. And we'll move into our next quarterly meeting, our third quarterly meeting, which will be the end of September.

And so next week, our hope is that we'll be able to get that date for you so you can plan ahead. And then even further, we want to plan ahead throughout the remainder of phase one. So we're not catching anybody off guard. This is new for us too; so we really appreciate your patience as we've been rolling out these meetings.

But now that I think we've figured out the best way to approach this for everybody, we'll be able to get you dates far in advance. So that's our hope and our goal. So be on the look out for that. And other than that, just a reminder, that yes, we'd be happy to take your feedback up until July 31st.

And last but certainly not least, thank you, thank you, thank you. This is a huge time commitment on your part. We're well aware of that. And we really, really appreciate your honesty and your candor today. It's going to make the project and this entire process a lot better. So we're very grateful. I think that's it.

MS. MARQUEZ: Thank you very much.

(VIDEO ENDED)

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In witness thereof, I have hereunto subscribed my name on this August 3, 2023.

Daisy Reyna

Transcriptionist

Q

HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:)
)
ANGELES LINK COMMUNITY BASED)
ORGANIZATION STAKEHOLDER GROUP)
DEMAND & ENVIRONMENTAL JUSTICE)
ANALYSIS WORKSHOP)
_____)

TRANSCRIPT OF PROCEEDINGS

Remote Meeting via Zoom Videoconference

Monday, August 28, 2023

Reported by:

Lisa Berryhill,
CSR No.: 7926

Job No.:
43591LEE-VC

HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:
ANGELES LINK COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP DEMAND & ENVIRONMENTAL JUSTICE ANALYSIS WORKSHOP

TRANSCRIPT OF PROCEEDINGS, held via Zoom Videoconference, commencing at 10:01 a.m., and concluding at 11:54 a.m., on Monday, August 28, 2023, reported by Lisa Berryhill, CSR No. 7926, a Certified Shorthand Reporter in and for the State of California.

APPEARANCES:

STEVIE ESPINOZA

JILL TRACY

ALYSSA MARTINEZ

EDITH MORENO

JULIE ROSHALA

EMILY GRANT

MARCIA HANSCOM

MARC CARREL

JESSY SHELTION

CHRISTOPHER ARROYO

RICARDO MENDOZA

KENTA ESTRADA-DARLEY

ROSELYN TOVAR

ROBERT ROY VAN DE HOEK

ANDREA VEGA

JILL BUCK

KRISTIN FUKUSHIMA

BELEN BERNAL

ELLA CAVLAN

ALEX JASSETT

FAITH MYHRA

RAUL CLAROS

RASHAD RUCKER-TRAPP

ENRIQUE ARANDA

APPEARANCES

(continued): ANDREA WILLIAMS

ANDREA LEON-GROSSMANN

THELMY ALVAREZ

PRESENTER:

YURI FREEDMAN

Via Teleconference; Monday, August 28, 2023

10:01 a.m.

ALMA MARQUEZ: Good morning, everybody. We'll be starting our meeting shortly to allow more folks to log in and get themselves situated. We'll be starting in a few minutes. Thank you.

Good morning, everyone. Thank you for joining us this morning. My name is Alma Marquez. It is my pleasure to welcome you to today's Angeles Link, August virtual workshop. I'll be co-hosting with Chester Britt from "Mariana," who will be joining us on facilitating the member discussion for today's meeting. I am the Vice President of Government Relations at Lee Anders Group, and I'm excited to have you all join us this morning to go over these very important studies.

Next slide.

I want to make sure we move this meeting forward and want to start off with going over some housekeeping rules. First and foremost, we are recording today's session. And that means we can hear everything in your background, so we are going to muting you. If you'd like to speak, we'd like for you to raise your hand button. That way we can call on you and you can participate in the member

discussion. So please use the feature on the Zoom link.

Also, we will be turning on your cameras when you're speaking. That way we can see you and we can better engage with you during our discussion. Thank you.

And our next slide, we'll be going over the agenda. So I'd like to invite Emily Grant, who is the senior public affairs manager for Angeles Link.

Welcome, Emily.

EMILY GRANT: Thanks, Alma. Good morning, everybody. Happy Monday to you all. I just want to go over our agenda for today briefly.

We'll start with brief self-introductions. We have some new folks on the call, I think. So we want to make sure we all know who we are. Then we want to gauge your level of the material, of your understanding of the material or any -- the time you've had to review the material before we go into it today. So we want to make sure that we're not being too-high level or going too in-depth.

So we'll do a quick Zoom poll to see how familiar you are with the material on both demand and environmental justice. And then we're going to start with demand first and then we will move into our Environmental Justice Analysis.

We have two hours for our meeting today. We want

to follow your lead on how to break up that time. We're thinking it will take about 45 minutes on the demand, but if we're having a really good, robust, in-depth conversation, then we can let that go a little longer.

And then we'll move over to the Environmental Justice, where I know we had some pretty robust conversation around that before. So we'll allow a little bit more time on that. But again, if it doesn't balance, we're here to follow your lead and have a great meeting today. Then we'll go over our next steps, our future meetings, and be available for any questions you might have.

That's it. Thanks again for joining us.

ALMA MARQUEZ: Thank you, Emily.

So with that said, let's go ahead and move forward with our self-introductions. So to keep us more on with today's agenda, I want to start off with self-introductions. In no particular order, I'm going to call out your name. If you can briefly state your name and the organization you're with, that would be helpful. We will unmute you when we call out your name.

And with that, let's have Andrea Williams.

ANDREA WILLIAMS: Hi, everyone. Andrea Williams, executive director of South Side Coalition of Community Health Centers.

ALMA MARQUEZ: Kristen, from Little Tokyo Community Council.

KRISTIN FUKASHIMA: Good morning. My name is Kristen Fukashima. I use "she" and "her" pronouns. And, yes, I'm with the Little Tokyo Community Council.

ALMA MARQUEZ: Faith, Myra?

We'll come back to Faith.

Marcia Hanscome?

MARCIA HANSCOME: Good morning, everyone. Marcia Hanscome with the Bayona Wetlands Institute.

ALMA MARQUEZ: Welcome.

Ella Cavalan?

ELLA CAVALAN: Hi, everybody. I am with Parents, Educators/Teachers and Students In Action. Nice to be here this morning with you all.

ALMA MARQUEZ: Thank you. Nice to have you here.

Julie Roshala?

JULIE ROSHALA: Hi there. Julie Roshala with Insignia Environmental.

ALMA MARQUEZ: Let's hear from Belen.

BELEN BERNAL: Hi, everyone. Good morning. Belen Bernal, Executive Director with Nature For All. Nice to be here.

ALMA MARQUEZ: Thank you. Welcome.

Jessy?

JESSY SHELTON: Hi. I'm Jessy Shelton. I'm with California Green Works.

ALMA MARQUEZ: Welcome, Jessy.

Ricardo Mendoza?

RICARDO MENDOZA: Hi. Good morning, everyone. This is Ricardo Mendoza with Coalition for Responsible Community Development.

ALMA MARQUEZ: Ricardo.

Kenta?

KENTA ESTRADA: Yeah. Kenta Estrada-Darley, also with the Coalition for Responsible Community Development.

THE COURT REPORTER: I'm sorry?

ALMA MARQUEZ: Welcome Kenta.

Rashad?

RASHAD RUCKER-TRAPP: (No audible response.)

ALMA MARQUEZ: Rashad, did you unmute yourself? We'll come back to Rashad.

Let's go with Robert.

Oh. Go ahead, Rashad.

RASHAD RUCKER-TRAPP: Sorry

ALMA MARQUEZ: That's okay.

RASHAD RUCKER-TRAPP: Connected to the wrong mic.

Anyways, My name is Rashad Rucker-Trapp. I'm the Executive Director for Reimagine L.A. Foundation.

ALMA MARQUEZ: Welcome, Rashad.

Let's go -- move on to Robert, aka Roy.

ROBERT VAN DE HOEK: Got me smiling by saying "aka Roy."

Hello, all. Good morning, everybody. Robert van de Hoek. Yes, Roy's my nickname. Defend Biona Wetlands.

ALMA MARQUEZ: Welcome.

Roselyn?

ROSELYN TOVAR: Good morning, everyone. This is Roselyn Tovar. I'm from Communities for a Better Environment.

ALMA MARQUEZ: Welcome, Roselyn.

Thelmy?

Thelmy Alvarez, if you could unmute yourself.

Okay. We'll come back to Thelmy.

We have here Jill Buck.

JILL BUCK: Good morning. My name is Jill Buck. I'm the CEO and founder of the Go Green Initiative.

ALMA MARQUEZ: Welcome.

And then I believe, Christopher?

CHRISTOPHER ARROYO: Good morning. I'm Christopher Arroyo, and I work at the CPUC.

ALMA MARQUEZ: And I believe that's everyone that I see here. If I missed someone -- oh, Alex.

ALEX JASSETT: Good morning, folks. I'm Alex Jassett. I'm the Energy Justice director with Physicians for Social Responsibility, Los Angeles.

THE COURT REPORTER: I didn't hear that.

ALMA MARQUEZ: Welcome, Alex.

And Andrea?

ANDREA VEGA: Andrea Vega, Southern California organizer for Food and Water Watch.

ALMA MARQUEZ: Welcome.

And if I did not call your name, if you can please raise your hand so I can call on you.

Faith.

FAITH MYHRA: Hi, all. This is Faith Myhra; she, her. I'm with Protect the Playa Now. Thank you.

ALMA MARQUEZ: Thank you.

Anyone else I may have missed?

Okay. It looks like we have everyone introduced already. So with that, let's go ahead and I'd like to kick it over to my colleague, Chester Britt, who will run us through the Zoom -- I'm sorry. Through the Zoom survey.

YURI FREEDMAN: I think Enrique may not have been introduced.

ALMA MARQUEZ: Enrique?

ENRIQUE: Thank you, Chester and Alma. Enrique, buenos dias. Solid enrichment action.

ALMA MARQUEZ: Thanks, Enrique.

Anyone else?

Well, thank you, everyone, for joining us this morning. We're very excited to hear from you and share with you today's presentation.

With that, let's go ahead and kick it over to Chester, who will run us through the next phase of the agenda.

Thank you.

CHESTER BRITT: Thanks, Alma. It's good to hear everyone's voice again after seeing you all in person last month, or most of you. We're going to do a quick Zoom survey. It's only two questions.

And again, as Emily mentioned, what we're trying to get at here is your familiarity with the materials that we previously sent to you so that our presenters can do a better job of trying to address the detail level of understanding that you might have regarding these materials.

So the first question is, "How familiar are you with the supplemental demand materials provided?" Your choices are "very familiar," "somewhat familiar,"

"somewhat unfamiliar," and "very unfamiliar."

You could just take a second to click on your answer.

And then as you're answering that -- it's actually a two-part question. The second is, "What demand topics are you most interested in discussing?" So the "scope and the process" -- covered a lot of that ground in July -- "methodology," "preliminary outputs for mobility," "power and industrial." Those are your choices, related to the demand topics.

We'll give everyone just a second to finish up your answer.

But you can see, hopefully on your screen, some of those results. It appears that people are kind of varied in their familiarity with the supplemental demand material we provided last week. We have about 20 percent -- 3 out of 16 -- that are very familiar. And then you have a handful of people that are unfamiliar -- or actually only one person out of 16. The majority, seems like you might have been able to skim through that material and/or maybe have some level of understanding of it.

The second question is what demand topics are you most interested in discussing? The clear winner is the scope and process, with almost 70 percent, and then

methodology has 38 percent, followed by mobility, power and industrial at about 19, 19, and 13 percent. So a lot of interest still in talking about the scope and the process that we're going through and also some interest in the methodology.

So that's good. That's why we're here today.

And I want to thank everyone for sharing your honest results -- I mean, honest answers to the questions. And we'll go through that as we go through the presentation.

So with that I'm going to now pass it off to Yuri, who is going to be our first presenter. Yuri is actually the senior director for business development with SoCalGas, and he'll be making our first presentation today.

Yuri, if you're there, we cannot hear you.

YURI FREEDMAN: Yeah, I couldn't unmute myself. So thank you for the host for unmuting me, I appreciate that.

You can all hear me know; right?

CHESTER BRITT: Yes, we can.

YURI FREEDMAN: Excellent. Thank you.

Good morning, everybody. I'm Yuri Freedman, director of business development at SoCalGas. And it is my pleasure and privilege today to share with you some of

the scope, methodology, and outputs of our analysis of demand for clean hydrogen, as requested by the decision of the California Public Utility Commission.

Let us go to the next line, please.

Chester, would you like me to talk about feedback or would you like to take it back and cover that?

CHESTER BRITT: Sorry, Yuri. I think this is a slide for us to cover some of the feedback that we've heard to date. But if you're wanting to just go to the demand, you can just go to the next slide.

YURI FREEDMAN: Yes, please.

So this is the important framing slide. And what you see here is, of course, the major blocks of the process that the analysis entails. As you all know, we shared with you -- we prepared and shared with you the study descriptions. These are the initial scoping documents that define the -- again, the reach and the depth of what we are going perform.

What we're going to do today as shown by this yellow error is to share with you how we approach this analysis, which is to say that some of the, so to speak, nuts and bolts, where we got the data, what we did with the data, and ultimately what the outputs of this calculations suggest. Clearly, this is preliminary findings, but we thought it's important for us to share

them with you to get a sense of the magnitude and sense of scale of where this is going. And ultimately, again, as you all know, we will be developing draft reports based on our work today, based on your input. So your input, your feedback, your questions are more than welcome to create a dialogue around our work.

Let's go to the next slide, please.

By the way, I have to apologize, I am presenting so I may or may not see the questions as they come up in real time. So I trust, Chester, you and others will keep me fully abreast and you'll decide whether or not to make a fuss. The question or to go through the slides and then have a conversation afterwards or both. There's no right way to do it. Any questions, any comments, at any time, I'm more than welcome.

So less talk about, as Lydia suggests, the scope and the process methodology.

Let's go to the next slide.

So as you all know, in December last year, the CPC approved our request and among other request in the final decision, there is a request for the demand for an end user study. Remember, we all in have 16 decisions. This one is 16 studies. This one is obviously quite important. And actually, Marcia's question is very topical and time. But thank you, Marcia.

The definition of clean hydrogen, as it is listed in the final decision of the Commission, entails, if I remember it correctly -- and please second guess, Tim, if I get it wrong -- the hydrogen does produce with zero emissions from renewable sources. That is a very kind of simple way to think about that or from nonfossil fuel sources. That is a very kind of simple way to think about that.

Again, I'll pause here for a second for anyone on our team who wants to give a more refined view or perhaps, hearing none, we'll continue. I'm hoping Marcia answers your question.

And the way you -- the way you approach -- I do not believe, Marcia, that that topic was brought up in a final decision. Could be final decision is publicly available, of course, and can be shared in the chat and box, the link.

So approach methodology is something which forms the basis of the any analytical study. Again, where I get the data and how you approach them. In this particular data study, we are very intentional about using the publicly available data. And, in fact, the data -- the bulk of data for the study comes from the California Air Resource Board. They have the database of emissions, which we are very fortunate, like everybody else, to be

able to access and use.

And I'll show you in a bit more detail later on how we treat this data. But the point is this is all public data. There's nothing in there that anyone isn't able to access. The model assumptions, we are going to be extremely transparent about that. Which we assumed -- and the assumptions will not be fully covered within this presentation. But the deck that we shared in advance has a lot of them. So again, any questions about assumptions, we are super happy to answer and to walk you through our logic why we assumed it was.

We did also recall that we did not want to create, if you will, one view of the world. Our intent was to show how the future might look like under a conservative view and then the median view and the ambitious view. And I emphasize ambitious use because California is ambitious in its desire to reach carbon neutrality. And we, accordingly, think that it's important for us to see what this ambition could translate to in terms of the demand for clean molecules, which again, we believe clean hydrogen is positioned to be one of the premiere clean molecules.

And then, like any other analysis, we are quantifying what it means going from the concepts to the questions. Okay. We are going to be carbonized

transportation, power generation, race industrial sectors, how much demand for clean hydrogen this might create 10 years from now, 20 years from now.

And so what we'll see in the end is those numbers which reflect the potential demand for this clean hydrogen as a function of a decarbonization of various sectors and the role that hydrogen's going to play in the decarbonization.

Let's go to the next slide.

It's important for us, in terms of the scope, not just to describe what is the scope. And, again, you'll hear me talking about these three key sectors: Mobility, power generation, industrial sectors. Of course, industrial sectors capture wide variety of various industrial activities. And we'll see this later in the deck.

What is quite important is what is out of scope. And the reason I'm bringing this up is that there are several variables that point to higher demand. And we purposefully did not want to include in this analysis but want to talk about that to make sure we all understand that, as we conduct deeper analysis, we are going to need to capture those variables.

The one of them which is very important is the liability and resilience. Quite simply, it's something

where we will need those dispatchable fuels that we can quickly put into the power grid to make sure that on hot days -- and we, as it happens, may have some of those days later this week. That on hot days we have ability to quickly access and quickly use clean fuels to support, to back up those intermittent resources. So on wind, but hydrogen, this applications is extremely important. And yet, that's something which we did not exclusively model.

You all can guess that if you are starting to include those reliability requirements, demand for hydrogen is going to go up. So this is something which is important to keep in mind.

We also did not assume that there's going to be a new generation, power generation facilities building in the States, which again, for sense of scale, we wanted to get -- show a number that the California Air Resources Board scoping plan actually assume that about nine gigawatts of new capacity may be required because of this demand, increased demand for clean electricity.

Obviously more power generation that is going to be zero emissions is going to require more clean hydrogen. And again, we purposefully did not include it into the scope at this point but there's no question in our mind's that this needs to be analyzed, identified, and quantified down the line in deeper analysis.

And the last but not the least, of course it's very important, carbon pricing. Carbon pricing and carbon impact is, of course, the main reason why we're going through decarbonization is to get rid out of CO2 emissions. Therefore, there is economic cost of doing that. And that cost could be explicitly expressed in the price of CO2 or it could be expressed with a variety of other legislative and regulatory mechanisms.

So the -- to the extent the state were to put the higher price on carbon, in the regulatory proceedings or in legislature, that clearly will have implications. That will have -- create more demand for clean hydrogen as a decarbonization vehicle. But that's something which we did not want to model.

So the point is that we believe our analysis is quite detailed. And you'll see -- I'm hoping you'll agree that they -- it's been done in depth, bottom up. But it leaves out important elements which could point to higher demand for hydrogen.

Let us go to the next slide, please.

These, again -- I know that we mentioned some of this and to be sure we all understand where we are in the process, the model has been defined, the structure of this has been set. We, based on these models, have conducted the numerical analysis of the data. So we will walk you

through that in detail.

What's important is that we are not doing this in the vacuum at the bottom. We're -- we are not just having the model crunch numbers and then come out and put them in the charts. We want to be sure that the numbers and the way we approach it makes sense. So we are conducting interview with the market participants, with parties that actually are going to end up using this clean hydrogen.

We're also conducting interviews to various parties that have looked at various scenarios with demand before and that sound which important to us because that informs our analysis.

And ultimately, based on all of this, we are going to refine the model, like any model is going to be -- try to get close to reality through iterative process that we describe here on the slide.

I understand -- well, I -- again, I will apologize but I may not catch all the comments here, but I think the one I caught is that we talked about demystifying hydrogen and not adding more complexity. I am fully supportive of that. And we will try in this presentation to tell you in a very common sensical, simple way how we approach the problem.

We do, however, have to analyze the market for hydrogen because like any other pipeline, like any other

project, we need to establish for the Commission and for ourselves and for you that there is no demand in California for a project like that.

So to do that requires quantitative work, requires modeling. That's why we're taking through this. But, again, the intent is to make it very transparent, very open, and replicable with you. So that is the intent of today's conversation.

Let's go to so the next slide.

I think we can just go through several clicks and just open this in its entirety.

Thank you.

So the intent here, to show you the logical of this and maybe I'll just focus here on the middle section, in the interest of simplicity, on the blue section.

So how to assess command for something. In this case, for hydrogen. Well, first, I'm going to say, okay. What is the market value we're going to look at? For example, what's the objective here? The objective is to reduce emissions. What will eliminate emissions? Let's take one sector and think about and transportation. Okay, we're going to eliminate emissions in transportation. That we know.

Let us think about what it means. It means that various transportation vehicles will need to be changed

from the emission-intensive vehicles today, the internal combustion engine to zero emission vehicles. And that's a process which we're going to talk about a little bit. What we assume, why we assume.

Then with these emission vehicles there are several types of them; right? There is one that's battery electric vehicles and then there's another one which is more often what we do is hydrogen fuel cell electric vehicles. They're both electric vehicles and, yet, hydrogen fuel cells, as the word suggests, needs hydrogen.

So we're going to make some assumptions about what proportion of those zero emission vehicles is going to be on hydrogen. And, ultimately, that creates the demand view for any given sector.

Some sectors may have relatively small share fuel cell vehicles; some have very large. And that's driven by the requirements by what we call duty cycle. Some vehicles need to carry a lot of load over long distances that puts premium on energy density that calls for hydrogen. Some others, like for example, short haul, light duty passenger vehicles, battery is clearly dominating technology and there are many of them.

Let's go to the next slide so we can dig into this in a bit more detail. And before we do that, we clearly are not the first party who is asking these

questions. We wanted to put the slide here so we'll all understand that the body of work to date on hydrogen has been really large.

On the left-hand side is the federal government report, which was issued several months ago, earlier this year. It's called "Hydrogen Liftoff Report." It obviously comes on the heels of the federal legislation that is intending to place several billions of dollars in the hydrogen assets. The DOE, Department of Energy, wants to know how to help make it happen.

You can see there are several state level reports. The carb scoping plan, the California Air Resource Board issued their report. In the bottom row there are two reports of the California Energy Commission. And on the right-hand side, at the top, there is a report by scientists of University of California.

So the point is that there's a large body of research, large body of analysis preceding us and we more than welcome you all to explore that. Needless to say, all these reports are in the public domain. So we really encourage you to look at that and, you know, when making our steps informed by the studies of the previous research and scientists.

Let's go to the next slide.

This slide is to -- maybe to recap the three

cases I described briefly -- the conservative, the moderate, and the ambitious -- on the left. On the right, what's important, these are the four levels. Think about them as the main thing is that matter when you decide whether hydrogen is going to get adopted.

Clearly, policy and legislation is super important. The energy transition is being driven by false legislation. So the degree policy leans more into using hydrogen, that is going to drive higher adoption.

What's equal important is technology feasibility. Is there actual technology that can do that? Other fuel cell forklifts, other fuel cell vehicles and light vehicles and trucks.

Commercial availability is something which matters because, yes, it's important to have technical ability. Is it affordable to the customers? Can people on demand side actually use that?

And the last one is not business transaction. That really is the question of how much a business is leaning forward. And what I mean by that, some businesses adopt their own decarbonization plans. Some businesses adopt their own zero emission deadlines. To the extent at business and a large business adopt that, that clearly is going to pull through more because then they realize that in some sectors this is their premier choice. So you will

see the interplay of this four sectors that manifest itself differently across the demand. But, ultimately, these are the four things that matter.

Let's go to the next slide.

Maybe before this, let make a pause.

And I realize I've said a lot in a very little time. So I fully realize to -- and to your point and others, that this may come across as complex. So I would be most happy to try to answer the questions right now on the scope, on the methodology on our approach.

CHESTER BRITT: All right. So do you want to take a pause, Yuri, here and -- before you get into preliminary outputs?

YURI FREEDMAN: I think it's fair gesture because, again, I think this is -- I realize that people that have not done this, you know, for living, it is fairly dense. So, yeah, I would welcome any comments, any questions so we can dig into the topics of interest, of importance to people here.

CHESTER BRITT: Yeah, so let's take a pause. So -- well, I just want to put everything in context just, you know, while people are thinking of maybe things they might want to add.

So, in July, we had extensive meetings that covered all the 16 work studies. And as you heard Yuri

discuss today, today's meeting, we're focused preliminarily on the demands study.

The demand study, it kinds of sets the tone for a lot of the other work studies because we have to know what the demand is for some of those other work studies to get completed accurately. So the demand has direct inputs into a lot of the other technical work.

The demand study is very technical. It has a lot of components to it and it's going to use a lot of source data, as you heard Yuri reflect on different source data out -- that will be put into the models. The models that are going to start to put out outputs, which we're going to see in a second, but the way that the scenarios are divided, in terms of the presentation, are conservative, moderate, and ambitious.

And then they're further divided by mobility, power, and industrial sectors. And those are the way that these models are working towards producing demand outputs that we can understand for utilization across the other work studies and to set the thresholds for what the demand is and is it enough to warrant Angeles Link?

So while you might not understand all the technical, you know, details of everything that's going on in the demand study, does anyone have any thoughts or questions about demand itself and how it might impact you

and the community? Or what your thoughts are or concerns are about demand or anything that you heard Yuri mention in his presentation about the technical approach that would raise the level of concern or something that you would want more clarification on?

Because, you know, as Yuri mentioned, some of this stuff is very technical. But that is kind of the process that we're going through with both the CBOSG and the PAG is to roll out these technical studies and get as much input as we can onto that process.

So I see, Rashad, that you've raised your hand. So I'm going to call on you first.

For all participants, when you're getting a chance to speak, make sure you unmute your microphone and then please announce your name and your organization for the court reporter, so when she's transcribing the meeting, she can have an accurate representation of who's speaking.

So, Rashad, if you can unmute yourself, you should be able to speak.

RASHAD TRAPP-RUCKER: Thank you. And I really appreciate the presentation that was given. I think it was well outlined; although, to your point, I think it is very technical and definitely takes some time to, you know, study a little bit more to better understand. But

I'm asking --

CHESTER BRITT: Can you just state your name and your organization for the court reporter?

RASHAD TRAPP-RUCKER: Rashad Trapp-Rucker or RASHAD RUCKER-TRAPP, R-a-s-h-a-d, T-r-a-p-p, Rucker, R-u-c-k-e-r.

CHESTER BRITT: Thank you.

RASHAD TRAPP-RUCKER: Hopefully I'm asking the right question here, but in terms of cost to the community, what does that look like for people in inner cities, people that may look at this and -- in layman's terms, may look at it and be like, wow, this sounds very expensive and it will cost me more money in the end on my bill or whatnot. But what's the cost of that?

Hopefully I'm asking the right question here and the right section.

YURI FREEDMAN: I think it's a very fair question, Rashad. And I think it should be in all minds.

So scope-wise, the economics and the cost competitiveness of hydrogen is going to be analyzed in a different study. That study that's being kicked off right now, we here, within this study, are not dealing with that. So I do not have those numbers right now to provided. That will be shared once we advance our economic study.

What I will say is that we are going to look very carefully at this issue, again, because it's fundamentally important to us, to the state, to our society, and we are going to look at costs, but those have benefits that this process brings to communities and especially underserved communities.

And maybe one simply example I'll give you -- and I know I may have mentioned this in one of our previous sessions, where decarbonizing transportation not only allows to reduce the greenhouse gas emissions but also has a tangible immediate and large input on air quality.

Quite simply, if you replace diesel trucks with electric fuel cell trucks, we are going to clean a lot of neighborhoods alongside of the freeways. And that is going to, again, have tangible impact, of course, just life and health on people who live in those communities. And that has not just societal importance, it actually has economic value because, obviously, there are significant benefits all around our society.

So we're going to make sure we capture that. But that is not within the scope of this study. That's the study of economics, if that makes sense. And other studies which we were ordered to conduct by the Commission, which we all do as requested.

CHESTER BRITT: So Yuri, can you just

elaborate a little bit more, though, on the concept of demand as it relates to the need to scale up this hydrogen and then how that impacts the cost. So, obviously, costs are typically much higher when the volume is much lower. And as you scale, then it allows for cost efficiencies that don't exist at a smaller scale. So demand does have a huge role to play in, obviously, determining future cost scenarios; right? Is that accurate to say?

YURI FREEDMAN: Yeah. No question about it. Thank you, Chester.

I think we in California actually have the living proof of that. It's called "Renewable Power." Because of the state taking lead on adopting renewal power, the price of renewable power, and the cost of building solar projects and wind projects came down dramatically over the last 10, 15 years.

So we in California know the recipe, if you will, to adopt the new technology. It's called, as you said, Chester, scale. I don't think hydrogen is going to be any different. So I think it follows from we do need those molecules. We will need molecules later this week to keep our lights on. Because in periods of peak demand, molecules are critical to keeping us cool and safe. That is the basic, very important needs.

Again, if we can't use molecules which are

emitting CO2 when they burn, such as fossil fuels, we're going to have to use molecules like hydrogen, when it burns and produces water. But we'll need these clean molecules in the future for reliability and resilience purposes, for sure.

And in scale is the way that the Federal Government has approaches that. They're putting $8 billion to work to make sure that there's enough hydrogen projects will be built. So that in the process of doing that, the scale will come up and the costs will come down. So the intent is to make sure that the federal funding catalyzes this. And, ultimately, the cost will come down to the level where it becomes affordable.

CHESTER BRITT: Thank you, Yuri.

Marc, you have your hand raised. Marc Carrell. Again, if you could unmute your microphone and just state your name and organization and then ask your question.

MARC CARRELL: Hi. I'm Marc Carrell with Breeze Southern California.

I didn't realize that the expectation over the next so many years, so many decades, for clean hydrogen, green hydrogen, is to use it for also power generation and not just for transportation.

So are there any -- my question is are there

any companies that are planning hydrogen power facilities and are there any that exist already and are you looking at it as large generation or distributed generation with small, you know, small units basically providing the power that's generated by solar and wind to be saved in hydrogen batteries or hydrogen fuel cells that can be used later?

YURI FREEDMAN: Excellent question, Marc. And I really couldn't have -- wouldn't have had a better conversation on the subject than we're having here.

So I think the answer is all the above. First of all, you know, not only do we have the examples of facilities being converted to hydrogen but, again, we in California have taken the lead of that. I'll explain to you why I'm saying that.

There is a plant in Northern California and Utah. It's called Intermolecule Power Plant. That plant has been supplying electric power for many, many years to Los Angeles Department of Water and Power. This direct transmission line that bring this power from us to California. This plant was a coal plant. It was burning coal for all the years of its existence.

Los Angeles Department of Water and Power, right now, together with Intermountain Power Authority, which is the owner of that plant, have made the decision several years ago to convert this plant to clean hydrogen.

And that actually is happening. This plant is going to come into operation over the next several years. So this is something where it is arguably about the first of a kind in the world a large, very large power plant that is going, initially, to run on the blend of hydrogen with natural gas but eventually going pure hydrogen.

Again, this was the catalytic moment in a hydrogen power generation application from the concept it became reality, undeniable reality because it's now being built.

Very recently, this year, Los Angeles City Council took a vote on replicating this approach with one of the plants in Los Angeles Basin. It's called Scatter Goods. And that plant that was run -- is running natural gas is going to be converted again to begin running 30 percent hydrogen, initially, and then on pure hydrogen.

So I'm happy to report that not only are there real-world examples, but we actually, here in California, are literally blazing the trail for application of clean hydrogen power generation. And, again, it goes from the fundamentals of power generation, where we have the wonderful abundance of renewables, of wind and of solar, but we do these those molecules to back them up, as we call to firm them up, in periods of intermittency. And that's where clean hydrogen plays quite remarkable role.

And by the way, all the manufacturers, all the major turbine manufacturers are now making their turbines compliant with 30 percent hydrogen because they see where the market is going. So they really have a very large momentum that is shared by the manufacturers, the GE, Siemens, Mitsubishi, Alstom, and by many others. So the big opportunity now.

Going back to the second question, that is also very important question. The question is, are those going to be large plants or maybe small facilities? And the answer may be all the above.

And the reason I'm saying that is that it is significantly less expensive to make power in the large plants. The economies of scale help. It's also, if you will, all the grid is already there. All the transmission facilities are there. So the replacing the fuel is a challenge, but at least you don't have to rebuild the grid next to the plant.

Now, that said, the other implication of hydrogen -- and we actually have demonstration project that I welcome you all to come and visit in Downey, is the way hydrogen can work with renewables directly onsite to create resiliency. And the way it works is that if you put solar panels -- and if in a sunny day, at 2:00 p.m., solar panels produce more than your facilities, which is

always, always the case, you can take extra power, convert it into hydrogen on the spot, put this hydrogen in the storage tank, and then when we use power, let's say in the evening, you can use this hydrogen run through the full cell and make the power independent of the grid.

That, to me, is zero emissions and high resilience because at this point you can maintain -- whether is the school, and I've seen the question about K12; whether it's the emergency services facility, think about fire department, the police station, you can maintain resiliency in the face of all the weather events.

That, to me, is a very promising implication. And that's why I meant to say that there will be a role for large centralized power plant, but there will be role for distributed generation, which is going to be pairing renewable power and fuel cells.

Again, I'm trying not to get too technical, but this is a real exciting topic. I'm really glad you asked this question.

CHESTER BRITT: Thank you.

Yuri, your answer generated a lot of follow-up questions. So I just want to go through those and then we'll get to Jill Buck, I believe, who also has some questions separately related to the demand study.

But Marcia Hanscome was following up on your

comment regarding Intermountain and what percent of this is still going to be used, quote, unquote, "nitrous gas."

Is that still methane?

YURI FREEDMAN: I think there are several things, Marcia, that are going on there. And I'll try to kind of dissect them. The initial mix of fuel that's going to get burnt in the plant is 30 percent hydrogen, 70 percent natural gas. Eventually, natural gas is going to be phased out and the plant is going to run just on clean hydrogen. And the facilities to make this hydrogen restored are being built right now, even as we speak.

The reason you brought up, I believe, the nitrous oxide, what they call NOx, nitrous oxide, these are the chemicals being produced in the process of burning things. When they burn something, as it happens -- majority of air around us, as you all know, is nitrogen. So when it burns something with nitrogen combines with oxygen, which is the second most advanced element in the air we breathe, and creates nitrous oxide, which has various health effects.

There are regulations that regulate the levels of nitrous oxide in the power generation facilities today. These regulations are very stringent because we in California have air quality issues and the state is very intent on managing this issue. There are commitments from

the producers of equipment from equipment manufacturers to stay within those limits, even as they start burning hydrogen.

So I guess my point is that the regulations that maintain the levels of those nitrous oxide, that we call NOx, are going to stay in force. And hydrogen -- using hydrogen in power generation turbines is not going to exceed as regulations.

I'm hoping that answers the question. But, again, happy to dig deeper into that.

CHESTER BRITT: Yeah. So there's a lot of follow-up questions. I'm just going to start reading some of them. Yuri, maybe you can just succinctly answer.

So she's still concerned, Scattergood is still 70 percent methane. The experts that she heard earlier this summer said that 100 percent hydrogen is not safe to be used. Is that -- and you were saying that right now it's 70/30 split, but it's going to be all green hydrogen in the future. Is that an issue related to safety?

YURI FREEDMAN: It is not an issue related to safety because safety is going to be ensured -- let's go this way. We have been using hydrogen for many decades. We just don't always see that because these molecules are traveling in pipelines and being used in various facilities.

So safety of hydrogen is well understood. There are training procedures that safety protocols. And, again, the hydrogen economy has been existing. It's just that we didn't use this hydrogen for the purpose of power generation. But we have been using this to make gasoline, diesel and jet fuel, and many other chemicals.

So hydrogen, the sense, is not new. And manufacturers are very intense on making sure that the same safety protocols that we have in place for power generation facilities, which, as I think you all know, run safely and reliably. The same safety protocols are going to be applied in a modified fashion if needed to the -- to the mix of power gener -- mix of natural gas and hydrogen and eventually the pure hydrogen.

Again, there's a lot of industry practice that has been accumulated over, I would say, close to a century of hydrogen. And that was a very, very substantial budget of knowledge.

CHESTER BRITT: All right. We have two more questions directly about the demand study.

Jill Buck asked, "Do you see opportunities for K through 12 school communities to utilize hydrogen and how can that sector be part of the demand for equation?"

YURI FREEDMAN: Yeah. That's a great question, Jill. And I try to touch upon that when I was talking

about the fuel cells. To me, resiliency is the name of the game. And I think we are going to have not fewer resiliency challenges but more as we move into the future where the climate is going to get hotter.

I think the scientist tell that this heat will create longer weather events and they may become more intense or violent. So we should not be even be planning for today. We should be planning for the future, where we are going to make sure that our essential facilities which, to me, are K-12, say three kid. So I care about this very, very deeply. And they are putting these facilities and schools -- and again, combining solar and full cells, make sure that no matter what happens to this transmission grid, you're going there, the facility which can supply, effectively, its own power and which has enough energy storage to last for several days. So super important application.

CHESTER BRITT: And then one follow-up question. Will the efficiency of burning hydrogen be considered in the demand study?

YURI FREEDMAN: The efficiency of burning hydrogen is obviously a factor in that. At this point, to do it really in depth, you would need to model the power grid. You ultimately would need to look at the amount of power generation that the facility will produce. Because,

as you know, power grid is a very fine instrument that balances supply and demand in realtime. As the demand goes up, you know, the plants come on and come off in 15-minute increments. So it's a very delicate system which is very large and very complex.

We fully intend to model this in the next phase of our analysis. For now, this analysis is so large that it was outside the scope of what we did. But there's no question, ultimately, as power generation facilities powered by hydrogen come online, we all need to understand how much power they're ultimately going to produce to make sure the supply and demand is going to stay balanced, as it is today.

CHESTER BRITT: All right. To try to keep us on schedule. That was a really good conversation. I just want to remind everyone, all of your chats are being documented. So if I didn't get to every single item on the chat, we'll definitely be circling back with you and it'll be part of our overall summary and responses as well.

I want Yuri to finish his presentation so we have enough time for the EJ discussion at the second half of our agenda.

So, Yuri, if you can go through these slides quickly. I know these are very preliminary results; so

nothing is set in stone here. But the modeling has put out some interesting results already. And so go ahead and walk us through that.

YURI FREEDMAN: Absolutely. And again, yeah, for good conversation, there's never enough time. This one is no exception, but I really appreciate the questions. I mean, they could not be better questions. So thank you all for asking them.

And on to the initial outputs. As you can see -- remember, I listed three cases: Conservative, moderate, and ambitious. There's no surprise that numbers go from lower end conservative to the higher in ambitious. And there range, as you can see, over 1 million pounds per year to 6 million tons per year for ambitious. So there's a big range here. Another observation -- there's a couple of observations to make.

One is that if you look at the dark blue wedge, there's the transportation. That's the foundational sector. And transportation is, to a large degree, driven by the heavy duty transportation, basically taking the long haul, heavy duty trucks on the road and putting the hydrogen fuel cell trucks in their place.

You can see that that wedge grows. But in the conservative case it underpins, it is the largest sector of demand.

The second largest, of course, is power generation. And you can see the power generation, that light blue wedge, it actually varies quite a lot between the conservative and ambitious case. The reason the story is that the question, how much are going to need this dispatchable power is an important one. And we are going to dig into this deeper in the next phase by the detailed model of the grid.

Today, you know, natural gas run, on average, about 30 percent of the time, give or take. We'll be -- you know, if you think about natural gas, take out natural gas, put hydrogen and ask the question, how much hydrogen power plants are going to run in the future? We don't know that today. And we'll find it out as we do more modeling. But we try to capture the spectrum of possible outcomes in the range.

That's why you see that the light blue goes from that, you know, more modest number in the conservative case into a really high number, the biggest sector of demand on the right. You see the light blue? That's power generation.

The last sector is really important because it may not be as big as the other two. The top line that -- need blue on the sector, but that's industrial. And around the industrial sector has to decarbonize because

there are large categories of various industries. Many of them employ a lot of people that work in those industries. And we need to find a way for them to get -- to find the path to carbon neutrality and stay in business.

So this businesses include food and beverage, metals, and many other industries which we, again, broke down and analyzed from the bottom up. So you can see that depending on the level of ambition that the width of that third line goes from fairly small thing to very large and ambitious case.

Again, let me pause for a second here because that is the key -- initial results which we wanted to share with you. Any reaction and comments on that will be, obviously, more than welcome.

CHESTER BRITT: I think we should just keep going, Yuri, for the sake of time. We just want to get to the next set of slides quickly because, again, the preliminary results and we'll come back to this demand study again.

YURI FREEDMAN: And again, I want to say it's more of the same but this breaks down the demand by those categories. Remember, we talked about the mobility. This shows, as you can see, the contributions of various sectors to mobility. And you can see, again, the dark blue on all three charts is the Class A, heavy duty.

But there are multiple sectors which are going to comprise sector and goes from 1 million tons per year to, obviously, high, almost two, but not quite, in the ambitious scenario.

Let's go to the next slide.

Power generation, you can see the big swing. And that big swing is determined by -- again, if you believe we're going to run power plants 10% of the time, that's your conservative case. If you believe that more plants will convert to hydrogen and they will run, let's say, 20 to 30 percent of the time, that's your moderate and ambitious case.

And again, we're not, you know, stake your claim here on any given case. Our intent is to show the range, the spectrum of possible outcomes, which we can further narrow down in the detailed modeling of power grid in the next phase.

And the next slide is going to show you the breakdown of demand in the industrial sector. You can see it grows quite a lot. What's really important, there are two sectors which drive that. One is what they call co-generation. These are the power generation facilities within the industrial plants. And they're switching to hydrogen is really important. Of course you can see how it matters.

The second one -- and that's the gray line which appears on the right-hand side. It's very tiny. Its ability to switch what they call gray hydrogen, which they use today. And by the way, they use it and they've been using this for decades. So that goes back to safety.

The processes are very well understood. But switching these to clean hydrogen, which is the same chemically but is made without emissions, is going to create a very large incremental demand for hydrogen.

I think that's the end of my slides here, Chester. So again, happy to pause here or, you know, happy to dig in deeper.

CHESTER BRITT: All right. So again, I want to keep us on track. We have an EJ presentation. I know there's a lot of interest in that.

So there was a question from Alex Jassett. And it really is focused on NOx control technologies and it's more of an air quality study -- or question, which I know we're going to get back to. So I don't want to ignore that question but maybe, Yuri, you can type in an answer into the chat so that she can see that answer.

She had to leave the meeting, it sounds like. So she's not available to hear the answer anyway. But she'll be interested in knowing that you answered it. So maybe you can do that.

And then, is there any other follow-up questions on those preliminary results? If there is, raise your hand and we'll get to your comment; otherwise, we can go to the Environmental Justice Study.

And, Marcia, I see your chat. My mistake as a facilitator. Alex is a "he." So I apologize for that. I made that mistake myself.

All right. So I don't see anyone else's hand raised. So if that is the case, then I am going to turn it over to Edith, who's going to make our presentation regarding Environmental Social Justice Analysis.

EDITH MORENO: Thank you, Chester. Can you hear me okay?

CHESTER BRITT: Hear you great.

EDITH MORENO: Awesome. Good morning. I don't have slides today; so if folks don't mind turning on their cameras to join me, that would be greatly appreciated. I don't want to be here on the virtual screen all by myself. So I would definitely love to engage with you and have a conversation and meaningful dialogue. So don't be shy.

Thank you.

Okay. Well, my name is Edith Moreno. I'm a regulatory strategy and policy manager on the Angeles Link team. I use she, her, and ella pronouns.

So first of all, I really want to thank you all

for devoting your valuable time and energy to engage with us today. As a reminder, we had really great discussions back in July that were focused on the scope of our Environmental and Environmental Social Justice study. And so that discussion that we had then really just reiterated the importance and the complexity of the EJ topic.

And so I do want you all to know that we heard your comments and felt that an additional session with you all warranted this additional time with you all today -- right? -- to essentially review some of the modifications that we're planning to make to the scope of the Environmental and Social Justice component of that study, which I'll refer to as the "EJ Analysis" today because it can be a little bit of a mouthful.

I do want to communicate with you all that EJ issues are a tremendously important topic for SoCalGas. And I want you all to know that, you know, we do recognize a disproportionate burden of environmental hazards that has been placed on the communities of color and other low income communities. And I want to make sure that EJ issues are adequately addressed and considered throughout the Angeles Link project.

SoCalGas wants to make a positive, lasting impact on the communities we serve. And we expect that Angeles Link can bring cleaner air and work force

development opportunities in our communities. And we want to get this right, and we need your continued help.

So with that said, like I mentioned earlier, we have taken our comments to heart and have modified our approach to our EJ analysis.

The folks have not had time to review the deck that was shared with you all earlier, I guess last week. Our plan for today is not, essentially, to walk through the slides but have more of a conversation and dialogue and spend more time listening and taking your feedback. And so if you did not have time to look through the materials, let me just kind of do a quick breakdown of what the EJ Analysis is going to be now comprised of.

So there will be two components. And so the first of which is the desktop EJ analysis. That would be executed, essentially, using the tools that are used by state and federal agencies like Cal Enviroscreen. And I know this is what we talked about last time. But the addition here, the Stakeholder Engagement Plan, is where we are planning to outline some of the engagement activities that we want to conduct in Phase II of the project.

So we're currently in Phase I. Again, Phase I of the project is where we are focusing on the feasibility of Angeles Link. Right? So what Yuri discussed today.

What is the demand of hydrogen? And then what other studies we have looked at is like, you know, who will be using the hydrogen? Where are we going to be getting the water for hydrogen? So again, that's all Phase I.

And in Phase II is when we are planning to move into more of the detailed engineering, kind of more refined analysis, et cetera, et cetera. And then the third phase is when we would submit a formal application requesting approval to construct Angeles Link. And that phase is still several years down the road.

So, you know, like I just mentioned, the EJ analysis was part of our original scope but we are adding this community focus stakeholder engagement plan that we will implement in Phase II to gather community concerns and address and mitigate any sort of impacts to historically marginalized communities. So this plan will include outreach to Native American communities and any other low income and disadvantaged communities that you would like us to include.

So the approach, essentially, would be this: It would be to develop this plan with your input during this phase of the project, so Phase I. And Phase II is where we're calling it more the "Boots on the Ground Outreach" and more of the engagement with each of your organizations and the communities that you serve. So this

could be anything from a listening tour, focus groups, any other method that you all think would be effective to gauge what matters most to our community members.

So with that, I invite you to lean in. I really would love to hear from you. I want you to let us know what to include or exclude in this plan. You know, we're here to answer any specific questions on our proposed modifications, and we'll be more than happy to pull up the deck if folks have any sort of questions on the material we distributed.

So with that, I will hand things back over to Chester to facilitate our discussion.

CHESTER BRITT: Thank you, Edith.

Again, we wanted to reserve a significant amount of time for this meeting to discuss the environmental justice issue again. As Edith mentioned, we had a robust conversation with you all and with the pack in July, which included this topic, and we got a lot of dialogue.

And so one of the reasons why this is on the agenda is because we wanted to make sure that you understood what we heard you loud and clear, that the last meetings in July were about the project descriptions related to all the work studies. And, you know, getting your input and adding that into the scope and how we're going to be proceeding forward with all the work studies

but specifically this one because we know how important it is, was why we put it on the agenda again today.

So we wanted to make sure that you understand we heard you. I guess the first question I would have for the group is, any of you that were participating in July, do you think we're moving in the right direction? Do you understand what Edith was presenting and how we're going to be addressing those issues related to environmental justice going forward, both in Phase I and, separately, in Phase II, which is two different processes? But the stakeholder engagement plan is the focus of Phase I and how we would do that.

So I would love to hear some of your thoughts. Please don't be shy. If you haven't spoken yet at one of these meetings, that's why we invited you, so we could hear from you. So we are very interested to know what you have to say.

I don't see any hands raised.

There we go. Andrea Vega, Food and Water Watch. If you could unmute your mic, announce yourself, and go ahead and make your comment.

ANDREA VEGA: All right. Thank you. Andrea Vega, with Food and Water Watch.

As we brought up in the previous meeting, myself and I know some of the other participants of the CVO, we

would like a third-party facilitator for any type of EJ discussion. So please come back to us with that.

CHESTER BRITT: Thank you for that.

EDITH MORENO: Andrea, do you have any recommendations on who? And if you don't today, I'd love to follow up with you, if you have any recommendations.

Thank you.

ANDREA LEON-GROSSMAN: Hello? Can you hear me?

CHESTER BRITT: Yes, we can hear you, Andrea. Go ahead.

ANDREA LEON-GROSSMAN: Yeah. Andrea Leon-Grossman with Vote Solar. She and ella pronouns.

I've been saying since I joined this stakeholder group that I think it's very important to have tribal consultation and consent. And I still don't see hardly anyone or pretty much anyone from a tribe present at these meetings. And I think that has been lacking all along. And I do want to echo, as well, Andrea Vega from Food and Water Watch.

I just don't understand why it's been like this for so long. I don't think the stakeholder process has been very strong or wholesome. I do have other contacts who, when I had spoken to them about these issue, they're like "I do not know anything about this issue and that that was going on." And "this is going to affect me and I

would have loved to be part of this."

So again, I think it's been lacking in many ways. And I think it's underwhelming. So that's where I'm coming from. And I also know that we were supposed to be getting a roster of everyone who's attending and I still haven't gotten it.

ALMA MARQUEZ: Andrea, thank you for your feedback.

And I just wanted to share that we do some organizations but, as you know, CVOs in general, our resources are limited. And they've been invited to attend, and we will share that roster with you shortly after this meeting. We have some folks that do not want to share their information; so we're giving them more time to be able to reassess that because we really want everyone to have everyone's information.

We do need to be a little bit more stronger in this area. I agree with you, Andrea. And that's what we're working on. And that's why this community extra phase that we're adding -- extra phase that we're adding to this Phase I, we want to be more inclusive. And I'd love to speak with you off line a little bit more about how we can be more inclusive in this process, including the Native American community, so that we are able to recognize and be more open to all organizations that want

to be engaged.

So I'd love to speak to you more about that offline, if possible.

ANDREA LEON-GROSSMAN: Okay.

ALMA MARQUEZ: Thank you.

CHESTER BRITT: Jessy Shelton, I think I see your hand raised. If you could unmute your microphone and state your name and organization.

JESSY SHELTON: Yeah. Hi. I'm Jessy Shelton. I'm with California Greenworks. We're environmental justice and urban forestry nonprofit based in South L.A.

And so just speaking from personal experience, with something like this when we have -- 'cause we currently have a quite large project that we're building in kind of the heart of South L.A. And so with these changes coming through, it's a grieving process, but we still hold different events and kind of, like, more for networking for us and also for the community. We want to bridge the gap between decision-makers and the folks in the community.

So we've been holding, like, events for community members and decision-makers to kind of be in the same room. And so California Greenworks calls it our climate equity series. But possibly doing something like that with other nonprofits in the area, you know, maybe

having somebody from these groups to speak and give some insight to community members around the area of who's going to be impacted. And maybe just explaining, you know, what's planned. Kind of like this but just like a roundtable discussion. We found it's fairly effective and people, you know, feel heard and kind of understand what's going on. So possibly doing something like that.

And I know that there are other organizations, other nonprofits that have events like these. So that could be, like, the third party, is what they're saying earlier, to kind of open that door, if that makes sense.

CHESTER BRITT: It does. Thank you so much for your input. Very good ideas.

Roselyn Tovar, I think I see your hand raised. If you could announce yourself. We'll unmute your microphone and you should be able to speak.

ROSELYN TOVAR: Hi, everyone. This is Roselyn from CVE.

So last month I wasn't unable to attend the July meetings. I actually had Covid; so I was out of office and couldn't be here. So I've been trying to catch up on that.

It would be helpful, I think, for these meetings to have some sort of transcription and notes just because I think the presentation is not really looking at

the slides. It's kind of hard to follow and understand what was going on in the meeting.

And also, I think all that context is really important, especially when we're going to bring stuff to our membership and try to get their input on certain things. It's like having a really good sense of, like, what's being said, especially concerning EJ.

And -- yeah. If there's a lot of meetings and folks aren't able to, like, sit in on them, it would be really good to have good notes and transcriptions to be able to follow up with, to be on track and also just to be present in the meetings more into the future and not to feel like you're not, I guess, missing a lot of the context. Like going into this meeting now, I'm trying to catch up.

Yeah. So just that comment.

CHESTER BRITT: Thank you for your input, Roselyn. And I hope you're feeling better. Sounds like maybe you are. So thankfully that's the case.

We do have a court reporter in all of our meetings, which we have transcriptions. They are available to you. The Zoom meetings are also recorded. So those are also available to you. Our staff, who is monitoring the chat, should be able to put you into the links of those things so that you can have access to those

and be able to watch them at your convenience.

All of our meetings, since the very beginning, should be available, just as a note. So if you come into this process a little bit later or had to miss certain meetings or leave certain meetings halfway through, you should be able to have access to those meetings and understand them both in terms of what was discussed as well as the Powerpoint presentations as well.

ALMA MARQUEZ: Yeah. And if I can add to that, Chester.

Roselyn, you're absolutely right. There was material that was reviewed at the July workshop; so I'd be happy to speak to you offline to catch you up because it was quite a bit.

Thank you for attending this meeting to catch back in. Thank you.

CHESTER BRITT: All right. Rashad, I think I see your hand up. And then Faith will come after you.

Unmute yourself, Rashad. You should be able to speak.

RAUL CLAROS: Hello. Can you guys hear me?

CHESTER BRITT: Yeah.

RAUL CLAROS: Hi. This is actually Raul Claros. I got the link from my colleague, Rashad Rucker-Trapp. So that's probably why it's coming up that way.

So we're with Reimagine L.A. Foundation.

So I just wanted to chime in here and, again, thank you for the space. Number one, I thought the facilitation at the last meeting was great. Again, I appreciated being included. A lot of our black and brown communities from South L.A., from Pico Union, Westlake, the Capetown area -- this was really the first time that anyone has really brought us to the Environmental Social Justice table.

And in that, I wanted to remind you all that we're happy to help with any kind of inclusion, you know, process or efforts to get more people of color and organizations that are working in these communities -- Boots on the Ground, Grass Roots -- to be part of this process. In that, again, we offer our network of over 43 different CVOs that are small to midsized CVOs that aren't the usual folks that are at these tables.

So including with the indigenous community, not only from North America but other indigenous communities that are represented here, due to the different migrations that have happened from Latin America and other parts. And with that, one of the recommendations that I would make is maybe we take these in-person meetings, as we move forward and that we're strategic geographically of where they're being held.

And so a lot of time the challenge is logistics, whether it's the transportation, whether it's the hours of when these meetings are happening. We're talking about working class families -- right? -- and working class folks. So not everyone can get to -- I forgot what part of town we were at last time. But at 11:30 in the morning or 10:00 in the morning; right?

So if we were to host some of these meetings in Boyle Heights, in Pico Union, in Capetown, South L.A. and we were doing it in the evening time, then I think that we can champion something like that if that's kind of our back yard; right? And that could probably be a model that you guys can use so that when you go to the Valley -- a lot of the folks in the San Fernando Valley -- I'm talking about CVOs, black and brown orgs up there, houses of worship, they always feel forgotten about. And, you know, that no one goes up to the San Fernando Valley.

So I just wanted to put that out there. And I also want to acknowledge that we can't be all things for all people. So I understand the bandwidth challenges that comes in putting all this together. So I would -- like, for example, I think I heard the representative from the water group, and I remember that we took a vote and we decided to leave that kind of at the end. And I wasn't there at the end, so I don't know how that went. But I

appreciate it how we kind of polled, you know, what the priorities are.

And so I think that that's also a best practice to really ask this group what our priorities are that are already participating and looking at that as far as who we start engaging as well.

So thank you for the time and the space.

CHESTER BRITT: Thank you so much, Rashad [sic]. That was great information that was captured. We appreciate your input.

Andrea Williams, I think you're up next. And then I also see Robert Roy with his hand raised as well.

Go ahead, Andrea.

ANDREA WILLIAMS: Hi. I was just wondering if you have the opportunity to have someone that can write lay language summaries for some of the science that's being presented? Because I think that people who don't have a science background are struggling with what's being presented, which is also leading to people having reactions of not trusting what's being said because they don't understand it.

And I think it would be really helpful to have either a glossary with definitions or someone to write a lay language summary. Because it is a lot, and even though you're summarizing a lot of it is a high level of

information for research. And if you haven't studied, you know, chemistry, you know, you don't know what a periodic table is, you don't know what petroleum is.

I think that a lot of things that are being said, people don't understand it, so they have no idea what impact or not impact -- not impact all of this could have because they don't even understand what's being presented.

And so if it's possible for you to have someone that can write lay language summaries for some of this, I think it would be helpful for the conversation and also for people to give input. Because it's hard to give input on a topic that you really don't know about.

And then, also, when you're bringing it to the community, there's going to be people who also may not have even graduated high school. And, then, they're really not going to know what some of the words are. And so I think the presentation of it, there needs to be like a lay language summary for someone to kind of refer to.

CHESTER BRITT: Really good input. I will sympathize with you in lack of understanding of all hydrogen issues. It's very complicated.

I will steal a little bit of Jill's thunder, that she's going to be presenting -- there's a next step slide coming up, Andrea, that is going to talk about creating a

live library of all the documents related to this process, which will include things like a glossary of terms, frequently asked questions.

You know, we're talking about trying to do exactly some of the things that you're talking about to make it more accessible for people. We recognize not only do people have varying issues of understanding of this issue but, also, some people are coming in and out of this process. Some people are on vacation; they're busy; they're not able to make every meeting. So there's a lot of levels that we're trying to communicate at and we're doing our best to come up with creative ideas of how to do that so that people have access to that information and can understand it and digest it at their own tempo and their own space and do that.

So you will hear more about that. And I really appreciate that input, and I will acknowledge that we're working on that behind the scenes. And you should see some very real addressing of the issues in the very near future. Thank you for that.

ALMA MARQUEZ: If I could just add, Andrea, we're not technical experts either. So we're constantly asking questions ourselves. And also that we are here, available for you as well. When you're receiving some of this information, feel free to reach out because there is

no wrong or right question. Because us, as facilitators, we ourselves are digesting this information. And, you know, we're trying to do as best we can to troubleshoot and say, hey, this might not sound -- this is a bit confusing for the general population. You know what I mean?

So feel free to reach out specifically to me, if you like, or Emily with SoCalGas, since I'm leading the CVO, facilitating and helping facilitate. So if you can reach out, I'd be more than happy to assist with what I can.

Thank you for that feedback.

CHESTER BRITT: All right. I think, Robert Roy, I think you're up next. If you could unmute your microphone, we should be able to hear you.

I can hear you.

ROBERT VAN DE HOEK: Can you hear me now?

CHESTER BRITT: Certainly can.

ROBERT VAN DE HOEK: Can you hear me?

CHESTER BRITT: Yep.

ROBERT VAN DE HOEK: It still says --

ALMA MARQUEZ: We can hear you, Roy.

ROBERT VAN DE HOEK: Thanks, Alma and Chester.

Since we're on EJ, environmental justice, I think that scientists are also involved in the environmental

justice movement, like myself, and degrees that are not science background are educated, but I can't -- an example here was Chester, Marcia, and Yuri.

Yuri is knowledgeable, has an accent, isn't communicating completely clearly because of the accent. And so people who are good at understanding accents, like Americans that have been here multi-generations -- even including Marcia Hanscome -- might hear different things, as she's educated. But she could be, as Rashad was just trying to say, about people not having even high school background or knowledge in chemistry or periodic tables. That's further proof in why we shouldn't even be using adjectives for gas, which I put in the chat.

The words "natural" and the words "clean" and the words "green" all are dumbing down and keeping the public from becoming knowledgeable. So we have to have an agreement to stop using those types of terms. And Marcia Hanscome, who doesn't have a science background, has come to a knowledge that methane gas -- the word -- adjective "methane" is what means -- which is what we're using for our gas and our cooking and heating. So that's clear.

But it took some time for her to use that term. And then when we -- even say "methane gas," we need to add chemicals added to it. So it's clearly not natural gas, and it's not clean gas. It's not safe gas. It's not

green gas. It -- we can't be continuing to -- and I said -- Alma just said and stated clearly, admitted that she doesn't have that background either.

And then, Chester, when you heard Marcia say, "nitro gas," it switched to you talking about nitrous oxides. And it just -- and then Yuri took it to "NOx," which is another way of saying "nitrous oxides." But you can't do that to the public.

I'm a scientist and I'm not confused by the terms, but I'm getting confused by all the people who don't have -- because we're not making it simple, and we're trying to confuse the public. And EJ people, they're laughing. People in the EJ movement are laughing at all of these adjectives of "natural" and "clean" and "green." And you have to understand that, as soon as you use those adjectives, it starts to shut down the communication and the EJ people get angry.

Okay. That's all. Bye.

CHESTER BRITT: Thank you, Robert.

I'm looking to see if anyone else has their hand raised, and I do not see anyone else.

There's a lot of discussion going on in the chat. And I appreciate all of our staff and SoCalGas people keeping up with the chat.

So there's basically people that are chiming in

saying that they agree with what Roy was saying, be careful of the terms.

So it looks like we're current with all of the chat, for the most part, as well as anyone else's hand raised. So I don't see anyone else's hand raised. If anyone else has any thoughts about the environmental justice discussion that Edith presented -- I guess one of the thoughts I have is that we are going to be having meetings again in September.

We're going to be talking about some of these issues and continuing our conversation about environmental justice. One of the thoughts we had about our September quarterly meetings is to break up into small groups so we can have a smaller facilitated discussion, more in depth about some of these issues.

I think one of the things that came up today was that we can do a better job of having these meetings be productive and informative. Maybe that's a way where we can get into the weeds more with smaller groups about certain issues.

And as I was saying that I think -- Edith, it looks like you raised your hand. So I'm assuming you wanted to say something.

EDITH MORENO: Yeah. I just wanted to -- thank you, Chester. I know you just alluded to the next series

of meetings that we're going to have in September. And I know Jill is on. I'm not trying to steal your thunder.

I do want to just kind of emphasize or note that this plan is -- this outreach plan, you know, this is something that we've never done before. And so we are really going to be looking for your input.

And so in September, we will come to you all with just kind of our preliminary kind of approach or, you know, "these are the items that we want to include in the plan." And then hopefully, then, we'll get a little bit more robust -- get into more robust discussion with you all once we have something to react to.

Because, again, I know I recognize that I just came and had a conversation on a high level of scope. But again, this conversation today was to help you understand just some of the modifications that we are making to our original EJ plan. And that in September, hopefully, we'll be able to roll our sleeves up together, and we can hear from each and every one of you on whether this is the right direction that SoCalGas is taking with the development of this plan.

That's it. Thanks, Chester.

CHESTER BRITT: Yeah. And I would just build on what Edith said. You know, I think one our goals going into the September meeting should be, like, let's compare

this project to other projects or experiences you've had. What are some of the lessons learned from other community engagement you guys have done. Because, again, what we're trying to do is take the best from all of our different perspectives. That's why we have an advisory group, is to make sure that we're hearing diverse opinions about how to do this, how to do a better job; right?

So we're responding to what we're hearing. As Edith has alluded to, you know, this is the first time for SoCalGas asked to do this in this way. We're making changes as we go. We're developing the plan.

And all that being said, this is still Phase I. We're just launching these technical studies. We're going to be going through them with you in a lot more detail, and we're going to be developing an engagement plan, as we start defining what this project is or isn't, and if we get approval to go into Phase II, that would allow us to have a very robust community engagement process.

Once we have an actual alignment and we know what the plan is and the project is, then we can define those things and have something to talk about. And those are kind of what we're doing here now is, like, we're starting to figure out what's important to you, how do we address that, and how can we make progress going into that Phase II process.

So, Rashad, I think you've raised your hand since I've been speaking, so I'm going to turn it back to you.

EDITH MORENO: I think that's the same hand.

CHESTER BRITT: Oh, did he just have his hand --

RAUL CLAROS: No, No. I raised it again.

EDITH MORENO: Oh, you did.

RAUL CLAROS: Yeah, this is Raul again, with Reimagine L.A. Foundation, Rashad's partner on this.

So my question, going back to my comment, where will the September meeting be taking place at? Geographically.

CHESTER BRITT: The same location in Downey that was last time, in July.

RAUL CLAROS: And at what time?

CHESTER BRITT: I don't know if we've established the times yet. Have we, Emily or Jill?

RAUL CLAROS: So again, I would like to ask why in Downey? And why not -- we're talking about inclusion -- right? -- and reaching concerned communities. Why not bring the meeting to them?

CHESTER BRITT: Well, the communities -- where are you talking about, the communities that you're referencing? Where are you talking about those meetings

being? Because the communities are scattered all over the place throughout Southern California.

RAUL CLAROS: I guess that's the question for you and the group; right? Like, we're trying to reach Central American communities, Chicano communities, African American communities, or just geographically going to the Valley. Right? Then that's where I could give you, you know, some recommendations; right?

So it just -- and that's why I go back to this -- right? -- like I go back to if we're really trying to get certain folks to the table on the Social Justice side on environment that's usually not at the table, then we got to bring the meeting to them, to their community, and making it at a time that the majority is available from that community.

And then if we rotate these meetings, then I think we could do like a survey to see where is our reach at from the people that are here. Some are from the west side; some are from the Valley; some are from the east side; some are from the south or the central part.

So if can find facilities that can open up and let us use the space, then that group or groups that are part of this work group already can then kind of spearhead the outreach for new folks. And then all of a sudden, when we go into virtual world, then you'll have

more participation here leading up to the next one; right?

And then in anticipation to the next one, if we know it's going to happen, then we all reach out to our contacts in that geographical area as well.

EDITH MORENO: Chester, I can clarify.

Raul, thank you for your comment and your questions. I do want to clarify that the meetings that you are all participating in today are part of the formal community-based organization group that we put together for Phase I of Angeles Link. And so, for Phase II, which is what we're going to be proposing more of community outreach, community engagement, is something that would happen in the future phase.

Again, we're currently in Phase I with the feasibility portion. And right now we're in the planning advisory group and community-based organization group process with you all. So it is a formal kind of advisory body that we've put together for Angeles Link.

But what we want to do in Phase II is to do more of exactly what you just mentioned, Raul, is to go into the communities and have or -- whether it is a listening tour or kind of breakout focus sessions, you know, whatever outreach is going to look like based on what we put together in this plan with your help and input is when we would be going to the Valley or we'll be going to the

South L.A. or we would be going to Boyle Heights, et cetera, et cetera.

So I hope that clarifies the question. But I'll pause there.

JILL TRACY: And, Edith, this is Jill Tracy. These quarterly meetings that are existing from the actual community outreach that we'll be engaging in Phase II; we're looking at having our quarterly meetings or some of our interim workshops within our community-based organization facilities. And so I see that there's a lot of suggestions in the chat for those facilities. We'd be happy to investigate those and look at them more fully.

The one big challenge that we're having right now is that in order to facilitate as much participation as possible, these meetings are set up on a hybrid basis. And it's a lot of work for the technical team to have these meetings set up -- we want to make sure that people feel comfortable -- if they can't travel, that they can still attend fully on a hybrid basis. So we just need to make sure that these facilities have the sound and the visual so that we can then use that.

So we're looking at potentially having our CEO quarterly meeting in December at one of our community-based facilities and then also potentially having our interim workshops there as well.

I hope that addresses your question.

CHESTER BRITT: Enrique, I see your hand raised. If you could unmute your microphone. It's good to see you. And go ahead and make your comment.

ENRIQUE ARANDA: Thank you, Chester.

I think a lot of it was covered by Raul, but I just wanted to bring something that needs to be -- as I'm reading the meeting chat, I think the issue of white privilege and space -- and something being place based, just like the work of your firm and the other firm involved here. When you do public works project, it's specific to the seven -- it is working on a project that's a public works project has to do with the freeways. Your average is centered on that area, the area that you're in.

I say there's no difference. There's 20,000 trucks going up and down the 710 are adversely impacting the health of us -- those of us who live around the 710 in Southeast L.A. So when we look at where, I think Raul pointed out the importance of South L.A. and Koreatown, but also Wilmington and Huntington Park. So many of our communities are just completely ignored here.

And I think the issue of privilege needs to be recognized and the issue of by design or not design of not being inclusive in communities and the space also needs to be recognized.

Sp just thank you.

CHESTER BRITT: Thank you for that.

ALMA MARQUEZ: Can I just share, Enrique? I appreciate your feedback, but you'll see once you receive the roster that all of you represent the L.A. Basin. And it's very diverse as it is. So your, yourselves, are representing the disadvantaged communities you're referring to. So we are representing -- this group is representing the disadvantaged communities.

Do we need to do a better job? Absolutely. But we have a very good representation with you all here. You've seen that there's about 17 people that joined today, but our group is 26 organizations throughout L.A. County. So that is very big and it was -- you know, we make sure that we did represent organizations that, you know, range from having a $50,000 budget -- even below, to over a million dollars.

And even in the scope of your group yourselves, we want to make sure that we're not only inviting the bigger organizations but organizations that are -- you know, have less resources and are doing work that are very challenging to do. So we made sure that we were inclusive and we were very specific about including the Highland Parks, the Wilmingtons because, you know, those are smaller communities and cities that most of the time do

get ignored.

So I appreciate that.

CHESTER BRITT: And then, Enrique, did you re-raise your hand or is it still left over from when you made your comment?

ENRIQUE ARANDA: No. Let me lower it.

CHESTER BRITT: Yeah. No worries. I just wanted to make sure.

ENRIQUE ARANDA: Thank you.

CHESTER BRITT: All right. Well, again, I really appreciate everyone's input on both the chat and raising your hand. I mean, that's why we're doing these things, is to get your input. We're looking at what you're saying. We're documenting it; we're responding to it as fast as we can. There's still Insignia and taking all of the comments from everyone and making sure that that's being addressed and tracked both for SoCalGas purposes as well as yourself to see how we're dealing with all that.

And again, while I was speaking, I think, Roselyn, you raised your hand? If you want to unmute your microphone, we should be able to hear you.

ROSELYN TOVAR: Yeah. Just wanted to add a quick note about the Angeles Link's website on potentially having a way for CVOs to request to join the CVO group on

the website instead of just, like, sending invites to them directly. So I would consider that maybe, like, bare minimal, but some sort of simple outreach, as well as having, like, public presentation and notes on the website.

CHESTER BRITT: Okay. Great ideas. Appreciate that.

Okay. So we're going to now switch to Jill. Go back to the presentation, Stevie, if you could. And Jill is going to talk about some of the next steps, and she's going to set us up for our meetings in September and kind of remind you guys all of the deadlines for input into all of these work studies that we're going through and when you should be getting that information sent to you.

So go ahead, Jill.

JILL TRACY: Thank you, Chester. And thank you all for attending today's workshop session. I really appreciate everyone's patience and time. We understand that there's a lot of material being shared.

Andrea, I totally understand some -- your expression of somewhat frustration at the challenge for this material. And we had -- you may recall that we prepared an original glossary of some terms early on and distributed those in June at our quarterly meeting at Alta-C.

But we are committed to updating that document as we take additional steps in our Phase I studies. So we will get those materials, updated glossary with updated terms, to this group. We are evaluating and preparing a living library that will have all of the presentation materials, the quarterly reports, a glossary of terms and FAQs related to hydrogen and the Angeles Link proposed system. And we'd like to get that available to you.

And that's also going to be -- it's a living library, so we're going to start it -- we're going to upload the historical materials so you all will have access to all those materials in one place. And then it will be updated on an interim basis going forward. So just heads up that that will be coming out in the next, I'd say two weeks. And so, hopefully, that will help.

And then, also, the fact that it's living will -- also, we want your feedback on how you feel that the living library could be supplemented. For example, you know, other materials that you would find helpful or links to Department of Energy or some other academic institutions that are studying the use of hydrogen, things like that. So be on the lookout for that.

I want to remind you about our deadline center coming up. We provided the demand study, the detailed deck that Yuri provided an overview today. The deck

comments on the demand study are requested by Tuesday, September 25th, giving you almost a month to review those materials. And please send your comments to Insignia Environmental at the email provided here. And, as you know, we'll be tracking all of your comments and our responses to those comments. And those will be provided as an exhibit to the next quarterly report.

We also wanted to give you a heads up that we are preparing summaries of the technical approaches or the methodologies for the remaining 15 Angeles Link Phase I studies. And then we will be sending those out next week, on Tuesday, following the Labor Day holiday. And we'll have until October 13th, so approximately five weeks.

And, Andrea, to your point on the glossary of terms, what we will try and do -- probably not by the 5th, given the brevity of time before this coming Tuesday -- but we will try and get a glossary of terms that will incorporate a lot of the terminology in our technical approaches, so that you'll have those available for when you're reviewing the technical approaches.

A reminder for submitting invoices for today's meeting. Those invoices should be going to Alma.

Is that correct, Alma?

ALMA MARQUEZ: That is correct. We'll be processing those invoices and sending you out emails

individually, so you can get your checks processed within the next week.

JILL TRACY: Thank you, Alma.

And then a reminder that the next quarterly meeting is on September 26, at the Energy Resource Center in Downey. We'd love to have you here in person but understand if you cannot attend in person, either way is welcome. And if there are specific topics that you would like us to address at those meetings -- in our next quarterly meeting, please send an email out to Emily and we'll do our best to accommodate those requests. And then, also, we'll be sending out a save-the-date for the December CBO meeting. That's our last quarterly meeting for the year.

It's kind of scary that we're already scheduling for around the holidays through the end of the year. But we wanted to get a save-the-date out because I know some folks will be on vacation or they have kids that are out of school and things like that. So we want to make sure that folks can attend that as much as possible.

And I will pause there to see if anybody has any questions regarding the next steps.

All right. I'll turn it back to Chester.

CHESTER BRITT: All right. Well, I think that pretty much wraps everything up. Again, we had a very

robust conversation today. Again, a lot of details. We just want to reiterate that this is not your only opportunity for providing input; right? So we recognize that we're going quickly through these. You know, we have a lot of work studies. We're having meetings on a monthly basis, it seems like, at this point.

We're sending out information to you through e-blasts and we're going to have a living library. We're asking you to provide comments by certain deadlines for certain subject matter, so please pay attention to these deadlines and we welcome your input. And we are paying attention to it and looking at all your comments and trying to address that as we're going forward. And hopefully you'll see that as we continue our series into, not only the end of this year, but the beginning next year as we get into more details of the study results.

So with that, I just want to thank everyone for your time and wish you guys a good Monday and have a great week. And we'll talk to all of you soon. Thank you so much.

JILL TRACY: Thank you, everyone.

(Proceedings concluded at 11:54 a.m.)

STATE OF CALIFORNIA)
) Ss.
COUNTY OF VENTURA)

I, Lisa V. Berryhill, C.S.R. No. 7926, in and for the State of California, do hereby certify:

That the foregoing 80-page meeting was taken down by me in shorthand at the time and place therein named, and thereafter reduced to typewriting under my direction, and the same is a true, correct and complete transcript of said proceedings;

I further certify that I am not interested in the event of the action.

Witness my hand this 18th day of September, 2023.

Y

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HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:)
)
ANGELES LINK COMMUNITY BASED)
ORGANIZATION STAKEHOLDER GROUP)
DEMOAND & ENVIRONMENTAL JUSTICE)
ANALYSIS WORKSHOP)
_____)

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TRANSCRIPT OF PROCEEDINGS

QUARTER 3 HYBRID MEETING

Tuesday, September 26, 2023

Reported by:

ALLISON SWANSON
CSR No. 13377

Job No.:
43985LEE-VC

HEARD BEFORE SO CAL GAS

ANGELES LINK TEAM

In the Matter of the Meeting re:
ANGELES LINK COMMUNITY BASED ORGANIZATION STAKEHOLDER GROUP DEMOAND & ENVIRONMENTAL JUSTICE ANALYSIS WORKSHOP

TRANSCRIPT OF PROCEEDINGS, held via Zoom Videoconference, commencing at 9:35 a.m. and concluding at 12:21 a.m., on Tuesday, September 26, 2023, reported by Allison Swanson, CSR No. 13377, a Certified Shorthand Reporter in and for the State of California

ATTENDEES:

SoCalGas:	Amy Kitson Emily Grant Darrell Johnson Jill Tracy Andy Carrasco Edith Moreno Katrina Regan
Arellano Associates:	Chester Britt
Lee Andrews Group:	Alma Marquez Antonia Issaevitch Edna Degollado Alan Rodriguez
Det Norske Veritas:	Pedram Fanailoo Cynthia Spitzenberger
Mitsubishi Power Americas:	Peter Sawicki
Food and Water Watch:	Andrea Vega
Watts/Century Latino Organization:	Autumn Ybarra
Mexican American Opportunity Foundation:	Ciriaco "Cid" Pinedo
Soledad Enrichment Action:	Enrique Aranda Luis Melliz
California Greenworks:	Jessy Shelton
Coalition for Responsible Community Development:	Kenta Estrada-Darley Ricardo Mendoza
Alma Family Services:	Lourdes Caracoza
Los Angeles Indigenous People's Alliance:	Luis Pena
Breathe Southern California:	Marc Carrel
Reimagine LA Foundation:	Rashad Rucker-Trapp

ATTENDEES (continued):

PSR-LA:	Alex Jasset
Southside Coalition of Community Development:	Andrea Williams
Watts Labor Community Action Committee:	Ava Post
PESA:	Ayasha Johnson
Nature for All:	Belen Bernal
Protect Playa Now:	Kevin Weir Mary Beth Trautwein
Little Tokyo Community Council:	Kristin Fukushima
Southeast Rio Vista YMCA:	Gerardo Salcedo
Go Green Initiative:	Jill Buck
Greater Zion Church Family:	Michael Fisher
Defend Ballona Wetlands:	Robert van de Hoek
Ballona Wetlands Institute:	Marcia Hanscom
California Public Utilities Commission:	Christopher Arroyo
Communities for Better Environment:	Roselyn Tovar

I N D E X

Los Angeles, California, September 26, 2023

9:35 a.m.

MS. MARQUEZ: Good morning, everyone. My name is Alma Marquez. It is my pleasure to welcome you today to the Angeles Link CBO Stakeholder Group Quarter 3 Hybrid Meeting. I'm the Vice President for Lee Andrews Group and the CBO lead facilitator. I'll be co-facilitating with my colleague, Chester Britt, who you'll be hearing from shortly.

So I want to first go over some housekeeping rules to get our meeting started. And just to remind everyone that the meeting is being recorded with video and audio. And we also have a court reporter who's making sure that she's taking notes of everyone's comments and participation for today's meeting.

We encourage you to turn on your cameras so we can better engage with you when we have discussion with you. Please feel free to use the chat -- Zoom chat to provide input and ask questions. And if you'd like to speak to please raise your hand and -- use the hand button to -- at the bottom of the Zoom screen. There will be wireless phones for folks who are here in person joining us. We can use that so you can communicate with us.

And with that, let's go ahead and move on with our next house -- with our next slide.

For today's agenda, we will start with our acknowledgement, a safety message, and our roll call. Some opening remarks from some folks here from SoCalGas. We'll have a review of decorum policy, as well as a glossary of terms discussion, a DNV hydrogen overview presentation, followed by a quick break, and then on to our breakout session on environmental justice community engagement plan. And that will follow an air emission 101 by some guests from today. And schedule review of next steps, and then we will be adjourning around noon.

And with that said, I'd like to invite Luis Pena, who is with the LA Indigenous Alliance, who will be starting off with our LAN acknowledgement.

MR. PENA: Morning. Do I read it?

Do I read it? Or I have to pick it up?

Sorry. I wasn't prepared. I thought it was gonna come up.

Benos dias. Good morning, everybody. So as far as the LAN acknowledgement, we respectfully acknowledge the indigenous peoples on who's ancestral land we gather of the diverse, vibrant communities of the Tonga, Tataviam, Serrano, Kizh, and Chumash people who for generations have cared for these lands and make their home

here today.

We honor and pay our deepest respect to the elders and descendants past, present, and emerging as they continue their enduring stewardship of these lands and waters for generations to come. We acknowledge our collective responsibility and commitment to elevating their stories, their cultures, and their communities of the original caretakers of these regions and are grateful for the opportunity to live and work on these ancestral lands.

We celebrate the resilience, strength, and unwavering spirit of indigenous peoples and are dedicated to creating collaborative, accountable, and respectful relationships with indigenous nations and local tribal governments.

Thank you.

MS. MARQUEZ: Thank you, Luis.

Next, I'd like to invite Emily Grant, who is the Angeles Link Senior Public Affairs Manager, who will present today's safety message.

MS. GRANT: Thank you, Alma.

Good morning, everybody. Thank you so much for being here.

So a quick safety message for today. We try to keep kind of seasonal and topical. So, obviously, the time is going to begin changing as we move into fall. And we

have a time change coming up in November. And with that, it always reminds me that I hate driving into the sun. I don't know if anybody else feels that way, but it's driving me crazy right now.

So a couple of quick reminders. Use your sun visor, leave more following room, and slow down. Keep your windshield clean and free of cracks. Don't store items on your dashboard. I don't know if that's a thing anymore, but my grandpa used to that. So it's nostalgic. I left it in there. Use reflective lane markings to guide you. Slow down. We already said that one. And consider larger investments, if possible, like polarized sunglasses or window tinting. And lastly, if needed, pull over and wait five minutes. Because with the sun moving, that can go a long way to keep you safe.

And that's it. Thanks.

MS. MARQUEZ: Thank you, Emily.

Moving on with our agenda, I'd like to go over roll call. So I'm going to good ahead and start with the folks that are joining us here in person. So let's go ahead and kick it over to Amy, and we'll go around the table. Everyone should have access to a mic. If not, we'll make sure we bring one over to you. And then we're going to go on to our folks that are joining us virtually.

MS. KITSON: Good morning, everyone. Amy Kitson,

director of engineering and technology for Angeles Link.

MS. REGAN: Good morning, everyone. Katrina Regan, engineering and technology development manager.

MS. SPITZENBERGER: Hi. Cynthia Spitzberger, principal consultant with DNV.

MR. FANAILOO: Good morning, everyone. Pedram Fanailoo, Low Carbon Segment Leader for DNV.

MR. MELLIZ: Good morning, everyone. Luis Melliz with Soledad Enrichment Action.

MR. ARANDA: Buenos dias. Good morning. Enrique Aranda with Soledad Enrichment Action.

MR. PENA: Luis Pena, the Los Angeles Indigenous People's Alliance.

MS. VEGA: Right on time. Hello. Andrea Vega with Food and Water Watch.

MS. MORENO: Good morning. Buenos dias. Edith Moreno, regulatory, strategy, and policy manager SoCalGas.

MR. SAWICKI: Good morning. Peter Sawicki, I'm a regional vice president, sales and marketing, for Mitsubishi Power.

MR. CARRASCO: Good morning, everyone. I'm Andy Carrasco, vice here at SoCalGas, vice president of communication, local government, and community affairs.

MS. TRACY: Good morning, everyone. Jill Tracy,

senior director, Angeles Link.

MR. JOHNSON: Good morning, everyone. Darrell Johnson, environmental services manager.

MR. BRITT: Good morning. I'm Chester Britt with Arellano Associates, and I am the facilitator of the PAG and Alma's cohort.

MS. MARQUEZ: And I see Ricardo just joined us. If you can just state your name and which organization you're representing today.

MR. MENDOZA: Hi. Good morning, everyone. Ricardo Mendoza with Coalition for Responsible Community Development.

MS. BUCK: Good morning. This is Jill Buck with the Go Green Initiative.

MS. MARQUEZ: Welcome, Jill.

Next, Alex Jasset. If you could introduce yourself and unmute yourself, please.

MR. JASSET: Yeah. Good morning, everyone. Hi, I'm Alex Jasset. I'm the Energy Justice Director at Physicians for Social Responsibility Los Angeles.

MS. MARQUEZ: Andrea Williams, you can unmute yourself and introduce yourself, please.

MS. WILLIAMS: Good morning, everyone. Andrea Williams, Executive Director, Southside Coalition of Community Health Centers.

MS. MARQUEZ: Welcome, Andrea.

Next I have Ava Post.

MS. POST: Hi, this is Ava Post with Watts Labor Community Action Committee.

MS. MARQUEZ: All right. I have Ayasha Johnson. If you can unmute yourself, please.

MS. JOHNSON: Hi, Ayasha Johnson, MSW intern for PESA.

MS. MARQUEZ: Welcome.

And I have Belen Bernal. If you can unmute yourself and tell us what organization you're with.

MS. BERNAL: Good morning, everyone. Belen Bernal with Nature For All.

MS. MARQUEZ: Welcome, Belen.

I have here Christopher Arroyo.

MR. ARROYO: Good morning. I'm Christopher Arroyo. I'm a Hydrogen analyst at the CPUC.

MS. MARQUEZ: Welcome.

And I have Dr. Ciriaco. If you can unmute yourself and introduce yourself, please.

DR. CIRIACO: Hi, Ciriaco Pinedo with the Mexican American Opportunity Foundation.

MS. MARQUEZ: Welcome, Cid.

And I have here Kristen Fukushima. If you can please unmute yourself.

MS. FUKUSHIMA: Good morning, folks. My name is Kristen Fukushima, Ieshi and Herprana (phonetic), and I'm the managing director of Little Tokyo Community Council.

MS. MARQUEZ: Welcome, Kristen.

And I have Lourdes Caracoza. If can introduce yourself, please, and unmute yourself.

MS. CARACOZA: Hi, this is Lourdes Caracoza, CEO and president off Alma Family Services.

MS. MARQUEZ: Welcome, Lourdes.

And I have Pastor Fisher. If you can unmute yourself and introduce yourself.

PASTOR FISHER: Pastor Michael Fisher. I'm the CEO of JT Community Community Development Corporation and the pastor of Greater Zion Church Family in the cities of Compton and Corona, California.

MS. MARQUEZ: Welcome, Pastor Fisher.

And I have Marcia Hanscom. If you can introduce yourself.

MS. HANSCOM: Morning, everyone. Marcia Hanscom with the Ballona Wetlands Institute in Playa del Rey on the Los Angeles coast.

MS. MARQUEZ: Welcome, Marcia.

And I have here Robert. If you can unmute yourself and introduce yourself.

MR. VAN DE HOEK: Good morning, madam moderator.

Nice to talk to you and to everyone. My name is Robert van de Hoek, Dutch American, Holland American immigrant. I'm with the Defend Ballona Wetlands. And I am a wildlife biologist, environmental scientist, botanist, cultural resources manager, geographer. Thank you. And I just noticed Marcia Hanscom's name was spelled incorrectly. It's M-A-R-C-I-A.

MS. MARQUEZ: Thank -- welcome, Robert.

And I have Roselyn Tovar. If you can unmute yourself, please.

MS. TOVAR: Hi, everyone. Roselyn Tovar with Communities for Better Environment. I'm an energy researcher.

MS. MARQUEZ: Welcome, Roselyn.

And I believe I've gone through everyone that is joining us online. If not, if you could unmute yourself and introduce yourself at this moment.

MR. WEIR: Hi. Yes, I'm Kevin Weir with Protect Playa Now.

MS. MARQUEZ: Okay. Welcome, Kevin.

MS. SHELTON: I'm Jessy Shelton. I'm with California Greenworks. I'm the program coordinator.

MS. MARQUEZ: Welcome, Jessy.

All right. And I think we have everyone that is joining us this morning. Thank you, again, for being

here.

And with that, moving us along with our agenda, I'd like to introduce Andy Carrasco who's the vice president of communication, local government and community affairs, who will be giving us our welcome remarks.

MR. CARRASCO: Thank you, Alma.

Just wanted to take a couple of moments and welcome everybody back. Good to see the folks here in this room. And also welcome those who -- for the folks who are joining us virtually. Thank you for taking the time to be here with us.

And, Emily, you're absolutely right, I still put a baseball cap on the dashboard, only because it's just easier sometimes. But I get it.

And before I jump in, I do want to take the time to really acknowledge the time and effort everyone is taking on here, in person or virtually and even during your off time, to really understand the complex, the deep dive in technical aspects of Angeles Link, this phase one. And just acknowledge that all of you have been doing that. But more importantly, engaging in that process.

And it doesn't go without notice that it does take quite a bit of studying, it takes quite a bit of deep diving on these efforts. And we want to be here to take on some of those questions that may come at any time whether

it's in this formal session or if you need to do an outreach to us, we're gonna be here. And we want to answer the questions and we want you to be engaged.

I think it really allows and will continue to allow us to have robust discussions and really give us the guidance that we're looking for from the folks you represent, the communities that you represent so that we really have a holistic view on how we look at Angeles Link this phase one.

But before I get started on a couple of the items that we're going to reach, I did want to start with a little what I call "diversity, equity, and inclusion moment" as well as a sustainable moment. I think it's important. If you don't mind turning -- yes. Perfect.

As we celebrate National Hispanic Latino Heritage Month, which we're right in the middle of, as well as a sustainability moment, I wanted to take a moment to acknowledge these wonderful young adults who are in high school, in Boyle Heights, where I grew up, and focus on STEM, which is very important. Not only is it STEM, but they have, for the first time, joined a competition, a national competition to look at what -- I'm gonna get this right -- the Horizon Grand Pre World Finals.

And it was a competition that they made it to the finals, and they actually completed in Las Vegas this --

earlier this month. And they got 13th place, for the first time. And it was an opportunity for young people not only to get interested in STEM, but interested in also clean fuels, what sustainability could look like in this space.

So I just want to acknowledge these young folks who are diving deep on this opportunity to really make a difference, but not only as citizens of the communities they represent, really, perhaps, maybe their future, looking at ways on how they can shape who they are and what their contributions will be.

And a proud moment as the vice president of community affairs, we were able to partner with this organization and help really steer and help them potentially reach their dreams. And though they got 13th place on a national, that is pretty darn good for a first time entry. So we're hoping to continue cheer them on and help them in the near future.

Thank you for showing that.

Just what does today look like today. All of you had an opportunity to take a look at the agenda. Our first presentation is gonna focus on the basics of hydrogen. We know -- as I stated, it was important that we had heard back from you and you folks have indicated that you wanted to learn a little bit more. So that not only that you become educated but that you have the ability to educate

others. And I think it's key to have a deep dive understanding. So we brought some experts. They're here with us today that are gonna take that one on. And so that was important.

The second presentation will also have a technical approach on some of the materials focused on GHG and NOx, another air emission studies. And -- to my left here. We're gonna get another deep dive opportunity to talk about that. And this particular focus area is gonna mirror our PAG group discussion working on this same focus as well on their next meeting.

And I'm just gonna leave you with this, as I stated and started, I want to make sure that everyone has awareness that we're here to provide information and understand it could be the first time you're hearing it. But we want to partner with you to make sure that you have an understanding and want to make sure you answer any questions at any time and deep dive. And we're willing to pivot. We just need to hear from you and continue this engagement.

So with that, I want to say thank you, again, for being here. And I'm gonna turn it over to Chester, which you'll get us started.

So thank you, everyone.

MR. BRITT: Thank you, Andy.

Let me just say, it's good to see everyone in person again. We took an opportunity in August to be virtual, but we're back together again in September. I want to just quickly remind us all, when we started the CBUSG earlier this year, we developed a set of guiding principals for how this group and the PAG would function and operate.

And I would say, for the most part, you know, I would like to just thank everyone for following these guiding principles. They're designed to make this group productive and for us to have a positive experience together as we work through all these technical studies.

And I think we've been able to have some very productive meetings since then. I'm not sure we anticipated that we were going to meeting once a month, but we are now and it's -- we're in a regular routine now, in a cycle where we're getting to go through all of these detailed information. And as we start to get further into the detailed discussions that we're going to be having over the next few months and we begin even to reveal some preliminary findings from these studies, I would just like to remind us all as a group that, first of all, we want to communicate openly and directly, but be courteous and listen attentively and be respectful for other points of view.

There is going to be the opportunity in these, you know, upcoming meetings where, potentially, there will

be disagreement with, maybe, the results or how people view them or interrupt what's going on with those studies. So we would ask that you would be respectful. We want to hear from you. We want you to participant fully in the group exchange. I mean, that's why you were invited to be on this committee, so that we could have a full dialogue with very diverse points of view. So we would ask that you would continue doing that.

And then just please continue to remind yourself to refrain from any personal attacks or any use of profanity. I think, for the most part, we've been able to do that. But there has been a couple occasions where people's opinions get a little, you know -- cross what we would like to consider the line of decorum.

So if you could just keep that in mind as we go forward. That's just a little friendly reminder as we move forward in these meetings. Okay?

So with that, I'm go to now go to the next slide, which I believe is our introduction of Amy Kitson, the Angeles Link director of engineering and technology and Katrina Regan, the engineering and technology development manager, who I believe are going to be going over the glossary of terms.

We know, as we've done some of these presentations, there are a lot of acronyms and a lot of

terms, and we want to make sure we're helping you understand what those are. And for the benefit for the group, we're gonna have a short presentation on that this morning.

MS. KITSON: Thank you, Chester.

So Katrina and I -- I think we met most of you a couple meetings ago -- we're going to go through some of the glossary of terms that's in your packet in front of you. So feel free to grab that out if you want to follow along.

Alma, if you could go to the next slide.

We've picked out a couple of terms that we're going to walk through today. And then as we go through, if there's any questions, feel free to raise your hand and we can answer them as appropriate.

The first term we're gonna touch on today -- and we're gonna bounce back and forth between me and Katrina. Just the -- gonna let you know -- is "blended hydrogen." So you may have seen this term in our technical approaches. And what that is, it's a mix of hydrogen with natural gas. Blended hydrogen can be used to generate heat and power with lower emissions than using just natural gas alone.

In typical blended systems of natural gas it's usually, typically, between 1 percent and 30 percent blend of natural gas, depending on the application and properties of the existing infrastructure. Blended hydrogen can be a

way of delivering pure hydrogen to markets using separation and purification technologies downstream to actually extract that hydrogen back out of the blended gas blend into pure hydrogen.

As a reminder, Angeles Link, as we talk about it today, is 100 percent hydrogen pipeline. But this term is the one we wanted to make sure to define.

And there's any questions on that one, I'll move on to the next term on the list here, which is "cap X" or capital expenditures. So what we mean by cap X is our investments a company makes into long-term assets. So these long-term assets are resources of a company that they will use for many years to come. So examples for us, as the gas company, would be buildings, pipeline, compressors, like the big asset types that we would have to install.

And I'll hand it over to --

MS. REGAN: All right. Thanks, Amy.

So the next term here is "open access/common carrier pipelines." So that will be in the glossary under "common carry transmission pipelines."

Common carry references the transportation of a commodity at set rates. And it establishes that the service is open to the general public.

So an alternative to this could be a private carrier. A private carrier would agree to transport goods

under particular circumstances and would contract with each customer without the assumption that a similar contract is available to the next customer versus common carrier. When you contract with a common carry, customers have access across the board to similar contracts. So it is set rates and it establishes, again, that it is open to the public for general use.

The next term here is "compressor stations." So this is where it can start getting a little technical. A compressor stations are an asset within a pipeline system. And a compressor station sort of acts like the heart of the gas pipeline system. So sometimes medical analogies may get a little easier to grasp some of these technical concepts.

Compressor stations supports smooth movement of gas through the pipes and squeezes gas to make it more compact. And this makes it easier to transport. As gas travels distances, it loses energy, pressure drops, and it can slow down, which makes it more difficult to move. So a compressor station would make the gas more compact and move it along in the system.

Compressor stations use powerful machines that are sort of like big pumps to push the gas forward, similar to how your heart pumps blood through your body.

MS. KITSON: All right. Thank you, Katrina.

We're gonna continue a little bit with the

medical analogies. We find they're very good use to talk about these things.

So "design pressure" is the next term we're going to talk about. So design pressure is the pressure in which a pipe or tank or vessel is expected to run during normal operations. So how we look at this is picture your blood pressure in your body.

Usually we all have, like, a typical blood pressure that we have. When you go to the doctor and they take your blood pressure, maybe it's high, maybe it's low. And then we look into what those are. But a design pressure on a pipeline system can be monitored with a gauge similar to how your blood pressure is monitored at the doctor's office. And that's -- the design pressure is what the pipeline or tank or vessel's typically expected to operate at.

MS. REGAN: All right. Back to me.

So next up, let's talk about some hard to electrify sectors. But let's talk about what that is. So hard to electrify sectors are those areas where electrification poses a significant challenge. Some industries rely on high temperature processes that are difficult to electrify just due to the immense energy requirements.

Well, for others, like dispatchable power,

electrification creates complex problems that have limited solutions or become impracticable for operation. Pound for pound, fuel provides far more energy than batteries would because it has a higher energy density.

I have a couple examples here that, hopefully, some of us can relate to. But, for example, a Boeing 747, an airplane; right? It needs about 120,000 pounds of conventional jet fuel and -- to travel five hours. All right. So keep that number in your head, 120,000. To replace that energy with a battery would require a battery that weighs 5.8 million pounds. So that's nearly seven times the weight of a fully fueled plain.

Another example here is a semi truck. Right? So including cargo, semi trucks are, by law, can weigh a maximum of 80,000 pounds. And a battery for an electric truck can be up to 16,000 pounds itself. So that's nearly a quarter of the total weight of the truck. And 5,000 more pounds than the weight of the actual truck. So this reduces the carrying capacity of that truck, ultimately.

So in this instance, there are both energy requirements but there are also operational challenges. So in trucking, you may have differences over a large geographical area in terms of temperature, and that can affect your ability to charge your vehicle. Or you may have challenges with terrain, like hills. And sometimes those

instances make something like hydrogen a better alternative for that sector.

Go ahead and turn it back -- oh, is it me? It's still me. Okay. Great.

So let's move on to the levelized cost of clean hydrogen. So this -- we're going to go back to finances here. So the cost of hydrogen can vary widely depending on the methods that are used, both on the production, storage, and delivery side. So the levelized cost of clean hydrogen is the equivalent cost per unit of hydrogen that would be reimbursed long its life cycle in order to obtain a total net present value equal to zero.

So, essentially, it's the cost that would need to be charged per unit of hydrogen to cover the life cycle costs over the entire horizon, including producing, storing, and delivering.

Go ahead and turn it back over to Amy.

MS. KITSON: Last but not least is "piggability." So I thought before we talk about what piggability is, let's talk about what a pig is. So pig or you'll sometimes here "inline inspection tool," they're used interchangeably. They use a technology, advanced equipment also referred to as "smart pigs" or "inline inspection tools," which are deployed inside of a pipeline.

Smart pigs were originally named for the

squealing sound they made while traveling through a pipeline. Originally, smart pigs were used to clean out debris or remove water from the line after a hydro test. Now they're more commonly used to carry out sophisticated technology that can interrupt, inspect, and look for pipeline anomalies.

Convention inline inspection tools use national -- natural gas pipeline pressure the smart pigs. That's what we use today. And having -- without having to shut down the line or interrupt customers.

They travel around five miles an hour as they go through the pipeline. And they're typically inspecting using natural gas at higher pressures like our transmission line or large diameter pipelines. And they record condition data as they go along.

So what piggability means is the ability for that pipeline to have that tool travel through it. So there has to be specific diameters or the valves or there's different ways that the pipeline either needs to be designed originally or retrofitted for the tools to fit and do their job within the pipeline.

MR. BRITT: All right. Well, I learned something because I had no idea what piggability was, and I was looking forward to that one in particular. I think I could kind of figure out the other ones, but that one I had no

idea.

We're going to take a couple questions, if anyone has any follow-up questions to the glossary of terms. And then we'll continue on with our presentations.

I see that Robert van de Hoek has his hand raised already, so we'll go ahead and start with you, Robert, while everyone else is thinking if they have anything to ask as well.

So, Robert, if you unmute your microphone, we should be able to hear you.

Robert, are you there?

Okay. Well, if you are able to unmute yourself, go ahead and do that, and we'll come back to you.

Is there anyone in the room that has any questions or anyone else online?

All right. Yes. Microphone, please. And if you could, all the speakers, please state your name for the court reporter. That'd be great. And organization.

MR. PENA: Luis Pena from LAIPA.

So these pigs, do they move or are they just inside the pipe or how big are they or what do they (indiscernible) do they flow with the energy? Like, do they --

MR. VAN DE HOEK: Hi.

MR. BRITT: Yes, we have someone else taking a

question right now, Robert, and we'll come back to you. Thanks.

MS. KITSON: All right. So, yeah, they do travel through the pipeline, but they use the natural gas pressure or they have to be pressurized to move throughout. And then they have little either magnets or little calipers that kind of go across the top, or all around the whole circumference of the pipeline. So they're able to go to, like, say, point A to point B. And while they're traveling through that, they're able to take measurements along the whole way. And then you're able to analyze and see if there's any differences in the wall thickness or other things in the pipeline. They're pretty cool.

MR. BRITT: Pretty interesting.

Robert, we're gonna go to you, if you can unmute yourself.

MR. VAN DE HOEK: Hello, this is Robert.

MR. BRITT: Hello. We can hear you. Please state your name and your organization for the court reporter. And go ahead.

MR. VAN DE HOEK: Okay. Thank you.

Yes. My name is Robert van de Hoek with Defend Ballona Wetlands in Los Angeles, California.

And I listened to the glossary. Pretty good, but on the very first term, "blended hydrogen," being a

scientist with background in chemistry too, and I just decided to look at the definition of "compound" to be clear. And, yeah, so I think we should use that word, "compound" and its mixed compounds. Rather than saying "blended hydrogen," we should say "mixed hydrogen compound gas" so that we include the various elements that are all -- 'cause elements are what -- we have different elements involved and they're mixed together.

And -- because methane is two elements and hydrogen gas is one element, but -- and we shouldn't say the word "gas." I don't think the word "blended" is good to use. I would recommend and ask and request that we drop the word "blended" because it's not a chemistry, science term for the public to learn, and it's got sort of a marketing value to -- it's not -- we should use neutral terms. That's what being objective and logic is. And we shouldn't use an adjective "blended," 'cause the word "blended" is an adjective, to make it sound positive. We shouldn't say negative either. We should pick a neutral term.

Thank you.

MR. BRITT: Yeah. Go ahead, Amy.

MS. KITSON: Yeah, sure. Thank you, Robert, for that comment.

I will say that this definition is similar and this term is used on the Department of Energy website, and

we can provide that link to you as well. And this is consistent with that definition, the one we used. But I appreciate your comment.

MR. BRITT: All right. I also see Jessy Shelton. You have your hand raised. If you can unmute yourself, we should be able to hear you. Just announce your name and organization.

MS. SHELTON: Hi. I'm Jessy Shelton. I'm with California Greenworks.

I just -- a little bit of clarification on the hard to electrify sectors. What -- I might have missed it. Can you just go over it one more time, please.

MS. REGAN: Yeah. Absolutely. So hard to electrify sectors are generally those areas where electrification just poses a significant additional challenges. So industries, some of them -- and when they need high heat application within their processes, the amount of energy required for those processes makes batteries or other electrification possibilities a less practicable solution or more complex.

So others, like dispatchable power, electrification creates complex problems that have more limited solutions. So pound for pound, fuel provides far more energy than batteries do because it has higher energy density. And sometimes that becomes even more crucial when we look at the operational challenges that are faced by that

sector specifically.

MS. SHELTON: Okay. Cool. Thank you so much.

MR. BRITT: Thank you.

All right. Do we have anyone else in the room that has a question?

All right. We're gonna go ahead, then, and keep going on our agenda and make sure that we're staying on course.

If we can go to the next slide.

We have today -- I want to introduce some guests that we have from DNV to present an overview on hydrogen. DNV is a third-party guest. They're volunteering their time to be here today, and we greatly appreciate it. Inviting them here today is in response to the CBOSG's interest in having more educational information presented about hydrogen and related topic.

This presentation is not part, just to be clear, of the 16 work studies that we've been covering. This is more of an informational, educational opportunity. During the presentation, we will not be engaging the chat feature and incorporating comments as we do for the work studies because, again, they're not part of the work program that we're doing. They're here to provide information for you as a benefit to the CBOSG.

We would ask that you take the time to listen

to their presentation. And if there are any flow-up questions afterwards, we'll take a few before continuing on with our agenda.

So with that, I'm going to introduce our two speakers from DNV. Pedram Fanailoo is a DNV's low carbon segment leader for North America, where he supports customers in their decarbonization plans and investments. As a segment leader, Pedram assists DNV customers in addressing some of the most complex issues facing the energy industry, including strategic, technological, and policy decisions needed to navigate the energy transition successfully.

He coordinates DNV's resources to deliver project teams tailored to customer needs. Pedram applies his two decades of experience in decision support, analysis, risk management, and assurance processes to development and deploy services supporting hydrogen, ammonia, carbon capture and storage, and low carbon fuels. He actively participates in business development, marketing, and project delivery.

Joining Pedram is also Cynthia Spitzenberger. She is the principal consultant with DNV's hydrogen center of excellence based in Texas. She is a hazardous risk management specialist with an in depth focus on consequence and risk modeling. Cynthia has performed over a hundred risk and safety assessments on a wide range of facility

types and is certified as a CCPS process safety professional.

So I want to welcome both Pedram and Cynthia. And I look forward to hearing their presentation. And I'm sure we'll all be learning a great deal about hydrogen in their presentation.

So with that, I'll turn it over to you.

MS. SPITZENBERGER: Hi. Thank you. Again, my name is Cynthia Spitzenberger.

And we'll just go to the next slide.

And the next one.

So really want to thank you for this opportunity to be here with you today and discuss the topic of hydrogen. So, first, we'll just have a bit about who DNV is and then cover a few of the basic properties of hydrogen. And then we'll also touch on some potential misconceptions about hydrogen and then go into a deeper dive on some of the detailed properties and also look at some of the current safety standards. And then, of course, towards the end, we'll have some time for some questions.

Next slide.

So, first, a bit about DNV. DNV is a global independent assurance and risk management company. We have over 13,000 employees across a hundred countries. And our purpose is to safeguard life, property, and the environment.

And that's a really key future of all the services that we provide for the various industries that we operate in. And we also take pride in being a leading independent technical advisor.

Next slide.

So we also have uncompromising standards of quality and integrity. And we have over 90 years of experience as a technical advisor and verifier. We also place a key importance on doing research with industry. So at any given time we'll have 15 or more industry -- joint industry projects that we're leading or a part of. And many of our technical standards, we have them across various industries. But our maritime and pipeline standards are often cited and used within codes.

And then, of course, as part of the energy transition, we have a whole team looking at the new technology that's coming up and also looking at independent forecasts of energy demand and supply.

All right.

So, first, some basic properties about hydrogen. It's colorless, orderless, tasteless, non-toxic, and a flammable gas. It's the most abundant element in the universe. So it's a key part of water. And so, as such, it's a key component of the oceans and in the atmosphere. It also is a part of the numerous carbon compounds that are

present in all animal and plant forms. And it's also a key ingredient of the stars. Of course, our sun as well. So it's found in many locations.

Note that hydrogen can be a liquid if it's cooled down to extremely low temperatures. But for the rest of this presentation, I'm mainly talking about hydrogen in the form of a gas, just to clarify.

All right.

And hydrogen is used today in many industrial applications. Of course in refining and petrochemicals, but it's also used for treating metals and in the production of stainless steel alloys. It's also used in pharmaceutical and drug manufacturing. And then also in glass manufacturing. If you're producing large plate glass. And as well in electrics and the semiconductor industry.

But, increasingly, we're seeing hydrogen being mentioned as a clean energy carrier. And that's expanding its potential use cases. And that's primarily because it can be created from just water and electricity. And so we're seeing its application in things like energy storage, electricity generation, and heating, and many other applications.

All right.

So one of the first things that is often brought up when hydrogen is mentioned is the Hindenburg.

And the Hindenburg was an airship. And its disaster occurred almost 90 years ago. And hydrogen was used as the lifting gas for the airship. And we'll discuss more about why that was, but helium was another -- could have been used, but it wasn't used because it was in limited supply. And it had less lifting capacity and, thus, it had less payload capacity.

And there are many theories about the cause of the disaster. Some of them you may be familiar with. A lot of people cite static electricity; some theorize that it was sabotage; and some are there is investigating the potential that the pink coating was actually an incendiary. But just to be honest, we just don't know. Right? It's still not definitively known what was the exact cause in chain of events that led to the disaster.

But there are some points that we can make. First of all, we would say that the airship was more designed for use with helium and that hydrogen was potentially applied in an incorrect design and environment. Not all the safety precautions that we would have taken today were likely applied. And then, also, when you see those images of the fire, just keep in mind that, of course, hydrogen was involved but there were other burning materials and fuels involved in that fire as well.

And then another concern that people come to us

often with is looking at hydrogen vehicles. So just to explain a bit about hydrogen vehicles, they are a fuel cell electric vehicles. They use hydrogen and oxygen to generate the electricity which powers the car. So there's no combustion involved. And it emits only water and warm air. And they actually are more efficient than gasoline internal combustion engines.

Now, the hydrogen that is used is stored in compressed -- as a compressed gas in the vehicle tanks. And the vehicle tanks are made of a composite material that undergoes rigorous testing. And if, for whatever reason, there did happen to be a leak, then the hydrogen vehicle and a gasoline vehicle incident would behave differently.

So a leak of hydrogen, since it's a compressed gas, it's going to vent very quickly and disburse within a relatively short time, just a few minutes. If you have a similar hole in a gasoline tank, that's going to also release over a period of time, depend on the volume that's within that tank. And then that's going to form a pool potentially under the vehicle.

Now, another consideration is the environmental impact. If you have a release of gasoline, there's gonna be other contaminates in that that could pool on the ground, while hydrogen is just going to basically disburse within the air.

Right. Next slide.

So now let's look at comparing hydrogen with some other flammable fuels. We have it here in a table comparing hydrogen properties with natural gas and gasoline. So the table highlights in blue are similar items and then yellow are highlighted the differences.

So there's a lot of similarities. You can see that hydrogen and natural gas are both colorless and non-toxic. And all three could be considered asphyxiants if their vapors are allowed to collect and basically displace the oxygen.

Natural gas and gasoline are odorized because, for safety reasons, they want to make sure that they can be detected. Hydrogen is naturally odorless, but there's actually -- and for a long time people were thinking that it could not be odorized. But there's actually been recent research on this topic and now it can be odorized. And that will likely become standard in the near future, just for safety purposes.

Each of the materials, of course, have their own -- can cause damage to different materials. And those are known issues that are accounted for within the design of any container. And then the key difference is really in their flame. So hydrogen is an almost invisible blueish flame, where as natural gas and gasoline, it's visible and

can be a blue or yellow-orange flame.

And if you can just click the next link.

And then the next one.

So here we see some examples. This is from a video from the Department of Energy, where they compare a propane flame and a hydrogen flame. So you can see the top image is in daylight, where you can easily see the propane flame, but it's very difficult to see the hydrogen flame, unless we're looking at it with a thermal -- camera, which you can see in the middle image. And then, of course, at night, it's easier to detect the hydrogen flame.

So this is a key difference to be aware of when looking at hydrogen, comparing to some of the other flammable fuels that you may be more familiar with.

All right. Next.

Now we're just gonna look at a few more additional properties of hydrogen.

If you'll just click the next.

Yep.

So buoyancy relative to area. We mentioned this before when we were talking about the airships. So hydrogen is 14 times lighter than air. Natural gas is only two times. And gasoline, the vapor, is actually heavier than air. So if we filled balloons with each of these vapors, the hydrogen one will actually, you know, rise very

quickly, compared to others. And the gasoline one would actually sink.

And then diffusivity. Hydrogen is almost four times more diffusive than natural gas. So what does this mean? If you think about -- like if you have a diffuser or incense in your home, that smell immediately sort of permeates the room. Hydrogen is similar in that it will quickly disburse and fill within the surrounding area.

Now, flammable is -- flammability is a concern. And hydrogen has a wider range of concentrations in air than natural gas. So because of this, the best safety practices are that we try to limit the potential for hydrogen to accumulate and collect in enclosed areas.

Then the next.

And then another aspect is the energy required to ignite. So hydrogen air mixtures require a less of an energy threshold to ignite. And, thus, the best safety practice is to have stricter equipment design and ignition controls to limit that potential of ignition and for sparks.

All right.

So since we are concerned about the fire hazard, let's take a quick step back and talk about fire. So fire is a chemical reaction. It's an oxidation process that actually happens so fast that light, heat, and sound are released. And the fire triangle is a nice example of

the three essential elements that you must have to have a fire.

So of course you must have a fuel, something that will burn; the next item is oxygen, which usually we get from air; and then the third is some sort of heat or source. So the intersection of these three elements is what will cause a fire.

In all the safety practices and standards are all about how we try to intersect or don't allow those three elements to combine. So as mentioned before, we try to not have ignition sources available and present or we try to limit the potential for the fuel mixing with air.

All right.

Now, there are many governing bodies and industry groups that have regulations and standards about hydrogen. These are a selection of them. There's many more international groups and standards that are available. In the appendix to the presentation, we have a list, a more detailed list that you're happy to review. We just don't have time to go into all the details today.

Now, just a bit about pipelines. The U.S. Department of Transportation has regulated hydrogen pipelines since 1970. And the gas pipeline integrity management requirements were actually added in 2003. And in the US there are over 1600 miles of hydrogen pipelines that

are currently operating. And about 700 of those are under PHMSA regulation.

And, then, in this map you can see here -- I know it's a bit busy and small. But, basically, the thick black lines are the hydrogen pipelines. And you can see that they're concentrated basically around the Gulf Coast where there's a lot of industrial activity.

And the other point we wanted to make was that PHMSA and other organizations are -- have a lot of ongoing research related to hydrogen transport and pipelines. And that's -- that's really informing the industry.

Next.

So just some key messages to leave you with are that hydrogen is a fundamental element present in water and in all living things. It's in use today in many different industries. And similar to other flammable fuels, it really requires hazard management and best safety practices.

The hazards can be, in some cases, prevented and at least mitigated through adequate design, operation, and response actions. And we know that hydrogen is new to many, but there's a lot of past experience and best practices that can be used for guidance in this transition to the clean energy future.

All right. And we're happy to take some questions.

MR. BRITT: All right. I want to thank you, Cynthia, for that presentation. That was great.

Does anyone have any quick questions before we move on, on our agenda?

I think Roselyn, online, has a question. If you can unmute yourself, Roselyn, we should be able to hear you to get us started.

MS. TOVAR: Hi, everyone. I just wanted to know -- I have a question, but I was unable to put it in the chat. I don't have access to -- it doesn't let me chat everyone. So I just wanted to note that. I'm not sure if other folks that are also virtual are having issues with that too.

But my question is, what is your definition of "non-toxic"?

MS. SPITZENBERGER: Okay. So non-toxic, there's a -- non-toxic means that there is -- sorry. I should back up.

There's actually a -- bodies that define what is toxic or not. So that means that there is not a bodily response to the ingestion or inhalation of that material. So other toxics you could -- if you could have a toxic bodily response depending on if you ingest it or if it touches your skin or if you inhale it. So if something is classified as non-toxic, then there's no known responses like that, that are recognized.

MR. BRITT: And I just want to reiterate, we did turn

the chat feature off during the presentation because these are volunteer -- DNV is volunteer third-party presenter today. We bought them in, again, for the purpose of education and information about hydrogen at the request of the CVOSG. They're not part of your work study program, so they won't be -- obviously, you know, we're not documenting all of the information related to the questions and responses that we would for the work studies.

I think, Jill, you have your hand raised as well. If you could, again, announce yourself, unmute yourself and ask your question.

MS. BUCK: Thank you so much. Jill Buck with the Go Green Initiative.

I had a quick question about the safety standards. Is there anything in those standards that either require or recommend realtime data that's publicly available?

MR. FANAILOO: I'll confess that I'm not an expert in all of those standards. I mean, they're quite lengthy and in depth. As far as I'm aware, there isn't any criteria that says you have to disclose public information like that. So regulators may rule and can request information and determine any course of action. But in terms of making it public, a lot of this information could be proprietary and out of context could be hard to understand what's going on.

MS. BUCK: Thank you.

MR. FANAILOO: But, again, that's based on what I've known in my career so far and I'm -- there's probably some element where I can be contradicted on that. But, broadly, that's what I think the situation is.

MR. BRITT: Thanks, Pedram, for that answer.

Ava Post, I think you have your hand raised?

MS. POST: Yes. I just have a quick question and I'm not sure if maybe I missed this in the presentation. But how was hydrogen gas produced?

MR. FANAILOO: How is hydrogen gas produced? There's a number of ways that hydrogen can be produced. The two dominant methods right now in the energy industry is through electrolyzers. Electrolyzers use electrical power to basically separate hydrogen atoms from oxygen atoms in water.

So we put clean water into one of these electrolyzers, use clean energy, so that qualifies as -- you know, people paint it with colors -- as green hydrogen. And then we use, like, hydrogen different applications. The F1 is through something called an SMR or an ATR unit, which takes natural gas and then it separates (indiscernible) there's a combination of hydrogen and carbon atoms. And what that does is it separates the hydrogen from the carbon. And to qualify that as a clean hydrogen source, that carbon

comes out as CO2. And that CO2 is collected and then put into a safe storage site.

MR. BRITT: Thank you, Ava.

All right. I think we're right on schedule. I want to continue to move on, and I want to -- before leaving this, thank, again, Cynthia and Pedram for making theirselves available today to make that presentation as a volunteer. We really, really appreciate it. And I'm sure the group does as well. I speak for them.

So I'm gonna turn it over to Alma, who I believe is gonna introduce the break. And then we'll talk about what we're gonna do when we come out of the break.

MS. MARQUEZ: Oh, I believe we have one more question before we break. And it's -- Robert, if you could unmute yourself.

Robert, I see your hand up. I don't know if you have a question.

MR. VAN DE HOEK: Yes. Hi. Thank you Alma for noticing. Yes, I did have my hand up.

The list supplement question to the last speaker and -- and the response of the engineer. And I felt that that was a good explanation, but there was something missing. Could he -- or summarize a little bit of what that speaker's last question was?

MR. FANAILOO: Sure, Robert. The last question was

what are the different methods of producing hydrogen gas?

MR. VAN DE HOEK: Yes. And so that's what I wanted to -- that production of hydrogen gas -- and you mentioned electrolysis and then the second message -- the second method was what interested me. After the carbon is separated and isolated, what compound does that carbon -- is it made -- what does it -- what do you then bond the carbon with since it's no longer bonded to the hydrogen? What -- is it becoming a -- making sugar molecules? You know, I haven't really researched that.

MR. FANAILOO: Sure. It's CO2 that's produced. So people like to call a fire hydrant of different colors. At the moment, those technologies exist. And without CO2 capture, they're termed as gray hydrogen. When we combine those SMR technologies with carbon capture, we qualify that as blue hydrogen because we are mitigating the CO2 into the atmosphere. So the hydrogen that's produced from that doesn't have a carbon footprint because we're restoring the CO2 in some kind of underground storage.

MR. VAN DE HOEK: Thank you.

MR. FANAILOO: Welcome.

MS. MARQUEZ: All right. And I believe we have one question that's in the chat from Roselyn to Laura. I'm going to go ahead and read it. Her question is, "If we are going to compare the infused cells to gasoline cars, I think

it is important to also include electrification when making these comparisons. How would you say hydrogen fuel cell cars compare in efficiency to better electric vehicles?"

MR. FANAILOO: I don't have specific numbers in front of me, so I'm just going to provide an opinion from Pedram, if that's -- if that's okay.

I think it's higher. I mean, from what I know about EV cars available, you know, a reasonable range expectation is about, you know, 300 miles. You know, a gasoline engine car, you can get, you know, 400-plus miles. And if you've got a gasoline hybrid, it could be even, you know, more than that. So if a fuel cell is more efficient than that, then I would expect a quite -- you know, quite a bit more. So you're verging on maybe double a standard EV car is.

So it's all evolving and -- but the -- a fuel cell is highly efficient. Most gasoline engine cars -- I mean, you're in, like, 30 percent range in terms of efficiency, in terms of how much of the fuel, the gasoline fuel turns to something useful, i.e., motion.

The best gasoline engine car in the world is in Formula 1 engines. And they just broke 51 percent. But nobody can afford that kind of technology in, you know, in day-to-day cars. And fuel cells, they've been around for awhile. Toyota and Honda have been making these for quite

some time and their efficiency is very high.

MS. MARQUEZ: All right. Thank you for your response, Pedram. And thanks, everyone, for your questions during this discussion. Again, as mentioned, thank you, again, to our guest speakers and presenters today.

We're -- in order for us to stay true to our agenda, we're gonna take a five-minute break. So we can resume back at 10:45. For those of you who are new to this facility, the restrooms are over to my left, your right, down the corridor.

So we'll see you at 10:45. Thank you.

(Pause in the proceedings.)

MS. MARQUEZ: Going to introduce -- reintroduce Emily, who is going to start us with our next presentation, which is our breakout. It's the E -- environmental justice community engagement plan activity that we have scheduled for you today.

And so, with that, I'm gonna turn it over to Emily, who's gonna get us started and then we'll go through the specifics of how we're gonna work on the breakout session.

But before we get started, I did see that we have some online folks that joined. And I'd like to introduce -- if you can please introduce yourself and give us the name of your organization. I see that Marc Carrel

joined. If you could unmute yourself and tell us what organization you're with.

Okay. I think we lost Marc. And then let's go ahead and kick it back to our in-person folks that just join. We have Kenta, who joined us here in person. Welcome, Kenta. And Rashad from Reimagine LA. Welcome to today's meeting.

And with that, I'll kick it over to Emily.

MS. GRANT: Thank you, Alma.

So, quickly, if we could advance slides.

Perfect.

So we just wanted to clarify, we're gonna do some breakout work today and breakout sessions to put together a plan on how we could engage the community. But, first, I wanted to take a second to just level set where we are today and where we may have the opportunity to go.

So, right now, Angeles Link is in phase one, as you all know. And phase one is composed of 16 feasibility studies. So phase one is all about studying and planning. And that's where we are today.

Phase two, we're not yet in. We will be submitting an application to the California Public Utilities Commission, our regulator for phase two. But we're not there today. So at this point, when it says "what is the plan for phase 2?" -- I would never want to put this on a

slide, but the honest answer is, we don't know.

And so we have the CPUC participating in all of these stakeholder engagement meetings. They will direct us for different activities that we will need to complete in phase two, including, hopefully, a community engagement plan. And that's what we'll be putting together today in phase one, which is all about planning and studying. And phase two, we're hoping to execute on some of those fantastic ideas that we can come up with today.

So with that, I'll kick it back to Alma, who's going to explain how our breakout sessions will work, and we can start putting some of these great ideas into the planning process and hopefully further down the road, in phase two, into action.

MS. MARQUEZ: Thanks, Emily.

So for this part, which I'm very excited to hear from all of you who are joining us this morning, we have two groups; right? So we have the in-person group who are going to break out into two separate groups. One of them is going to be two and three. So we have Alyssa and Edna, who are in the back.

And for purpose -- to make this a little bit more -- to flow a little bit better, we're going to have Luis -- Luis Melliz, Luis Pena, and Rashad go into one group. And Enrique, Andrea, Ricardo, and Kenta in the

second group with Edna.

Now, just to go over the -- and then folks that are joining us online, we are using a randomizer. So you will be put into separate groups of four. So we're going to have four virtual breakout sessions.

Everyone will have the opportunity to answer topic one, which is -- covering the goals and objectives for this entire process. And then group two -- so you'll have topic one and then topic two. That'll be group one here in person. Top -- group two will be topic one and you'll cover topic three. And then the virtual folks, again, will all cover topic one and then four, five, six, and seven.

For this breakout session, we are going to spend 30 minutes in your group discussing the questions that are in your packets and have been dropped in the chat of what you're going to be answering, as well as discussing anything else that you'd like to give feedback on. We are taking comments from now until October 13th.

So just because you're in a breakout session today doesn't mean you do not have the opportunity to answer any of the other topics. As a matter of fact, we want to encourage you to do so because we want to give everyone a fair amount of time to respond and not be restricted to today's activity of 30 minutes.

After the 30 minutes, we're gonna resume back

and everybody report out on the following 15 minutes of what was discussed in your group. And we'll be putting these -- for those that are online, you'll be using mural two to put your Posit-It notes and -- and thoughts on to it as a recording mechanism. And for folks who are here, we're going to have these giant Post-its that you're gonna write down your thoughts.

Our scribes, who I mentioned earlier -- here, in person, we have two and online we have Nancy, Alan, Antonia who will be taking on the rest of the groups, and Nancy -- CV, who will be joining us and doing the scribing for the virtual folks.

Does anyone have any questions?

Oh, one more thought.

MS. GRANT: Sorry guys. One more thing I want to add. So if you have been assigned a topic, we did that to make sure all the topics were covered. We do have 30 minutes for this portion. So, likely, you're gonna be able to go through topic one and also your assigned topic. After that, if, as a group, there's anything else you would like to comment on, we're all for it. So just pick that topic and add some thoughts.

We'll be distributing Post-it notes as well. So even as an individual if you have an idea on other topic, just write it down on the Post-it note and then you can

stick it on the topic easel. Hopefully this will all make more sense when we -- once we start doing it.

But, certainly, we just wanted to make sure that all the topics were covered. We're not trying to assign anybody to anything in particular. So please feel free to comment on anything you would like.

MS. MARQUEZ: Okay. With that said, we'll have Luis Melliz, in person, Luis Pena and Andrea, if you can meet Alisa, who's raising her hand over at the back table. And then Enrique, Rashad, Ricardo, and Kenta meet Edna, who's raising her hand in the back. She'll be scribing for your group. And we will resume in 30 minutes. So by 11:25, we'll resume and report out on our group discussion.

Thank you.

(Pause in the proceedings.)

MS. MARQUEZ: Resume back to the general room. And we could start reported out. I think we'll go ahead and get started with our in-person groups first, and we'll give you a few minutes -- yes. Let's go ahead and hand you a mic, just to try -- stay true to our time for today.

And let's go with our scribe Alyssa. If someone from your group can report out. Or Edna, whoever is first -- whoever is ready to report out, if someone from your group can please share. Group two, I believe you had, is someone else from your group going to report out or you

want to report out?

UNIDENTIFIED: You can start with group three.

MS. MARQUEZ: Andrea, can you report out for your group?

MS. WILLIAMS: I asked. Well, we're gonna start with group three. So our team did a lot of really great brainstorming, specifically on topic one. So we kind of divided it into a couple different sections.

We're gonna go ahead and start with the goals. First, successful community engagement process. My group discussed that it's important to get out the info early. And once you do get the info out early, it's also important to just keep sending reminders to the community so that we're giving them updates, we're letting them know that this information is -- it's important to break down the information. It's really important to make sure that the information that's being presented is accessible as well. And keeping the topic's focus.

So a lot of folks in the community are going to be really interested in hearing about the community benefits. And so ensuring that the topics that are presented to the community focus on the topics that they want to know about and that they are more curious about. But that is the focus of those presentations.

Some of the, just, general updates that the

team called out is making sure that we're updating city councils, neighborhood councils, water agencies, the council of governments, other groups, and making sure that when we're out and briefing these groups, that the community knows that we're briefing them but then also knows where they stand on this project.

Success for community engagement looks like clarity on the direct benefits. So, again, jobs, the direct impacts. Clarity on air impacts. Clarity on just the overall approval process for this project. Clarity on all of the impacts and benefits, being clear about the usage for this project and just overall transparency.

Some of the tools identified for effective community engagement are utilizing the Promotora network that exists across LA County; making sure that we're taking the meetings into the community; making sure that we're incorporating all of the lessons learned from past projects, specific to environmental justice; that there is, you know, a community approval process in a sense; and that we're also defining partnerships with all of our CPOs that have been engaged to make sure that the community knows that we've been engaging them.

So that was what we discussed for topic one. Our third topic was focused on Native American and tribal engagement. Do that. Some of the groups -- the group

discussion was that there's a lot of work and individuals that have already been engaged on this process. So we need to do a better job of increasing the visibility of the existing participants and the existing partners that we've identified specific to Native Americans and tribes and those representatives.

We should also leverage the CBOSG for connections with these groups so we do a better job of also engaging any additional groups.

And, lastly, tapping into the triable groups that represent LA. Again, like I mention, there's folks that are working on this project that are working with SoCalGas that are already engaging Native American groups and tribal groups. And so leveraging that connection to make sure that we're tapping into all of the appropriate triable groups here in LA.

So that's what we discussed. I'm gonna go ahead and pause there if there's anything else that you would like for me to add.

MS. MARQUEZ: Okay. Thank you for that update and revision.

Let's move on to group two. If someone can identify themselves as reporting out.

Is that you, Luis?

MR. MELLIZ: Hello. Good afternoon, everyone. My

name's Luis. Excited to be here.

We discussed a little bit about everything. I felt like we kind of clustered a lot of things together. But, nevertheless, I think that our goal and objective I think were mentioned, too, by the other group. But, overall, it's really just how do we engage folks and how do we bring folks together.

Ultimately, I think really gives us an opportunity to partner up with those organizations that have already been doing this work, such as when we think about -- at the grassroots level -- I know on the call there's also someone from Nature For All, which is a -- it's -- obviously it's about nature. But, ultimately, they're an advocacy group that brings in a lot of nature organizations together to advocate.

And I know one of their members happens to be the Council of Mexican Federations, which is another grassroots organization, that does work at the grassroots level, specifically with monolingual families. So those families that are Spanish-speaking. And so that's a good opportunity for us to engage them to provide, ultimately, a comprehensive approach to engagement.

Really explaining how this affects community, how it affects the rate payers. Also looking at other partnerships such as with Best Start Communities at the

county level, which is funded through First 5 LA. That would be an opportunity to really go to the actual communities all throughout the county.

And really looking for ways to engage the communities by asking communities about SoCalGas, who they are, what they do, how they operate. And really making the language more -- not so -- not so like we have here where it -- you know, they're very complex terminology. Like really -- for the common man like me, I would say something like common, like not too elaborate but straight to the point because people can get confused. And really focusing on what this is all about.

So when we think about hydrogen and we think about the current -- we talked about inflation in our table -- we talked about a lot of things. But, ultimately, when we think about how to -- what -- what's it costing you now, well, with -- if we move towards hydrogen, you're gonna be saving. You're gonna be able to -- yeah, you're gonna be able to ultimately save.

So that's some of the things we talked about. Cost effectiveness, partnering with other CBOs, frontline communities that live by SoCalGas facilities.

And I'm gonna pass it on to Luis.

MR. PENA: Hi. Luis Pena from LA Initiative People's Alliance.

So like he said, we kind of touched upon a different aspects of it. But I think, essentially, it would be in the language of right now currently what's happening economically to -- to our communities, especially disadvantaged communities, as well as focusing on how this is also saving, you know, on the earth in terms of, like, how even -- we even mentioned that even sometimes sustainability becomes this trendy term. But in reality, like when it comes to lithium, in order to mine it for EVs, we have to still destroy the earth. We still have to extract and do this whole process that is very harmful. And so how maybe through, you know, hydrogen it -- you know, we avoid that kind of, you know, process.

We mentioned, like, just how is it that we can pass the message on to our communities in different languages. I mentioned animation sometimes. Because sometimes when I see some kind of issue and it's, you know, brought on animation, it simplifies it for me. But, you know, I can get into the nitty gritty of more complex language but not -- you know, that's -- that won't work for a lot of our family members who are just focused on the day-to-day, you know, paying the bills and trying to just get by, you know.

Anything else?

I think that's -- yeah.

UNIDENTIFIED: I was really trying to give it to her because it was really her idea. It was really her idea here. So -- but I'll go ahead and let you say it.

MS. VEGA: All right. Andrea, Food and Water Watch.

So considering that the Angeles Link project would involve new pipelines, from what I understand, I think that once we have a better idea of what the proposed routing is, there needs to be an emphasis on going into the communities where these new pipelines would be built and taking genuine community input on whether these people actually want that in their back yards or not, as well as going into communities where SoCalGas already has existing facilities. I'm thinking Aliso Canyon, Playa del Rey, and once again, taking genuine input on whether or not SoCalGas has been good neighbors so far.

MS. MARQUEZ: Okay. Thank you for reporting out.

Next, let's move on to our virtual groups. A virtual group who discussed topic four can report out. And if there's something different that you haven't heard, just to keep us mindful of our time, that you'd like to share, if you haven't heard it already, if we can hear that feedback, that would be great.

Group four. I believe that was Antonia's group.

MS. ISSAEVITCH: I can report out. Should I just do

it from here?

MS. MARQUEZ: Sure.

MS. ISSAEVITCH: Okay.

MS. MARQUEZ: If you can mic yourself -- mute yourself so we can get a mic over there.

Thanks for flagging us, Belen.

All right. Let's try it now. Antonia if you can go ahead and -- oh, perfect. Okay. You can continue to report out. Thank you.

MS. ISSAEVITCH: Okay. Should I start over or --

MS. MARQUEZ: Yes.

MS. ISSAEVITCH: I'll just -- yeah, I'll just quickly start over. So our first -- in our first group we were talking about transparency and giving communities decision-making power, providing meaningful engagement, and educating communities, making the information digestible and accept -- accessible.

And then we also talked about getting feedback and providing community feedback surveys using QR codes to hear from community members after they're reached out to. And then this kind of bled into what does a successful plan look like.

So we talked about -- so for building trust, we talked about noting red flags in advance and kind of giving communities more of a heads up if something is expected to

affect them. Holding meetings where community members meet. I think we talked about kind of going into communities and there was a -- there was the example of using the -- potentially the Watts Center community room and we were just discussing different areas where we could hold meetings.

We also talked about being prepared to discuss revenue and how that will affect the regions. And kind of talking about the economy and that goes into providing internships and hiring from within communities. So using engineers and everyone that's from the community and providing contracts to the communities that will be affected by this project.

We talked about an education rollout plan and hosting town hall meetings, getting community members involved. And we also talked about hosting booths and supporting education programs at schools as a way of reaching more community members through youth and then also that they will go back and talk to their families about whatever they've learned if we're able to host booths or support education programs that focus on hydrogen and clean energy.

And then we talked about which -- our topic, which specific neighborhoods communities and/or groups should be engaged? So we talked about hiring organizers, including that in the budget; concentrating on educating and

engaging young people; contacted and educating businesses along the route. And we just really stressed the point of hiring from within.

So as a way of -- as part of the engagement kind of letting people know how this will affect their community economically and maybe what employment opportunities might be available to them as to get them more excited about the project. And then we talked about identifying leaders. We talked about including RSCBOSG group and outreach efforts.

MS. MARQUEZ: Thank you, Antonia, for reporting out.

Next we have group five. Belen will be reporting out on your discussion. If you could unmute yourself, please, Belen.

Thank you.

MS. BERNAL: Thank you for unmuting me.

So I think -- Belen Bernal, Nature For All. Thanks for the shout out who -- whoever it was, I didn't catch the name earlier.

But I think not to duplicate some of the comments already mentioned, I definitely really enjoyed the last comment on, you know, using the Promotora or organizer model. It's important to have folks that have those trusting relationships be part of the conversation.

In our group we also talked about the need to

ensure we had the local elected voices. So, you know, where -- where are they on this topic? How well educated are they on this topic? How will informed are they? Because they are the ones who represent a large number of constituents in the region.

I know I asked this early on and I understand that maps are not currently available, but for sure, you know, once that's being identified, definitely, you know, go through an asset mapping of what communities definitely need to be reached.

We also talked about making sure that, you know, you're making those meetings accessible for families, obviously looking at different times. But providing child care within, you know, eye distance, within the same space, obviously, during evening meetings.

You know, I also mentioned, you know, having, when possible, members of the PUC or the local state representatives that are also, you know, appointing folks to these different boards and committees be present and actually have them co-convene with you so that they're inviting their constituents and taking a position at the table, if that makes sense.

Let's see here. And then looking at the various languages. So predominantly, in our case, you know, English, Spanish, but communities like in the San Gabriel

Valley, looking at, you know, various translation and interpretation services for the API communities that are growing in that space.

And thanks for flipping through the slides. I'm sure I wasn't reading every single one. But if there's anything that I may miss -- may have missed, by all means --

MS. MARQUEZ: Thank you, Belen, for reporting out.

From group six we have Marc Carrel, who will be reporting out. If you can unmute yourself.

MR. CARREL: Hi. We -- in terms of identifying the main goals, I think a lot of the stuff that I'm gonna say is a little repetitive with other things that have been said. But we said to educate the key stakeholders and elected officials along the link. Educate the media with briefings long before the construction starts, so they're aware of what's going on. And if we're going to continue to have community engagement, the info that Angeles Link provides needs to be unbiased and include different perspectives.

In terms what a successful plan would look like, we talked about partnering with local community groups to explain the benefits, groups that are going to -- let me rephrase that. SoCalGas should partner with local community groups who would then explain a lot of the benefit. When communities hear from groups and others that they have -- that have credibility in their community, then they're going

to be more open to hearing it.

About alternatives, not just hydrogen, and other ways to transition, and then comparing them. Talk about the benefits and the downsides of what you're trying -- yeah, don't just talk about the benefits, also talk about the downsides and what you're trying to do to address those downsides.

Engage with community to answer questions, which I think was mentioned. Finding credible endorsers is helpful. People support it from the community. Highlight the environmental impacts, especially the negative impacts and talk about how that's going to be addressed. Host town halls in the communities as well as table at community events and pop-ups. Have a presence in the community so people know that you're invested in this.

Also, talk about the direct impacts to the specific communities, the specific EJ communities and their neighborhoods and why this is something they should support. Talking at a very high level, if not necessarily gonna give them the -- address their concerns in talking about the specific concerns that they have and how you're addressing their specific concerns but also the specific benefit that those neighborhoods will see, whether it's jobs or improved public health or what have you.

And then, in terms of the four subject matters,

the topics seem very high level, and they're not talking about the community impacts. So I think that goes to the same point. Discuss what the potential impacts are and the benefits and be specific, not just about hydrogen and Angeles Link but about, you know, what the -- I'm sorry. They have to be specific, not general, about hydrogen and about Angeles Link and about what the benefits are.

Show folks how they have a voice. SoCalGas can create more public impact. How can they shape the -- how can communities shape the project with feedback. And creating the pathway so that SoCalGas has not created a pathway for people on the ground to provide feedback. So giving them a pathway for feedback, as others have said, QR codes and other things.

Thank you.

MS. MARQUEZ: Thank you, Marc.

And last but certainly not least, our virtual group that covered topic seven, if you can report out.

MR. RODRIQUEZ: Yes. I think I will start. So I think our group did mirror a lot of the topics that were touched up on in the previous groups.

We have a need or an objective for practical -- practical and relatable information. We need to ensure that all disseminated information is both practical and directly relatable to the communities affected. On site court

reporter for transparency and accuracy. Route transparency, other issue. Provide clear, detailed information regarding the exact routes of Angeles Link pipeline.

And for question number two, we need language inclusivity. Research the language spoken within disadvantaged communities and ensure all communications is available in those languages. And tangible examples. Offer tangible examples of case studies to showcase potential impacts and benefits, making the plan more comprehensible.

And on topic number seven, our topic -- our group's topics, we had a couple -- couple themes in our suggestions. There's a lot of misunderstanding in communications. A good way to prevent this misunderstanding is to encourage listeners to repeat back what the speaker has said to ensure clarity and understanding.

There's always a stigma associated with new resources. So require feedback to address and overcome any related stigma. There's also an issue of lack of follow through from different documents. Emphasize the importance of continued communication and follow up after presentations to maintain a clear understanding across all departments.

We also have, again, language barriers and cultural differences. And the way to mitigate is to ensure information is available in various groups -- in various languages and promote awareness of cultural sensitivities.

And another barrier is the lack of incentive for community engagement. A way to mitigate it is to implement community games and offer rewards to participants who can demonstrate what they have learned.

We also had one more answer for topic number six. And that is to make meetings available in multiple times.

And that was the discussion of our group.

MS. MARQUEZ: Thank you, Alan, in group seven.

Thank you, everyone, for being engaged in this breakout session. I think it was very informative. I've never seen that many Post-its in a long time. Last time was when my five-year-old twins were playing with my bag full of Post-its. So this gave me a little -- a little stress. But, no, thank you so much again for your participation. It sounds like your groups are very engaged and very thoughtful in everything that you shared with us today.

As we've mentioned, this process is -- our goal is to make it a transparent process. And I believe this exercise is allowing us to get us -- continue to get us through that path. And everything, as we've mentioned before, will be noted and will be taken to our folks in the back, to Insignia, to make sure that everything is being recorded properly and we're able to share with the entire group here. And we'll continue to do so.

So with that said, this concludes this session of our agenda. And we have a couple of more presentations and then we'll break out for lunch.

So with that, I'd like to hand it to my colleague, Chester, who will lead us through the second phase. Thank you.

MR. BRITT: Thanks, Alma.

And I want to welcome you guys back to the table, too, if you would like. We're gonna have, like Alma said, a couple presentations and then we'll wrap up.

I want to introduce our next volunteer guest presenter from Mitsubishi Power Americas. I'm actually going to let Darrell Johnson introduce Peter. Darrell Johnson is the SoCalGas manager for environmental services and he will introduce Peter in just a second. But let me quickly remind you that we will not be taking chat questions during the volunteer third-party presentation. This organization -- these organizations are donating their time and they're not subject to the same process that we're going through with our work studies.

So with that, I'll turn it over to Darrell.

MR. JOHNSON: Thank you, Chester. Appreciate the opportunity, again, to speak before the CBO.

Someone online used the term "digestible information"; right? So I think that I -- I chose that term

because I'm gonna describe a little bit of kind of air or NOx 101 so that the concept of NOx can be digestible in a very simple and simplistic way.

Next slide.

So I have a couple slides here. And I just wanted to say so, you know, why are we studying NOx; right? And what is NOx? So NOx is nitrogen oxide, and there are six different types of nitrogen oxide. But, traditionally, when you talk about air quality, NOx is associated with two forms of those nitrogen oxides. That's nitric oxide, or NO, and nitrogen dioxide, NO2.

And the reason I -- I wanted to give a very simplistic idea. So when we're talking about NOx, we're talking about those two, nitrogen oxide and nitrogen dioxide. And, you know, just as a little bit background information to talk about nitrogen, because obviously when we're talking about NOx, we're talking about nitrogen and oxide in different combinations; right?

So we've said this before, but it's important to understand that, you know, the air we breathe, the earth's atmosphere is 78 -- 78 percent nitrogen and 21 percent oxygen. So 99 percent of that, you know, air that we take is primarily nitrogen ox -- so how is NOx formed? And I think I shared this in an example previously. You know, NOx is formed via the oxidation or combustion of

nitrogen in air at high temperatures over time; right?

So when we have a combustion process and you have 78 percent of the air in the combustion process being nitrogen and the other 21 percent being oxygen, at a high temperature, you create NOx. Right? So NOx is created even naturally. I think I gave the example that every time lightening strikes on earth that it creates NOx in the atmosphere. It's high temperature, it's high temperature combustion of nitrogen and oxygen.

So NOx is created when we combust pretty much all the fuels that we use. You know, natural gas creates NOx and -- and hydrogen would create NOx as well.

Okay. And NOx is, you know, a portion of a number of different areas of consideration; right? So we talk about combustion at high temperature. That takes place in industrial, commercial, and residential combustion units, your boilers, you know, motor vehicle combustion. All the cars that are driving throughout the country right now that are internal combustion engine, burning some type of fuel, are creating NOx as part of that process, in addition to your electric utilities, the electric generation process that uses fuel oil or natural gas, in that process is creating NOx as well.

The reason NOx is a consideration and a topic of our feasibility study is NOx is a criteria air pollutant.

And it's known to contribute to the formation of acid rain and ozone at the lower levels; right? We know ozone is great at the higher levels. And we stopped using refrigerants because we didn't want the radiation penetrating the upper level ozone areas. Ozone at lower levels is deleterious. Okay.

One of the other consideration we have with NOx, and it's important, and I think our speaker Peter will speak to this in some manner, is that there are, you know, federal and state controls that they have regulatory controls that they have for NOx and have had for quite some time. As we move forward in the consideration of hydrogen, there will be additional regulatory consideration that will drive and innovate the design of equipment and the control technology associated with NOx.

Oh, sorry. I had it. Not too good over there.

So I wanted to say -- so I'm talking about NOx and how high temperature combustion creates NOx and I wanted to say, when we're talking about hydrogen combustion and NOx, like one of the reasons that we're looking at hydrogen as a cleaner fuel is because hydrogen is carbon free. As we try to decarbonize the environment, the pipeline, the infrastructure, hydrogen doesn't have carbon; right?

Carbon is a potent greenhouse gas and so there's no CO2 that comes from the combustion process of

hydrogen. That's one of the real benefits of considering hydrogen. In addition to every chemical has its ability to bring both benefits and detriments when you talk about combustions.

One of the benefits of hydrogen is it's a very stable molecule in combustion at various temperatures. So at lower temperatures, it's very stable, and at high temperatures, it's very stable. So that's one of the benefits of hydrogen, in the combustion process.

Downside of that is that hydrogen, as noted in the previous slide, does generate NOx because, at high temperatures over duration of time, the combustion of hydrogen will produce NOx.

Hydrogen can produce NOx at various levels. And some of our studies are looking at, you know, how some of those levels might even indicate small increases because hydrogen burns at a very hot flame. And that temperature of that flame is very high as well.

And my fourth bullet, I just wanted to say that, you know, part of our feasibility study was to determine the impacts of hydrogen and the associated NOx that could be part of that hydrogen process. It also is to determine mitigation measures to reduce the potential of NOx from hydrogen. And we have, you know, studies that will show equipment design and control design have been very

effective at controlling NOx from, you know, methane fuels like natural gas and NOx.

And also I just wanted to say, you know, part of the education as we talk about this, you know, we're in many ways in infancy when I talk about the development and design of hydrogen-specific equipment. When people talk about changes in equipments, NOx associated with hydrogen, that equipment was designed for natural gas. As we move forward, there will be specific design and control equipment designed specifically for the combustion of hydrogen, which will, in turn, increase and reduce the potential of hydrogen NOx and other emissions.

Having said that, it leads into, you know, our guest today. I'd like to introduce Peter Sawicki, who is the regional vice president of sale and marketing for Mitsubishi Power Americas. Peter is the regional vice president for sale and marketing and -- for Power America and major equipment supplier and energy solution provider for the power industry.

Peter is based out of San Diego, California, and is responsible for Mitsubishi Power's sale and marketing activities in the Western United States. Peter has over 25 years of experience in the power industry with roles in design, engineering, project management, project development, and sales. Peter has earned his BS in

mechanical engineering from Manhattan College and his MBA in finance from Fordham University.

Please welcome Peter.

MR. SAWICKI: Thank -- thank you, Darrell. And thanks, everyone, for allowing me to speak today.

So, yeah, the basis of my presentation will be around hydrogen and the power industry and around NOx production and what Mitsubishi is doing to control NOx.

So just starting off, thank you for the kind introduction. So I am Peter Sawicki. I'm the Regional Vice President for sales and marketing for Mitsubishi Power. Mitsubishi Power is a subsidiary of Mitsubishi Heavy Industries, which is a large Japanese-based conglomerate focusing on power generation equipment.

So as we drive a new technology, we're really working on solving what we call the energy trilemma. And that's basically keeping energy clean or making it even cleaner, affordable, and reliable. So these are really all three points that are kind of working against each other but are all critical in the energy space.

We need clean power for the reasons we've mentioned all along; right? We need to protect the environment. And as we drive towards this decarbonized future, we have to work towards technologies that are making -- being less polluting and using less carbon in the

atmosphere.

And while we're doing that, we have to make sure that we're doing that affordably; right? We have to keep the rates low so everybody can affordably utilize energy on a regular basis.

And then, finally, reliability. We can't jeopardize reliability as we're doing this for the various reasons. We can't afford to have power outages just for -- just for general safety reasons and -- so, really, those are the three main challenges as we're driving forward here.

So as we go into the presentation, I'm gonna start out with kind of the why for hydrogen specifically in an energy sector to help you understand. I'll try to -- I've got a lot of charts in my graph. I'll try to keep it, as best I can, in layman's terms. But, certainly, if you don't understand anything, we can go over it in the Q and A following the presentation.

So my first chart here is just showing the solar and wind curtailments in California. So curtailments are basically -- they happen when there's too much energy on the grid and not enough demand. So we're blessed with quite a lot of sun shine here in California, in the west in general. And so a lot of that renewable energy comes at -- during the middle of the day.

And so what problem occurs now is we really

have too much wind and solar in the middle of the day, and we don't have enough demand for that energy. So what we have to do is actually turn off some of these solar power plants, which is obviously a very inefficient way of utilizing the technology; right? We really want to be able to utilize as much renewable energy at -- when it's produced. And if we can't do that, then we have to really look at means of storage.

So you're probably hearing in the news quite a bit about how to store renewable energy. California's been installing quite a bit of -- quite a few battery installations. Mitsubishi Power has installed several in the State of California alone. And that's basically -- we use a large battery system to store renewable energy.

But that's usually done on a short-term basis. So that's usually done generally around the four-hour basis, where you can take the energy from, say, midday and then shift that to the evening peek, where most of us come home and use -- utilize most of the electricity.

So, generally, now the way our electricity demand works is, you know, the early mornings we get a peak demand, where everybody wakes up and starts using their appliances. And then towards the end of the day, when everybody comes home, we have another peek demand. The middle of the day is pretty well accounted for now because

we have all of this renewable energy. Actually, we have too much renewable energy that we're trying to shift this -- this energy to when we're actually utilizing it. So we're doing that in batteries.

But as you can see in the next chart that I have here, we predicted as we go to a full decarbonized society -- so we -- if we go to 100 percent renewable portfolio standard, we have these periods of the year where we have way too much generation. So even with the shifting of batteries, we just have times of the year where we're going to have way too much renewables that we're going to have to shift, not only on a daily basis, but on a seasonal basis.

So in the energy sector, we look at clean fuels as being the solution to this problem. And hydrogen is being one of those key clean fuels.

So in the energy space, we really look at hydrogen as being kind of an energy storage medium, where we're basically shifting renewable energy from one time of the year, or one period of the day to another period of the day. So it's really critical to us as we look to get away from fossil fuels and really decarbonize the fuel that's we're utilizing in the future.

So next slide, please.

So hydrogen is really not new in the energy

space. Mitsubishi Power has over 4 million operating hours of some blend of hydrogen in our -- in our gas turbine fleet. So we really understand the dynamics of utilizing hydrogen gas turbines.

This is older technology, gas turbines. These have been around since the 1970s. Most of these gas turbines that utilize hydrogen utilize some means of water or steam injection to control the nitrous oxide emissions that are produced during combustion.

And as we -- as an industry, we've moved away from this technology. What we use now is called dry low NOx combustor -- or combustion technology, which really means we don't utilize water in the combustion. So we save the water from the process so we can utilize the water for other means in society.

And so as we're developing the new technology now, we're really looking at moving from our natural gas combustion, dry low NOx combustion, which does not utilize water, into hydrogen combustion. So I'll go into a if you more details of what that means.

Next slide, please.

So the good news is a lot of the existing gas turbine technology can handle some blend of hydrogen today without any impacts in NOx production. So this is a test in our -- one of our facilities in Georgia. It's the McDonough

facility. And what we did here is we set up a test rig where we introduced a blend of hydrogen into the natural gas stream and tested that for combustion.

And what we've realized is -- you can see the results here. That, really, out of 20 percent blend, no negative impacts. We were able to maintain the NOx levels that we achieve with natural gas combustion. So that's really just a small blend of hydrogen. And, really, where we want to go with this is really to take it up to 100 percent of hydrogen as we're driving the technology forward.

So next slide please.

So one thing to note in the power generation industry specifically, as Darrell mentioned, technology is not stagnate. We're always driving to be better and more efficient and reduce the emissions that we have from our technology.

So as you can see, over the last 20 years, we've significantly reduced the NOx emissions associated with combustion in the power industry. And that's due to quite a few things. It has to do with not only the combustor technology in the gas turbines specifically, but also the post combustion clean up technology that we have.

So when we utilize the fuel in the gas turbine, when we combust, we have a certain amount of emissions that

we're trying to control right at the point of combustion, when we introduce the fuel to the air and ignite it. But also post combustion as well.

So after the fuel comes out of the gas turbine -- the exhaust comes out of the gas turbine, we try to clean that up as well. So we utilize technology called an SCR, a selective catalytic reduction. And that technology has advanced year over year over year, which allows us to drive down to these ultra low NOx number that's we can achieve today with natural gas.

So the target here is as we convert over to hydrogen, we want to maintain those NOx levels. But you can see over the last 20-plus years that we've been able to drive quite a bit of NOx out of the -- out of the atmosphere -- or out of the exhaust from our emissions due to those technology advancements. And those technology advancements will not stop today. They will continue to go forward and we expect additional benefits over time.

So next slide, please.

So, really, as we're looking at -- not to get into too much detail here. But as we get into looking at technologies for developing new gas turbine technology, the good news is as we look to retrofit or bring on new gas turbine to the market, really what we're focusing on is only the combustion technology. The -- most of the power plant

equipment will stay relatively the same. What we're really focusing on is the piece of equipment that actually combusted the fuel.

So where we're looking at, in the past, natural gas, now we can take a blend of up to 30 percent in our conventional combustor technology -- and we're actually testing now the new combustor, which we call a multi-cluster technology, which will allow us to blend up to 100 percent and maintain those stack NOx emission levels that we achieve with natural gas technology today.

So the key takeaway here is NOx emissions is present from combustion. NOx emissions is a challenge for us as we move to hydrogen combustion. We want to combust the hydrogen at the highest possible temperature we can in the gas turbine in order to maintain the efficiency, which, in turn, reduces emissions and reduces the amount of fuel that's utilized during the combustion.

But in doing so, the trade-off is NOx emissions. So we have to really be cognizant of how we tune the gas turbine and utilize this new technology to maintain those NOx emissions going forward.

So next slide, please.

So in order to do so, we really need to test this equipment before we bring it out to market. So I just came back from this facility. I was there last week. This

is at our manufacturing facility in Takasago, Japan, which is just outside of Osaka, Japan. And where we have two operating power plants, we have a large gas turbine and a small gas turbine. But we also recently installed electrolyzer equipment.

So the electrolyzer -- as one of the earlier speakers mentioned, that's the piece of equipment that's utilized to create hydrogen. So, basically, you take a water molecule and you run electricity through it and through the catalyst in this electrolyzer, it separates the water molecule into hydrogen and oxygen.

So we have one of those operating at this facility. We also have container storage for hydrogen. So we can storage hydrogen for utilizing and testing. And then we will be utilizing that and testing in our gas turbines before we go out to market these gas turbines.

So actually, happy to say, in April of next year, in our smaller gas turbine, we'll be doing the first 100 percent hydrogen testing. But the initial testing that we've done on the specific combustor itself has given us promising results as far as maintaining NOx and able to deliver a product that will be able to be both clean, reliable, and affordable. And that's really the challenge here going forward.

So once again, thank you for the time. I'd

like to open it -- I don't know if now's the appropriate time for questions, but certainly happy to take questions.

MR. JOHNSON: Thank you, Peter.

And I just wanted to wrap up the session to say that, you know, as part of the feasibility study on NOx, you know, we are mandated to evaluate the research that's available out there for, you know, the appropriate approach to calculating NOx, whether that be an increase or reduction.

But as -- in addition to that -- and I'm trying to bring this conversation full circle -- we're also mandated to examine the technologies and potentials for mitigation of NOx as well. So we're going to appropriately calculate what the NOx might be, but also evaluate what the potential for reduction in NOx, both now and in the future. Obviously, the project is a future project. It's not happening today. So things will happen in between the time that we're actually combusting hydrogen and the technology that exist at that point.

So I just wanted to finish the conversation with that and say thank you very, very much for your attention. Appreciate it.

MR. BRITT: All right. Do we have any questions? Yes. Anybody have any thoughts online or in person?

You guys are a hungry bunch or a quiet bunch,

one or the other.

All right. If we don't have any questions, then I'm going to turn it over to Emily, I believe, who is going to wrap us up.

MS. TRACY: Almost there. Almost there, guys. Thank you so much.

So I know this has been -- we've said this time and time again -- an iterative process. We have 16 studies. As the studies progress, they don't all progress on the same -- at the same pace, which obviously impacts our schedule and how we approach our meetings and our stakeholder engagement moving forward.

So I'm going to ask Jill to do an update on where we are and how our schedule might change and that we continue sending out surveys and trying to gauge from you how you want to approach meetings moving forward.

We don't want to give you too much information. We also don't want to not be fully transparent with you. So we're constantly trying to evaluate the best way to do that. So we've gotten some good feedback on the meeting today. It seems like the breakout sessions worked pretty well. So we'll keep asking you to help us shape our meetings as we're moving forward.

So I'll kick it over to Jill.

MS. BUCK: Thank you, Emily.

Good afternoon, everybody. And thank you for sticking it out. I know I'm the last speaker before lunch. So I'll try to keep it brief.

So we originally published this schedule for everybody back when we were at Altacy (phonetic), for our second quarterly meeting earlier this year. And it was a very ambitious schedule. But as Emily noted, we've got 16 studies that are mandated by the final decision in the regulatory proceeding. They are all moving forward, but at a different pace.

And so, Andrea, I believe you were the one that, at our last meeting in -- at the ERC, you had expressed some concern about the pace of that schedule and that additional time would be appreciative. And so we did take a hard look at the study and the schedule. And so we -- you'll see that in the red line is where we are today. This is the original one.

And then you want to go to the next slide.

We added an additional two months to the final schedule to provide our stakeholders additional time to review, not only the ongoing studies, but also the draft report, which will be issued sometime in late May of next year. So to give everybody additional time -- we understand these are highly technical studies. It's a lot of information. We also, you know, to facilitate your review,

we uploaded the materials into the living library. So hopefully that's working out for folks.

And as Emily noted, the more feedback allows us to better serve you guys. So if you have any input for us on the living library, we'd really appreciate it.

And so this new -- this new schedule reflects the need for additional time. And then also the resources that we've provided to you will hopefully be helpful to you all.

And with that, I will pass it over to Alma. Thank you.

MS. MARQUEZ: Thank you, Jill, for going as -- giving us the timeline and making sure that we're clear on what was asked in the past meetings.

With that said, I want to just go ahead and remind everyone we'll be sending over invoices for folks that joined us from our office, Lee Andrews Group, so we can get you paid for your participation in today's quarterly meeting.

We also have a post survey in the back of the room that will help us make these meetings more easier for you all to attend. So we'd really like to hear your feedback. So I also want to mention a QR code. We're big on QR codes. So if you can just scan it back there and give us your feedback, that'd be greatly appreciated.

And with that said, I want to again thank all of the speakers today -- oh, I think we have one question before we get to the food.

MS. GRANT: Super fast. Sorry. One more thing. I recall a couple of folks saying that they would prefer a different meeting location for next time. We are already starting to plan our December meetings. If you can send me any ideas you have for locations, I -- we're really open to it. So please just shoot me an e-mail, send it my way.

MS. MARQUEZ: Thank you, Emily.

And with that said, we're going to go ahead and adjourn today's quarterly meeting and thank everyone for being here, specifically our guest speakers, all of the staff here at SoCalGas, and you all for your time.

Thank you, and have a great rest of your day.

(Meeting adjourned. 12:21 p.m.)

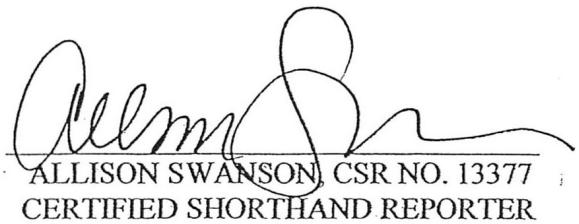
REPORTER'S CERTIFICATION

I, the undersigned, a Certified Shorthand Reporter of the State of California, do hereby certify:

That the foregoing proceedings were taken before me at the time and place herein set forth; that any witnesses in the foregoing proceedings, prior to testifying, were duly sworn; that a record of the proceedings was made by me using machine shorthand, which was thereafter transcribed under my direction; that the foregoing transcript is a true record of the testimony given.

I further certify I am neither financially interested in the action nor a relative or employee of any attorney or party to this action.

IN WITNESS WHEREOF, I have this date subscribed my name.



ALLISON SWANSON, CSR NO. 13377
CERTIFIED SHORTHAND REPORTER
FOR THE STATE OF CALIFORNIA

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In the Matter Of:

PLANNING ADVISORY GROUP

TRANSCRIPT OF PROCEEDINGS

July 18, 2023

Case No:

CERTIFIED COPY

PLANNING ADVISORY GROUP (PAG) MEETING

Tuesday, July 18, 2023

Reported by:

Stephanie Leslie
CSR No. 12893

The Planning Advisory Group (PAG) Meeting taken before Stephanie Leslie, Certified Shorthand Reporter 12893, for the State of California, commencing at 9:00 a.m., Tuesday, July 18, 2023, at 9240 Firestone Boulevard, Downey, California.

APPEARANCES:

Chester Britt
Alma Marquez
Emily Grant
Amy Kitson
Katrina Regan
Jill Tracy
Ernest Shaw
Sal DiCostanzo
Nicholas Connell
Edith Moreno
Neil Navin
Arthur Fisher
Miles Heller
Katrina Fritz
Arun Raju
Matthew Taul

APPEARANCES (CONTINUED):

Charles Wilson
Tyson Siegele
Chris Myers
Rizaldo Aldas
Hope Fasching
Rashad Rucker-Trapp
Christopher Arroyo
Julie Roshala
Anniken Lydon
Sam Cao
Megan Lorenz
Armen Keochekian
Tim Demoss
Norman Pedersen
Joon Hun Seong
Marna Paintsil Anning
Yuri Freedman
Rodney Cobos

Tuesday, July 18, 2023, 9:00 a.m.

Downey, California

MR. BRITT: All right. Good morning. I want to welcome everyone to the Angeles Link Planning Advisory Group. This is the first of four workshops this week. It's a very ambitious schedule this week to meet with everyone regarding the work studies, and I want to thank everyone for taking the time out of their day.

We have a full agenda, so we're going to get right to it. And I want to just introduce myself. My name is Chester Britt. I'm the executive vice president for Arellano Associates. I lead the facilitation of the Planning Advisory Group, which we're meeting with today.

I want to also introduce Alma Marquez, my sidekick, who is the vice president of government relations for the Lee Andrews Group, and she is leading the community-based organization stakeholder group, and I want to let her introduce herself and make a message today for the land acknowledgment.

MS. MARQUEZ: Yes. Good morning, everyone. It is a pleasure to be here this morning

with you all. And for the folks who are here online, thank you and welcome.

I want to take this opportunity to do a land acknowledgment especially because we do have some members that are part of the -- representing the American tribes locally.

We respectfully acknowledge the indigenous peoples on whose ancestral land we gather, of the diverse and vibrant communities of Tongva, Tataviam, Serrano, Kizh, and Chumash people, who for generations have cared for these lands and make their home here today.

We honor and pay our deepest respect to their elders and descendants, past, present, and emerging, as they continue their enduring stewardship of these lands and waters for generations to come.

We acknowledge our collective responsibility and commitment to elevating the stories, culture, and community of the original caretakers of this region and are grateful for the opportunity to live and work on these ancestral lands.

We celebrate the resilience, strength, and unwavering spirit of indigenous peoples and are

dedicated to creating collaborative, accountable and respectful relationships with indigenous nations and local tribes. Thank you.

MR. BRITT: All right. Thank you.

We're going to go ahead now and do self-introductions. We're going to just pass the microphone around the room here, and then we'll go online and introduce our online participants as well.

So we'll start with Emily, and we'll work all the way around.

MS. GRANT: Good morning. Emily Grant, senior public affairs manager with Angeles Link.

MS. KITSON: Good morning. Amy Kitson director of Angeles Link Engineering and Technology.

MS. REGAN: Good morning. Katrina Regan, Engineering and Technology Development Manager for Angeles Link.

MS. TRACY: Good morning. Jill Tracy, senior director, Angeles Link Regulatory and Policy.

MR. SHAW: What's up, what's up? Good morning, everybody. Ernie Shaw, president of 43 Transmissions and Storage. Good to see you.

MR. DICOSTANZO: Good morning, everyone. Thank you for having us here. My name is Sal DiCostanzo. I am with the ILWU Local 13.

MR. CONNELL: Good morning, everyone. Nick Connell, executive director with the Green Hydrogen Coalition.

MS. MORENO: Good morning. Edith Moreno, regulatory strategy and policy manager. I know it's a mouthful.

MR. NAVIN: All right. And good morning. And Neil Navin. I am the chief clean fields officer for SoCalGas.

MR. BRITT: All right.

And now we're going to introduce people that are online. I can see most of you, so when I call your name, if you could unmute yourself. We will unmute your microphone as well. And then you should be able to introduce yourself.

So I see Arthur Fisher.

(Brief pause in the proceedings.)

MR. BRITT: You good?

MR. FISHER: Hi, there. My name is Arthur Fisher. I am a supervisor with the safety analysis section of the Public Advocates Office of San Francisco.

MR. BRITT: Thank you, Arthur.

I see Miles, it looks like, Heller.

MR. HELLER: Yes. Miles Heller with Air Products.

MR. BRITT: All right. Katrina Fritz?

MS. FRITZ: Hi. I'm the executive director of the California Hydrogen Business Council, Katrina Fritz. Sorry I couldn't be there in person today, but I plan to be there on Thursday. Thank you.

MR. BRITT: And then it looks like Arun Raju.

MR. RAJU: Hi. Good morning. Arun Raju, UC Riverside.

MR. BRITT: Okay. Matthew Taul.

MR. TAUL: Hello. My name is Matthew Taul. I'm working with Ian Fisher in a safety branch of the California Public Utilities Commission Public Advocates Office. I'm the senior engineer.

MR. BRITT: Welcome. Charles Wilson?

MR. WILSON: Hi. Sorry. Charlie Wilson, Southern California Water Coalition.

MR. BRITT: Welcome. Tyson Siegele?

MR. SIEGELE: Hello. My name is Tyson

Siegele. I am representing the Utility Consumer Action Network today.

MR. BRITT: Welcome. Chris Myers?

MR. MYERS: Hi. I'm Chris Myers with the Commission's Cal Advocates.

MR. BRITT: Rizaldo Aldas.

MR. ALDAS: Hi. Good morning, everyone. I'm Rizaldo Aldas with the California Energy Commission Research and Development Division.

(Reporter clarification.)

MR. BRITT: Could we increase the volume for the people online? Because our court reporter is having trouble hearing.

So that was Rizaldo Aldas.

Could you just restate who you're with, Rizaldo?

MR. ALDAS: Sure. Hi. Good morning. I am Rizaldo Aldas with the California Energy Commission's Energy Research and Development Division.

MR. BRITT: All right. Hope Fasching?

MS. FASCHING: Hi. Hope Fasching, Policy Analyst of the Green Hydrogen Coalition. Thank you.

MR. BRITT: Thank you. Rashad Rucker?

MR. RUCKER-TRAPP: Good morning, everyone. My name is Rashad Rucker-Trapp, executive director of Reimagine LA.

MR. BRITT: All right. Christopher Arroyo.

MR. ARROYO: Good morning. Christopher Arroyo. I work at the CPUC.

MR. BRITT: All right. And I think that is -- let me see.

Did we cover everybody?

Actually, it looks like Julie Roshala?

MS. ROSHALA: Good morning. I'm Julie Roshala. I'm an environmental planner with Insignia Environmental.

MR. BRITT: All right.

Eric Hoffman?

(No response.)

MR. BRITT: Eric? Okay.

Anniken, it looks like, Lydon?

MS. LYDON: Good morning, everyone. Anniken Lydon. I'm a senior planner with Insignia Environmental.

MR. BRITT: Okay. It looks like Sam, and I cannot read -- I cannot see your last name. Is it Cao?

MR. CAO: Yeah. Sam Cao, South Coast Air Water Quality Management District.

MR. BRITT: Okay. There's another participant that doesn't have a name. It looks like SoCalGas office. We'll skip that one.

Megan Lorenz?

MS. LORENZ: Hi, Chester. Megan Lorenz, SoCalGas.

MR. BRITT: Okay. And then it looks like Armen Keochekian.

MR. KEOCHEKIAN: Hi, Armen Keochekian and I'm a director at Insignia Environmental.

MR. BRITT: Great. Thank you very much. Okay. So that gets through our introductions.

I want to welcome everyone. As you can see, we have a large contingent online today, so we are going to have a workshop today that is going to be very dynamic.

We are going to have lots of presenters, lots of conversation. We hopefully will get into all the things that you want to discuss, want to talk about.

And these meetings are, you know, in the middle of our normal quarterly meetings, and -- okay. We did have one other person that joined us,

Tim Demoss.

MR. DEMOSS: Yeah. Tim Demoss from the Port of Los Angeles.

MR. BRITT: Thank you so much for being here.

MR. DEMOSS: Thank you.

MR. BRITT: Okay. So a couple housekeeping items to just get us started.

This meeting will be recorded on both video and audio. We do have a court reporter here, who will be transcribing the meeting.

Please, when you speak, announce yourself and speak directly into the microphone so everyone can hear both in person and online.

Our online participants are relying on us speaking directly into the microphones and projecting our voices, so if we can do that.

The Zoom microphones are muted by the host, so -- to eliminate the background noise, so you will need to unmute yourself when you're called to speak, both in person and online.

Again, you need to use one of these electronic microphones. Most of them are turned off, so when you turn it on, it takes a brief second to just reconcile with the electronic board,

and then you should be able to speak into the microphone.

We do encourage you, for those of you online, to turn your cameras on so we can better engage with you and see your beautiful faces.

Please feel free to use the Zoom chat to provide input and ask questions throughout the meeting. We do have people monitoring that chat.

All of the chat comments and questions that you check -- type in are being documented as if you verbally said something as well, so there's multiple ways to provide input. And if you could do that chat feature, and use that, that would be great.

If you would like to speak and you're online, please use the Raise Your Hand button.

We have lots of opportunities, as you'll see, for dialogue, so you shouldn't have to wait very long for us to call on you and you should be able to make your comments.

And then the wireless microphones will be passed on as we have people that are speaking.

So I mentioned our ambitious agenda today. This agenda, just so you know, is not exactly what was in your packet or what we sent you. There have

been some adjustments to the order.

All the content is the same, but the tour, which we were going to have of the facility here, which we thought was going to be able to start this morning, is now going to happen at lunchtime. So we did have to move some of the agenda items to allow for our speakers to speak.

So I'm going to go through what our actual agenda is, which is on the screen here, and that should reconcile with what we're going to do today.

So we had the continental breakfast. We are going to do a safety message and welcome in a minute.

We'll plan for the applicable safety requirements. That will be our first discussion item. And then we'll have a member discussion about that.

We'll then get into the workforce planning and training evaluation and have another member discussion.

We will then get into the preliminary routing and configuration analysis, have another discussion.

And then we'll go into the demand study, which will be the last work study session before

lunch.

Then we'll have a break for lunch, and we'll do our innovation experience tour.

We will then break out of lunch and come back and do our production planning and assessment.

And then we will have another break, if we need it. And then high-level economic analysis and cost effectiveness.

And then we will finally end with a brief debriefing and wrap-up and thank you.

So, again, we have a very full agenda. Information was sent out previous to this meeting related to all these topics we're going to be covering. Hopefully you had a chance to look through that. If not, we are going to have presentations on each of the subject matters.

Again, today's meeting is a workshop, so we really want to get into the dialogue about individual subject matters. We're going to try to keep everyone on topic about the subject matters that we're discussing.

There will be opportunities to discuss the other subject matters either in the future presentations of this meeting and/or other meetings that we're having this week.

So this is one of two meetings for the PAG. Today's meeting is going to cover six subject matters. We'll cover another five or six on Thursday -- no -- yeah, Thursday. I have to keep it straight. Today's Tuesday. So we will be having another discussion with the PAG Thursday as well.

And then counter to these meetings are the CBOSG meetings, which are going to happen tomorrow and Friday. They're going to be covering the same subject matter.

So with that, I'm going to introduce Edith Moreno. She's the regulatory strategy and policy manager for SoCalGas, and she's going to do our safety message.

MS. MORENO: Good morning. Can everyone hear me?

(Audience responds.)

MS. MORENO: Okay. Great.

Good morning, everyone. I am Edith Moreno, the regulatory strategy and policy manager at SoCalGas.

So safety is paramount at SoCalGas, so I wanted to kick off our morning together with a brief safety message focused on preparing for

extreme heat conditions.

So it's been very warm the past several days, and we're expecting temperatures to reach in the high 90s in places like the city of Downey, where we're located today, and places like the Inland Empire, which is supposed to be over 100 degrees.

So I'm originally from the city of South Gate, which is just down the road from here. I did not have air-conditioning growing up, so I spent a lot of times at places like the Downey mall, which is directly across from the Energy Resource Center.

So this is crazy that I'm here today working at a place -- at a facility which is across the street at a place where I would spend a lot of time.

So if I wasn't at the mall, if I was at home, I would make cold compresses with -- you know, put them in the freezer with a wet dish towel or a paper towel to stay cool.

And at night to help me fall asleep, I would prop my little leg up on the wall just because the wall was cooler than the ambient air temperature with in my room.

But you can cover your windows with drapes

and shades to keep the sun's rays out, wear light clothing, and drink lots of fluids to stay hydrated.

Some symptoms of heat-related illnesses such as heat stroke and heat exhaustion. So signs of heat stroke are body temperature which is above 103 degrees, red hot and dry skin with no sweat, dizziness, confusion, or unconsciousness.

And some signs of heat exhaustion include heavy sweating, muscle cramps, fast or weak pulse, dizziness, headache, fainting, nausea, vomiting, or confusion.

So if you or any of your loved ones experience any of these symptoms, ask for help and direct someone to take you out of the heat into a cool, shady area, lie down with your feet slightly elevated and sip chilled water. In the case of an emergency, please call 911.

With that, thank you so much for your time this morning. Please stay cool. Have a safe summer.

And now I'd like to welcome Neil Navin, who is our chief clean fuels officer at SoCalGas.

MR. NAVIN: All right. Thank you, Edith.

Well, I appreciate -- I appreciate

everyone coming this morning. Good morning. Thank you for joining the Planning Advisory Group today during our week of workshops on the scope of work.

I really want to acknowledge and thank you all for the gift of your time. We made some fairly strong commitments as part of the Angeles Link work to have a robust public engagement process, and you are part of that process, and it does require time, and we really appreciate the time you're devoting to that.

I also want to just acknowledge and thank you folks for a great last meeting. Again, a lot of healthy, respectful dialogue. We need that dialogue to make sure that we get a robust set of feedback on the work we're doing.

And I'd like to think that we can keep that going this week. I want to build on that momentum.

Today we're going to be talking about the scopes of work for many of the sites we're doing. We really need your help and insight to look at the materials you were provided, provide your thoughts so we can understand your perspective in this process. So, again, I want to thank you for your partnership.

We've got a fairly long day today. I will also say, though, that we are going to take a little break for those who are here in person to go see the hydrogen innovation experience at lunch and I look forward to taking you over there.

Thank you for those on the Zoom call and for dialing in. I hope that we have a robust and engaging dialogue today. So, again, thank you.

I know we have one more additional participant here in person, so I wanted to make sure he had a chance to introduce himself as well.

MR. PEDERSEN: Thank you, Neil. My name is Norman Pedersen for Southern California Generation Coalition.

MR. BRITT: Okay. Great.

So now we're going to get into our first session, which is the plan for applicable safety requirements and scope discussion.

I'm going to introduce Amy Kitson, who is the Angeles Link Director of Engineering and Technology.

MS. KITSON: Thank you, Chester. I just wanted to briefly introduce myself a little further, since it's been a while since I talked in front of you, I think the Q1 meeting. And then

I'll pass it over to Katrina.

And we will be doing these studies -- we work as a team together. So as we work in these, you'll hear from both of us and continually on throughout the year as we go through these studies together.

So originally I'm from Michigan. I went to Michigan State University. I started in utilities around 20 years ago, it's hard to believe. I started at the consumer's energy commission of Michigan. Then I moved to Southern California and worked at SoCalGas for almost 18 years now.

I've worked for many groups within the company, integrity management, engineering, field operations, and now I've circled my way into the clean energy group, specifically on Angeles Link and hydrogen.

So I look forward to working with you all and hearing your feedback today. So I'll hand it over to Katrina and we'll dive right in.

MS. REGAN: Thank you, Amy.

So I'm excited to talk to you today. I'm Katrina Regan. I'm the engineering and technology development manager. And as Amy said, we will be

working very closely on all these studies, so you'll hear from both of us today.

I'm originally from the northeast. I came out here for college. I have a civil engineering degree from Loyola Marymount University. And then I also have an MBA in IT in finance as well as a graduate certification in renewable energy engineering.

I've been with SoCalGas for about 12 years in a variety of different departments. I started with engineering. I spent some time out in the field, though, with gas ops distribution working on emissions abatement solutions, and then also in gas control and system planning before I came over to the CEO side.

So I'm excited to talk to you today. Thank you.

MS. KITSON: All right. So you're going to hear from us three times in a row here, since our studies are the first three up today, starting -- kicking it off with safety.

So I think a number of you have worked -- or been a part of SoCalGas, and you know that safety is one of our core values at our company, so this study is near and dear to all of our hearts,

and we pose safety to our employees, contractors, systems, and our public as the most foundational aspect of our business.

So the objective of this study essentially is to evaluate the safety requirements involved in pipeline transmission, storage, and transportation of hydrogen and assessing those applicable safety requirements for both our employees, our contractors, system, and public safety. So very similar to how we go about our business on the natural gas side of the business.

We -- so are there any questions there on the objective before we dive into what each section is?

(No response.)

MS. KITSON: Okay.

So for the safety considerations, we are going to characterize the physical and chemical properties of hydrogen, the impact and safety of our gas transmission system.

So really, what that is is we have a lot of experience, as we discussed, on the natural gas side. So now what we're doing for this study is translating that now into the hydrogen side of the business.

We wanted to identify the key safety risks and potential mitigations using industry standards as well as other history companies have around the country with hydrogen. This is not the first time hydrogen pipelines have been used. There's over 1,600 miles of hydrogen pipelines across the nation.

So this is something that is very established and we think that we can learn from as a company as we move forward into this venture.

We also want to identify and apply both key safety codes and standards both used in the U.S. and then globally. So that's the first section.

And then the second section is we'll be diving into our specifications, gas standards, and protocols. So we're looking at a lot of the industry best practices, as I stated, and other protocols, as well as internal -- our internal gas standards and specifications, what we might need to modify that we already have existing and what we might need to establish as new procedures for our field operations and engineering people.

And then finally we have the employee, contractor, system, and public safety section. So

we're identifying organizations that undertake hydrogen safety training. We've already undergone this at the start, to do this.

We brought in WHA to educate our Angeles Link team, and then we are -- our plan's in August for our entire leadership team across the company, and then we're continuing to explore other certifications and other safety training that we can bring into the company for both our field employees and our management employees.

In addition to that, we have operator qualifications that many of us are familiar with for our field employees, and we are looking at what that needs to change or what needs to change there as well.

And then finally we're identifying the public safety concerns and develop public safety awareness plans, including outreach to our local first responders. This is, again, very similar to what we do today on our national gas side of our business.

So at a high level, those are our three kind of core areas that we are looking at in our study.

And then next slide.

And then this is the description work. This is really where we want all of your feedback as we go through these. And I think this is where you, in your packets, you'll have, like, a breakdown of each one of these.

So as Chester said and Neil said, you know, I can open it up now to questions and comments, and we really want, you know, any thoughts you have on our approach and what we're planning to cover. And then if there's questions or comments, we're opening up the floor to you now.

MR. BRITT: All right. Thanks, Amy.

So before we get into the actual comments or questions, let me just give you a little bit of context here.

Again, we would remind you to announce your name, if you're making a comment, for our court reporter to record it.

Please be concise and focused on the discussion topics at hand. We will have a chance to get through all the different discussion topics today, but we want to take one at a time, make sure our discussions are focused on those topics.

We want to get into a dialogue with you about what's going to -- about these topic matters.

This is a workshop. We're envisioning it that we're going to roll up our sleeves and, you know, get into a dialogue about some of these issues so we can take some of that comment -- those comments that you're giving us and make sure that those are incorporated into the process.

Verbal comments, just as a reminder, are not the only way to provide input. Feel free to type in chat.

You will also have the opportunity to continue to weigh in on these subject matters through the end of this month. That's the timeline that's been established for comments on these scopes of work.

So we would, again, give you that opportunity to think it through and provide those additional comments if you have any.

We are accepting input after this meeting, so if we run short on time or if you think of things later, you know, now's not your only opportunity to make comments.

So we'll go back to that slide that Amy was referring to and then open it up to anyone that has any thoughts or comments about this subject matter.

All right. I know it's early, but it's not that early.

So let's dive into some of the things that Amy mentioned.

So she mentioned that the work studies are going to look at safety concerns involved in pipeline transmission, storage, and transportation of hydrogen as well as safety requirements for employees, contractors, systems, and public safety. So there's a lot to unpack in that; obviously, looking at transmission storage and transportation.

Are there any thoughts related to those three things, in terms of looking into those things regarding safety? All right.

MR. PEDERSEN: Norman Pedersen.

MR. BRITT: Please turn your microphone on and ask the question, Norm Pedersen.

MR. PEDERSEN: Amy just mentioned the possible parallels to the natural gas side. Some of us have been very involved for years now on the pipeline safety enhancement plan and also with the DOT PHMSA regulations. And all of that is basically forensic in nature, looking backwards.

Here we have an entirely new system that is going to be started from scratch.

And so I'm wondering if Amy and Katrina can go through some of the safety concerns that are unique to building an entirely new system where we're not going to be engaged in forensic work. We're going to be trying to design a state-of-the-art system that will be safe going forward.

MS. KITSON: That's a great question, Norm. Can you hear me okay? I'll just speak into it.

That's a great question, Norm.

So I think one of -- I'll give you a couple examples that we're looking at. And, again, this will come to more fruition as we continue with the studies and get the results this year.

But to your point, we're now able to design a pipeline system with a lot of these integrity management systems in mind ahead of time. Such things as how do we ensure this is to the right maintenance standards that we need to put forth to monitor this pipeline moving forward for the safety of the public.

Number 2, we're able to look at the different materials and welding practices that are looked for. Like I said, this is not the first

rodeo for hydrogen pipelines. There are a lot of them around the country, both here and Europe.

And then secondly, we are part of several research groups, such as PRCI and others, where their -- almost their whole research, I guess, schedule this year is really about hydrogen.

So that's another thing that we're a part of, both from looking forward on materials as well as if there's any opportunities to repurpose existing facilities or the pipelines.

But it's a great, great opportunity for the gas company to take all these things that we've learned, like you said, from the years of operating and put it forth in building our new system. So I look at it as a very positive step for us.

MR. BRITT: Thank you, Norm, for your question.

We have a couple who have chatted questions in, and I'm going to read off a couple of them.

First is Katrina Fritz. She wrote, "Has the Center for Hydrogen Safety through I- -- AICHE been engaged in Angeles Link?"

MS. REGAN: So we do work closely with the Center for Hydrogen Safety both -- definitely on

our blending side and our RD&D.

For this study, the safety study, as we progress and we have additional content, we'll be reaching out to them to act in a third-party reviewer role so that they can give us additional advisement and we are approached and the study itself once it's developed.

MR. BRITT: All right. And Miles Heller asked, "What is the difference between transmission and transportation?"

MS. KITSON: So transportation -- so I'll start with transmission.

So our transportation -- transmission is similar to our gas -- natural gas. They are large pipelines that transport the gas across our system in our neighborhoods.

Transportation is essentially both. So the transmission system and the distribution. So it's basically taking the system as a whole and how we're going to transport it either from -- you know, from our production sites that we'll hear later from Yuri.

MR. BRITT: All right. We also have a comment -- or question from Sam Cao that says, "Can we specifically discuss safety for the case if

hydrogen is blended into existing natural gas pipeline?"

MS. KITSON: So for the Angeles Link system, we're looking at only 100 percent hydrogen pipelines, so this study is based specifically around pure hydrogen, green hydrogen for this, not blended.

MR. BRITT: All right. I don't see any other questions.

Amy, was there another one that has his hand raised?

MS. KITSON: Sal has one.

MR. BRITT: I see you now, Arthur. Sorry about that. So go ahead now and ask her a question.

MR. FISHER: Yes. Just to follow up on that, some of the alternatives have been suggested, that should be examined and certainly at the last meeting, were including assessment of, blending and separation and then also repurposing.

So you're going to narrowly define what safety aspects you're looking at to the only alternative you want to look at, which is a pure hydrogen pipeline, while in the environmental review, you're going to look at three different

potential alternatives.

That doesn't kind of marry-up, as far as I'm concerned. Safety is going to come before environmental, but safety has to cover all three alternatives that have been requested.

So those alternatives are blending, hub and pure hydrogen pipeline -- I'm sorry, and repurposing of pipelines.

So how are you going to --

MS. KITSON: I didn't understand all of that question.

MR. NAVIN: I'll jump in here. This is Neil Navin, it was a little hard to hear you.

MR. FISHER: Okay. I'll speak slower and closer to the mic now.

MR. NAVIN: No. It's okay. Your question was actually a very good one.

So we did have in our last session a suggestion that as part of our alternative analysis, that we needed to look at the opportunity to blend hydrogen to move hydrogen instead of building a purpose-built new pipeline.

And so I do think we do need to consider how we would include that in our safety work, so thank you for that.

I will suggest that there is a whole other work stream involved, Arthur, that is actually looking at blending and blending safety as part of a separate application in front of the CPUC.

So we might need to figure out how those two elements work together to make sure we cover the safety -- the safety studies necessary for Angeles Link and for the various alternatives that fall out of them.

MR. FISHER: Yeah. Just to kind of circle on this, with the CPUC, there will be an expectation to have an alternative. So I wouldn't want to be in the position where you haven't looked at all the safety things necessary to be involved in the CPUC.

MR. NAVIN: Yeah, it's a great question because we need to make sure how safety in the blended options are explored. So thank you.

MS. KITSON: That's a great point. And to Neil's point --

MR. NAVIN: I would say, also, blended and repurposed, so I think that was another element as well.

MS. KITSON: That's a great point because we are undertaking that evaluation on the blending

side, as Neil's saying. It's kind of separate from this. So we'll look at ways to incorporate. That's a great point.

MR. NAVIN: Yeah, Arthur, we're having trouble hearing you. Could you --

MR. FISHER: So I'm just wanting you to clarify the blending application before the PUC or blending proceeding before the PUC, is that the alternative bio method PUC that we're --

MR. NAVIN: Yes, that is correct.

MR. FISHER: Okay. I just wanted to check.

MR. BRITT: Tim, did you have a question?

MR. DEMOSS: No.

MS. KITSON: Sal.

MR. BRITT: Oh. I thought you were pointing at Tim. You were pointing at the mic.

MR. DICOSTANZO: I have a quick question before I ask my follow-up question.

The term "repurposed," can you elaborate on what that means exactly?

MS. KITSON: Yeah. I can go.

What that means is we're looking at -- it means two things for us: It means repurposing our right-of-ways for our lines, and it can also mean

repurposing the natural gas pipelines themselves, so it could mean both things for us.

MR. DICOSTANZO: So my question is to the top bullet point right there, the hydrogen public awareness plans.

In a workplace like ours, at the Port of L.A. and Long Beach, our local communities are hyperfocused on what takes place there because it's a -- you know, it's a very large facility and it's omnipresent; right?

So I'm assuming that we're going to get into the safety training, operator qualifications.

I would like to also -- to ask how that's going to bleed across industries.

So, for example, you have your pipeline operators, your folks that do what Ernie's folks do, but then at some point, you have to pass that off to our folks in the port where we are obviously not manufacturing or producing any of this, but we're putting it where it needs to go; right?

So how will we -- will we have access to the training and the skill set that you folks are developing as we go, Number 1?

And more importantly, how do we get -- what specific strategies do you intend to deploy to

gain the trust of the public? Because really, without that, we're going to have a really -- Tim, am I wrong?

MR. DEMOSS: No. No.

MR. DICOSTANZO: We're going to have a really heavy lift for the amount of demand that we're going to have there and the steady supply that's going to be needed there. So that's my question.

MS. KITSON: Yeah. It's a great question. I'll tell you our plan and you let me know if you have any feedback to that.

So I'll start with how we can work together or, you know, kind of communicate our approach.

So I'll touch a little bit on this when we get to the workforce as well, but we are already starting to work with AltaSea and other community colleges and others to help formulate their curriculum for hydrogen training both from -- and we're looking for input from our human resources group as well, as far as our technical group, to help inform those, because that will help get the word out to our local communities.

And then secondly, from our public

awareness perspective, what we do currently already and what we plan to translate into this hydrogen is both we meet with local community officials, first responders, as I mentioned, and large end-use customers, we're very used to, you know, having relationships with, as far as our natural gas -- our large commercial, industrial, and other customers.

So I can see that continuing on with this hydrogen rollout.

And then we do have public awareness plans currently with our -- outreach for call before you dig and other things, that we have targeted programs that we're used to rolling out, and I would think that we would identify similar programs for hydrogen for those.

So I think those are examples that we're planning on incorporating in this. And if there's anything that you can see missing or would have comments on, I would be open to your feedback.

MR. DEMOSS: Tim Demoss with the Port of L.A.

Yeah. I just want to kind of make a comment to add on to what Sal just brought up. We went out before we joined on with ARCHES -- we went

out into the community to maybe six, seven meetings to talk a little bit about hydrogen, and on some level, it was well received, and on other levels, they had their concerns, and safety was a big one.

It was mainly about leaks in the pipes around the ports, and everybody's afraid there's going to be explosions and stuff like that. So this is a really important subject.

And the quicker we get it out to the community to talk about this and educate them, the better.

MS. KITSON: That's great feedback.

MR. BRITT: Sal has another question.

MR. DICOSTANZO: Just a quick follow-up. I know we're playing tag team here, but I think the longer you talk to our community about this and the more transparent that you are, the more traction you're going to get.

I would honestly start now instead of wait until, "Let's wait until we get this." You're going to have to bet on it a little bit and make an investment because you won't be able to make up for time.

When you're studying for a test, if you consider the night before, yeah, you may or may not

make it, but if you study a little bit over time, you have a lot better chance. So that's Number 1.

And Number 2, could we have that same connection at the union with the -- that AltaSea has and that these other folks have, because they have a -- in collaboration with the folks at both ports, we have a workforce training campus that is in the design phase currently and hopefully soon it will be built and all that.

So we have our own curriculum projects that we're working on, and we would love to gain from your expertise.

MS. KITSON: That would be great, Sal. Before we leave today, let's -- yeah.

MR. BRITT: Ernest? Ernie?

MR. PEDERSEN: Norman Pedersen.

Amy, people from the port are seeming to sense that there's a significant -- Norman Pedersen.

They seem to be seeing a significant difference between the safety of natural gas pipelines, which are very familiar, and the safety of H2 pipelines. These are going to be H2 pipelines.

We won't use the old service lines,

regulators and meters. We will have new service lines, regulators and meters that will be carrying pure hydrogen.

You've looked at existing H2 pipelines, so what would you say are the significant differences, if any, between natural gas lines and H2 pipelines?

MS. KITSON: Thank you, Norm. So I will answer with what we know today. Again, this is something we're starting to study at the end of this month and August, and I'm sure we're going to learn a lot more as we go.

But a couple things is hydrogen is different than natural gas, but it's not, you know, more dangerous or -- it's just how we handle it and how we go about and transport it. It might be a little bit different, but it doesn't mean that it's any more dangerous or -- in that way than natural gas.

Hydrogen is an energy-dense material that is no more or less dangerous than other energy services, including natural gas or gasoline. Hydrogen has been used safely in the industry for over 100 years.

So, again, this is not the first time that it has been used. It is nontoxic, nonpoisonous,

and defuses rapidly, which actually makes it safer than natural gas and other fuels.

So those are a couple examples that we have.

I don't know if you want to add any others, Katrina, but that's good examples.

MR. BRITT: Ernie?

MR. SHAW: Ernie Shaw. Yep. Ernie Shaw, Local 43. I just kind of want to tag on to our brothers from the port and Sal here.

Could we expand that public awareness, you know, not just to talk with, like, city council, town halls and all that and helping everybody be aware of what, you know, hydrogen is and gas is, but also municipalities, third parties, Caltrans.

We noticed on our side with transmission that there's a lot of just unknown with them. They're not aware of what's underground or even, like, what's around in signs and stuff like that, and maybe they just don't realize the extremities of it. And it's not until we educate them.

We would stop the job, of course. We would stop the job in place, shut down the job, and we kind of educate them and say, "Hey, before you continue, you need to have 811 tickets," stuff like

that.

Or even, like, the fire department. They're not aware of what's going on, and they may just assume something's dangerous.

I know recently they broke into one of our overpressurization boxes, right, on Figueroa, and we kind of had to let them know that's just natural for that to occur and stuff like that.

So I guess what I was trying to say is just, yeah, if you could expand that public awareness not just to the public, but to everyone else as well, municipalities, third parties, contractors, et cetera, et cetera.

MR. BRITT: Good input.

Do we have anyone else that has their hand raised.

(No response.)

MR. BRITT: It doesn't look like we do.

To just close us out, Amy, you mentioned mitigation measures. Can you give us some examples of what types of mitigation measures might be considered?

MS. KITSON: Yeah. A couple examples.

So one thing we do with our current transmission lines -- most people know. I'll start

large and then we'll go slow.

So with our transmission lines, we currently put tools within our pipelines to take measurements and look for any corrosion or other things that need repairs.

So those are some things -- to hydrogen, to Norm's point, is different.

So one of the threats in a hydrogen pipeline is cracking, which also could be in a natural gas pipeline, but this tends to be, like, a higher threat.

So we want to make sure that we design this pipeline, that we could have a crack pig go through this pipeline, for example, that needs a certain diameter, things we could get ahead of to make sure that that's possible.

Another thing is our -- it's a little bit smaller now, but from a distribution perspective, we want to put plans in place, to Ernie's point, to keep the public safe and educate and make sure that we're getting ahead of either -- like, we're going to look at things like: Are there any certain codings or welding or materials that are better and then what are the maintenance practices associated with those that could be different, as well as, you

know, leak surveys and things like that. We'll put into place to see if it's any different than what we do today. Does it need to be more often or less, or what does that look like? So those are some examples.

MR. BRITT: Great. Okay.

I think we're right on schedule, so we're going to go now to our next topic, which is workforce planning and training evaluation. So we'll go ahead and turn it back over to Amy.

Before we do, we did get a last-minute hand raise.

Arthur, I think you raised your hand again.

MR. FISHER: Yeah. Just one final comment. We've actually been going -- I've actually been going through the project alternatives again to double-check, and carbon capture, so that means carbon dioxide transportation, which means -- which has their own set of risks.

MS. KITSON: Right.

MR. FISHER: So if you're going to scope this, I think you need to look at that as well. I'll leave it at that.

MS. KITSON: Thank you, Arthur.

I have a few people in the room who will be interested in this one.

So the next one we're -- the next study we're going to talk about today is our workforce planning, training, and evaluation scope.

So I think this is another example, along with safety, where SoCalGas brings a lot to the table when we're talking about hydrogen pipelines.

We have a strong existing workforce, over 8,000 management and union who have an extensive operation background that we're already bringing to the table, but we obviously need to train them differently, to Norm's point, as to what hydrogen is.

This current study is going to assess our current workforce and internal training standards compared to what potential future potential workforce and training is needed to strategically build, transfer, and transition workforce to maintain and operate the infrastructure.

That's the objective of this study. I can go into the details next, unless there's any questions on that part.

(No response.)

MS. KITSON: Go to the next slide.

MR. BRITT: Norm?

MS. KITSON: Oh. Sorry.

MR. PEDERSEN: Norman Pedersen, SCGC.

Regarding this and also regarding the last topic we just discussed, the Department of Transportation's PHMSA has a very well-developed regulation, 49CR.192, principally on natural gas pipelines.

What does PHMSA have so far with regulatory structure for safety? Anything along that line for hydrogen pipelines?

MS. KITSON: That's a good question, Norm.

So that's also, again, one of the things that we will be looking at in this study.

But what I know today is that PHMSA -- we are working closely with PHMSA to -- that's something on the top of their mind; right? We know that there's a lot of money going out to start putting in a lot of the hydrogen infrastructure nationwide, and that is something that they're definitely working at, and we're part of that discussion.

And in lieu of the federal regulations, we're looking at what industry best practices, what

other regulations or protocols might be available, even in Europe or other places, as well as the United States.

So things like ASME B31A.12, .12, things like that. We're looking at what is out there in lieu of the federal regulations in partnership and working with them to have to, whether it be PHMSA or FERC. I think that's still up in the air as far as where those regulations will stem from the federal government.

MR. PEDERSEN: Well, for safety, I think it will be PHMSA, not the FERC, for natural gas pipelines.

And I guess the bottom line that I'm getting from what you just said, you have to be looking at the PHMSA regulations, and PHMSA has not promulgated the regulations, so they're still forthcoming for hydrogen pipelines.

Even though we do have hydrogen pipelines in the nation, primarily around the Gulf Coast, for example, they have not yet promulgated a set of regulations; is that right?

MS. KITSON: Yeah, not that I'm aware of.

MR. BRITT: You're going to go through the rest of your presentation and then we'll --

MS. KITSON: Yeah. All right. So I'm going to dive into a couple of these different areas that we're going to look in, and then obviously if there's questions as I go, raise your hand. Otherwise, we won't stop.

So we are -- the operation and maintenance protocols, I think we've touched on this several times.

So we're going to be reviewing guidance, to your point, Norm, from PHMSA that may pertain to natural gas, and then we will marry that with what is available from the best practice perspective with hydrogen.

We are going to look at DOT and other construction qualification protocols. Again, we're doing what we can when it comes to hydrogen, but I think there's a lot of things that we can continue on from our natural gas economy. And then there are best practices like ASME and API that we can incorporate.

We're looking at the timeline for workforce staging, so I think that's to Sal's point, and Ernie, when do we need to start educating, and what is the timeline looking for, when we need to start incorporating them into our

workforce and the company?

And this is an area where we're currently -- and we're open to working with more, but this is just where we've started. LA Urban League, AltaSea, Advanced Academy, AQMD. We're working with as many people as are open to collaborate with us on this, because this is a common thread to get this going.

And again, we're working with a lot of these organizations to support curriculum, guest speakers, tours. However the various organizations need us, we've offered help in various different ways.

And then we are going to be looking at -- I think this got brought up again -- comparison to existing SoCalGas facilities, how will these be used as a basis for applicability for hydrogen facilities and if there's any modification required with our existing facilities as well as, obviously, putting out some new facilities as well.

And then accredited training and operational qualifications.

So we're looking at, like I said before, bringing in accreditations for our company and different training opportunities for both our

employees, and then to Ernie's point, the public; right? Because our employees are our best advocates as well.

So if our employees are trained in hydrogen, they can help us with a lot of those communications to the customers as well.

And then the risk management piece is really looking at all those things I talked about and what changes and kind of timing them, when those need to go and when those need to go first, training, materials, procedures, things like that.

That's the overall, you know, approach to this study, and then obviously I'll open it up to questions and comments if there's anything you think we might have missed or you think we need to elaborate more on.

MR. BRITT: All right. Any questions or thoughts on this subject, workforce planning and training?

MR. NAVIN: Chester, this is Neil. Maybe if I could just step in here. I do think, maybe to a comment that Sal made earlier of training, you know, I would say that our initial focus for work was training required for the Angeles Link structure construction and operation.

I do think we need to understand how we -- how we can go beyond that during Phase 1 and at least describe those areas of our training to take place for end users, for instance. We're talking about the end use of the boards and those places.

I just want to make sure that we put out there that we will look at that.

I don't know how much effort we'll be able to undertake in Phase 1, but that may be something where we describe what the problem is and what needs to take place and then the size of the problem and the size of the challenge.

But the work itself, to define what workforce training needed to take place for end use at ports gets described in Phase 1 and solved in Phase 2.

I just want to make sure we are really clear about that, and some of the feedback that we're going to get during this process is going to point towards work that needs to take place.

Given this breadth of the work that would take place for that kind of designing and training program for that, I just want to be really forthcoming that we'll note it as something that needs to take place. We'll try to figure out how

much we can tackle in Phase 1, how much takes place in Phase 2.

MR. BRITT: Thanks, Neil.

Ernie?

Yes. I see your -- that was a thing we developed at our last meeting. People stand up, their name card.

MR. SHAW: All right. I'll speak loud enough so the wonderful court reporter can hear me.

Once again, everybody. Ernie Shaw with the Local 43. So I'm going to sound like a broken record when we talk about stuff like this and maybe try to fill in the blanks for everybody who may not know or ask questions and just kind of put it out there for comment.

But I see all this description of work and, you know, protocols and operations protocols and staging timelines and all this stuff on here.

I mean, when I hear kind of the comments that everybody's saying, it's crazy because, like, we already -- man, we already do all this already as it is, so it's kind of like have everybody's minds at ease.

You know, even though we're jumping into something new with hydrogen, kind of unknown,

training and everything, already from transition, we're already doing this on a daily basis for years and years and years. We're just dealing with a different kind of gas.

So, like, in terms of, you know, training and stuff like that with our brothers at the ports and the longshoremen and everybody else, if there's a way that we can definitely translate and communicate our processes and/or training or any other way that we can work together to kind of bridge the gap on that, we will, because we already do it, and we're seeing as we are doing it, no incidents, accidents, you know, thankfully.

We do enough welding, arc welding, low-hydrogen welding. We're constantly qualifying on that every six months and operator qualifying on that.

Pigging, we do that successfully. I mean, hot and cold climates -- we do that successfully every month, sometimes every week. It just depends.

Planning, the patrolling of the pipelines, the surveying. I mean, we do that quarterly, semiannually. We do enough of it so that if anything happens, we're aware of it and we jump on

it right away. That way nobody -- the public or nobody gets hurt and nobody's affected by it.

So you don't hear nothing about us because that's how good we are. I'm not trying to be rash or anything, but it's like the CIA. You don't hear about our successes, but you hear about our failures, and thankfully we don't have any failures to date, I should say.

So I just want to make a comment on that, that to kind of feel safer for our public and everything else, we do enough of it as it is every day to where you just don't hear about it.

And going into this, it will just be like waking up on Tuesday morning, let's go. So we're ready to go to work and help everybody out.

Oh. And we also do mentoring, our own mentoring internally. So, you know, anybody that comes in to transition to storage, I mean, we get them ahead of the game, mentor each other, shadow each other, to where it's just like waking up and going to work.

So anything we can do to communicate that or mentor or spread that message to everybody, or training, I mean, we're open to working together to do that, so -- that way we're all on the same page

and on the same boat. Thank you.

MR. BRITT: Thank you, Ernie.

Yes. Norman?

MR. PEDERSEN: I actually have a question, I think, for Ernie.

MR. SHAW: Ernie Shaw. All right.

MS. KITSON: Good collaboration.

MR. PEDERSEN: When you do your training, how much reference is there to regulations or industry standards, published industry standards?

On the natural gas side, we have, what, the National Society of Mechanical Standards. We've had them for decades.

So how much of those standards play -- the existence of those standards and the rest of those standards tie in with the kind of training that, at the working level, you do?

MR. SHAW: Ernie Shaw. Thank you, Norman. That's a great question. That's a mouthful, so I'm going to try to, like, dumb that down to my level where I understand it.

So the way I interpret that question is -- so in any of those industry standards or training or stuff like that, you know -- so I think one thing that came up was, like, PHMSA is like the

mega rule. I think that came out recently, and that responsibility -- man, this microphone sucks.

That responsibility -- I laid that upon myself to kind of go out, outreach with the company, work together to kind of know what's going on with those industry standards or anything coming up and help communicate that to, you know, our members.

That way they're aware of it and, you know, we'll have, like, a safety stand-down or weekly meetings or monthly safety meetings, things of that nature, to be up-to-date with the latest and greatest and that way we don't miss a beat. So we actively work together.

Oh. And we also have, like, a bimonthly meeting with our directors, you know, for transmission and storage with the BP.

So us with our local union, right, myself, my treasurer, my VP, and with the senior leadership in the company, and these things that arise, we, you know, work together to be able to translate that and, sorry, communicate that to the membership so everybody stays up-to-date and nobody skips or misses a beat, because that's one thing we don't want, is something coming up, nobody knows what's

going on, and then being caught late to the party.

I don't know if that answers your question.

MR. PEDERSEN: No. It absolutely does. Thank you very much.

MR. SHAW: No problem.

MR. BRITT: Thank you.

Anyone else online or --

Okay. You can chat in a comment if you have any, if you're online.

I know we have a lot of folks online that have a lot of experience, Arun, Charlie, Rashad. I would encourage you guys to ask questions, if you have any.

Others, Katrina -- I know there's a lot of folks -- I'm not mentioning everyone, but please feel free to ask a question or make a comment.

Amy, maybe you can expand a little bit more --

Okay. Did we get someone? Okay. Katrina. There you go. Okay. Katrina, please unmute your microphone.

MS. FRITZ: Hi. So I really like what I'm hearing from port, union, everybody. There is a lot of synergy to be had here.

For example, the NFPA has standards already, and a lot of it's based on the current mobile refueling network; right?

So a lot of local officials have already been trained, hydrogen, hydrogen safety protocols, because of the fact that they have hydrogen refueling in their community.

So it's another area where we have something that can be customized to this that already exists.

And I'm wondering if you end up forming some kind of subcommittee on this topic. The California Hydrogen Business Council would be very happy to participate.

We also have on our staff one of the international experts in safety codes and standards. She's been working on the -- she's chairing the new carbon intensity international group that's working on the carbon intensity standards that would be applied to any of the DOE projects. So if this would become part of the hydrogen hub, that would be important to Angeles Link as well.

So those are some initial comments I had as well, but I am very happy to hear this

conversation.

And I also agree that the community outreach needs to come now, not later. And that is based on numerous examples of hydrogen projects being installed in California previously. That is really where they tripped up, was doing that outreach when they were already beyond the planning stage, in the approval stages. Thank you.

MR. BRITT: Thank you.

MS. KITSON: It's great feedback. Thank you.

MR. BRITT: I think we might have had another person join us too, Rodney Cobos. I will give an opportunity to you to unmute your microphone.

And then Tyson, we'll go to you after that.

So Rodney, if you want to unmute yourself, and you can introduce yourself.

(No response.)

MR. BRITT: Going once -- all right.

We'll go to Tyson. Then we'll come back to Rodney if he's available.

Go ahead, Tyson. Unmute yourself and ask your question.

MR. SIEGELE: Hi. Yes. I'm Tyson Siegele with the Utility and Consumers Action Network.

So there are a couple of different things that I wanted to cover. I think the first one is an overall question of topics and when we're going to cover different things.

One of the pieces of safety is NOx emissions, but I think that is going to be covered in a different area; is that correct?

MS. KITSON: Yes. No emissions. That is on Thursday. That will be a full study on Thursday on that one.

MR. SIEGELE: Great. Great. Okay.

And then in terms of current safety, when we're taking a look at how to deal with hydrogen safely versus natural gas safely, one of the things, Amy, I think you mentioned was that there's not -- they're different, but they're not necessarily one being more dangerous than the other.

So with that, one of the things that I think would be good to talk about is where SoCalGas has had issues so far with natural gas and the changes that SoCalGas has made with natural gas safety to address those issues.

And so I'll just name a couple of safety issues that have occurred over the years and are being reviewed at some point still.

One clearly, Aliso Canyon, we've all heard about Aliso Canyon many times at this point. Lots of work has been done around Aliso Canyon.

At this point, also, it's not -- it hasn't been shut down, but Aliso Canyon is mentioned in the document that was released on work as, you know, something that is going to be included in the scope of -- you know, how soon can that be shut down, how does that affect -- how does the work on hydrogen affect -- affect the timeline for that?

So I guess, Number 1, safety issues related to natural gas with Aliso.

Number 2 is I think that there was a study on the Line 235 rupture that occurred and that there was a root cause analysis that was done on that.

One of the things that would probably be interesting and helpful in terms of taking a look at safety with hydrogen is to take a look at things like that, at the cause of Line 235's rupture and what happened there and then, you know, the steps that SoCalGas took after that happened.

Will SoCalGas be willing to go ahead and release the root cause analysis of that rupture, the Line 235 rupture, so that we could take a look at that in conjunction with safety with hydrogen going forward?

So I guess those were the two main things, Aliso Canyon and safety and then Line 235 and safety.

MR. BRITT: So thank you, Tyson, for your input.

And Amy, are there lessons to be learned from other incidents that occurred with natural gas lines in relation to hydrogen, and how would you make that correlation?

MS. KITSON: Yeah. I'm glad you brought that up, Tyson. It was something that I was remiss in mentioning.

That is something that we will be looking at as part of the safety study, specifically even hydrogen incidents that have happened and lessons learned from that and what safety mitigations have been put in place as a result of those incidents, and they are out there and available.

So that is something that we will be looking at.

And then I think I also mentioned during Norm's question is definitely things that we have learned over the years at SoCalGas to enhance the safety of our system is absolutely something that we will look at as part of this project.

We've been in service and operation for over 150 years, and we've learned a lot over that time, and we will continue to, as we design this new system, take all that into consideration.

MR. BRITT: Great.

Sal, please.

MR. DICOSTANZO: Yeah. Sal DiCostanzo.

We're operating under the assumption that this pipeline is going to go through, and it must go through. It is beyond a doubt that there is not enough electricity, there is not going to be enough electricity to do all the things that we want to do in a clean way.

We must have hydrogen as a source of power, storable, renewable power in the port and beyond, whether it's cement production or steel or -- all the different uses of which you folks are probably much better versed than I am.

But it is folly to think that we are going to be able to meet consumer demand for the products

that are on board the ships that come in and out of our port and that traverse our railways and our freeways and our store shelves or front porches now, right, if we don't have abundant sources of power from a variety of places.

I'd like you to just go back for a minute to the demand shock that we experienced in March 2020.

Close your eyes for a minute and picture walking through the store, any grocery store, and seeing empty shelves, shelf upon shelf, aisle upon aisle.

This is not a joke. We have to get this done, and we have to get it done in a way that's safe, that's equitable, and that is reliable.

So please, let's keep the focus on how we move forward and not how we stop this. If that's the goal, then this is not the right forum for you. Thank you.

MR. BRITT: Thank you.

It looks like we have had another person join us. Joon, if you are online, if you joined us, if you could unmute your microphone and introduce yourself, that would be great.

And then Rashad, I see.

MR. SEONG: Yeah. Can you hear me?

MR. BRITT: Yeah.

MR. SEONG: My name is Joon Hun Seong. I am with the Environmental Defense Fund. I am here as alternative for Michael Colbert [phonetic], who was not able to attend today.

MR. BRITT: Okay. Well, thanks for joining us.

Rashad, if you could unmute your microphone, you can make your comment.

MR. RUCKER-TRAPP: Yes. Thank you.

I definitely want to agree with the last speaker. You know, we definitely have to advance ourselves as technology is advancing and find what's most important, what is affordable for our communities.

And so I do hope that -- I definitely appreciate the conversation that is happening and appreciate being a part of this.

And I'm looking forward to the outreach part and how we educate our community about this project, the supportability, the importance of it and the safety of it as well.

I do look forward to seeing the results from previous projects that have happened, that

we've learned from and everything.

But I definitely want to keep the focus on going forward, not stopping the progress that is currently happening.

MR. BRITT: Great input, Rashad. Thank you.

Arun Raju, unmute your microphone.

MR. RAJU: Hi. I have a suggestion and a comment.

So the suggestion was if -- you know, I am not sure to what extent the local or regional community college districts are engaged in this process.

I think it would be a very good idea to keep them in the loop and keep them aware of these plans to related to workforce because they provide a -- they contribute to this process, especially for the training programs.

And there are some networks happening, so it would be good to leverage this also.

And as a request, I would like to see more details on the specific protocols, training programs, and all of the other items that we can see if there's overlap to existing processes.

MR. BRITT: Do you want to --

MS. KITSON: Yeah. I had a little trouble hearing.

MR. BRITT: I was having trouble hearing as well.

Raju, would you --

MR. NAVIN: I think I heard. Thank you, Raju.

I do think, to your point, we need to look at the opportunity that exists within the community college system to perform training.

So there are -- as a number of folks have mentioned so far, there are a number of entities that provide training. There are apprenticeship programs within the represented workforce and unions.

So we'll need to, I think, catalog all of the potential opportunities to try and make sure that we have an understanding of who's available, who wants to be part of training this new workforce, and the best way to both train the individuals that are directly engaged in the energy infrastructure and those that are managed by the energy structure -- infrastructure -- so, again, those folks would be end users as an example.

So I think, as Katrina mentioned, we

already have significant hydrogen infrastructure in the state today by way of pipelines, production facilities, and at least we do have hydrogen filling stations.

And so there are existing avenues to train, and that's got to include looking at our existing avenues within specific companies like SoCalGas, for instance, that have a trained workforce that we need to simply add to the training to include hydrogen.

MR. BRITT: Thank you, Neil.

Miles, you provided a chat. You asked, "What is the source of hydrogen for Angeles Link? Is it derived from electricity sourced in California?"

You might have looked at our agenda and noticed that we are going to be having presentations on both of those subjects this afternoon, both on production and demand.

So we would encourage you to stay focused on those, and we'll have a presentation, which hopefully will answer those questions.

All right. Does anybody have their -- Ernie and then Norm.

MR. SHAW: Oh, wait. Norm, are you good?

All right.

MR. PEDERSEN: You're all right.

MR. SHAW: Ernie Shaw, 43, Local 43.

Once again, broken record here. So I want to make a comment to you, Mr. Tyson Siegele. You always keep me entertained, man. Everything you say is very informative, man. I like to think I learn a lot, so thank you, once again, for everything.

But you mentioned, you know, Aliso Canyon and, you know, the Line 235 rupture and all that, you know, and I'm just going to say it; right? It happened; right? Yeah. It happened. Everything happens for a reason. Nobody's perfect. We're not perfect. I say we are, and that's not perfect in itself, so -- but we learn as we go; right?

For every situation -- for every action, there's a reaction, and we get better from that so that way it does not happen again, ever. Because, you know, in our business, lives are at stake.

So I want to make a mention, though, when that had happened, before then, San Bruno happened; right? And because of that, we were able to learn from that and follow and prevent anything like that from happening ourselves.

So frequent, you know, lead survey, more staffing to do the lead survey, patrolling the pipeline, you know, for visual inspections, abnormal operating conditions and such. And even pigging our pipelines more frequently than we ever did before to -- you know, for inspecting internally, pigging -- and I know everybody looks at me when I say "pigging"; right? But it is an acronym; right? It stands for, like, pipeline inspection --

MR. PEDERSEN: Or eye alignment.

MR. SHAW: Internal line inspection; right? It's the sound that a pig makes, kind of squeak. So that's why we call it "pigging." But anywho.

But what this does is it takes images and GPS points, and it basically draws a map when it goes through the line, start to finish, of any impressions or, you know, internal corrosion or anything like that, such to where we can -- "Oh, there's something here. Let's go take a look at it."

So we go, and what's called a validation dig. We'll go and dig it up and take a look, get eyes on it. And if it's that bad, either we'll cut

it out or drop in a new piece, boom, boom, boom, or soft pad or whatever our engineering team would advise.

So -- and then the Aliso Canyon thing; right? I mean, we have our UGS guys; right? Underground, gas. They do what -- their well inspections or line -- wireline inspections, things like that. So they can take a look and see any internal corrosion or any stuff like that going on.

And then we also have fenceline monitors that will pick up any gas going over a certain amount. And if it goes over that amount, we're already, you know, ready to get front and center to respond.

So to address, I guess, your safety concerns and everything that goes along with it, I mean, I don't know if that helps, Tyson, but I see you've got your hand up already.

And everybody else on the call, you know, if you're wondering or anything like that, I'm just filling in the blanks for you. So thank you.

MR. BRITT: Thanks, Ernie.

I do want to remind us we are focused now on the workforce planning and training, and we are almost out of time for our discussion, and we need

to bounce to our next subject.

But Norm, if you have anything for workforce training, we want to know what your comment is.

MR. PEDERSEN: Well, Ernie read my mind. I put my card up after hearing Tyson.

And I do want to say, in response to Tyson, we do have a root cause analysis of the explosion on Line 235. Of course, we have one costing well over $100 million for Aliso Canyon.

PHMSA, as I understand it, also has one for the explosion outside of Coolidge, Arizona, on Passage Line 2000.

So I guess flip it into a question for Amy and Katrina, to what extent are you going to take a look at those root cause analyses and then, to follow up on what Ernie was just saying, apply lessons learned to the design of hydrogen pipelines?

MS. KITSON: So -- and I'll answer it very small.

So that is part of what we are looking at as part of the safety study for incidents. Obviously, primarily hydrogen incidents, so we will be designing a hydrogen pipeline, so we want to get

a really good look at those.

But exactly, to Ernie's point, all these things that we take into our system over the years as a result of learning both externally and internally are something that we will incorporate into our pipeline design.

MR. BRITT: All right.

Tyson, we're going to take one more before we go to the next subject, if you have something to add about workforce training, that would be great.

Go ahead and unmute yourself, Tyson.

MR. SIEGELE: Hi. Yes. Thank you so much.

Once again, Tyson Siegele, the Consumer Action Network.

Ernie, thank you so much. I really appreciate that. That's exactly the type of information that I'm looking for, that I, you know, appreciate having in these meetings, so thank you for sharing all that information.

In addition to that, Norman, yeah, I agree there's a lot of information out there, and one of the things that I think would be helpful to us as a whole, as the Planning Advisory Group for the Angeles Link is if we can have some of those

distributed to the Planning Advisory Group, that would be helpful.

That would help us to say, "These are the things that happened in the past; these are the steps that SoCalGas is taking, has taken, and will continue to work on in the future for both natural gas as well as Angeles Link."

So with that, my request is, to SoCalGas, if in the next round of documents that are provided to the Planning Advisory Group, if you could provide the list of documents, actually, that Norman noted is -- would be a good start on the list of reviews and studies that have been done on these types of -- these types of incidents that we want to, of course, keep from happening in the future and something that -- you know, I think that clearly all of the union leadership here is doing a tremendous job, you know, day in and day out, looking to make sure that things are safe for the general public or for workers.

And so, again, I just wanted to wrap up with that.

And Ernie, thank you for sharing.

MR. BRITT: All right. Thank you, Tyson. So that's our first two subject matters.

Obviously, workforce planning and training is very integrated with safety matters. Now we're going to switch to the preliminary routing and configuration analysis.

MS. KITSON: Thank you, Chester. So let's move on to preliminary routing and configuration.

So this -- the purpose of this -- or the driver of this study is to establish routing configurations that fit into a broader Angeles Link system.

So many of you may be aware or not -- I just want to give you a little background -- as part of the Angeles Link application, we had spec reports, as we call them. They're, like, located on our website that are -- anyone has access to -- that outline some possible routes for Angeles Link. So this study is using that to inform and then taking it beyond those routes.

Our aim is to move from a macrosystem-level education to identify specific opportunities that we can target to build out first.

At the end of the Phase 1 reports, we aim to present several preferred routes. That's the objective of this -- of this study.

Is there any questions with that?

(No response.)

MS. KITSON: All right.

So I think we've touched on this several times already with the safety and workforce planning, but similar to that, we plan to design our pipelines similar to our natural gas pipelines in the sense that based on population density or location of the pipeline, integrity management practices, hydrogen safety best practices, these systems will be engineered in that light, the best safe handle use of hydrogen.

The pipeline routing evaluation -- I think this came up even during our Quarter 1 discussion -- is this is one of those studies that a lot of the other studies are feeding into.

So as we -- as you hear them over the next couple days, things such as demand, environmental, these are all things that we're taking into consideration as we put forth these routing options.

We will do a systematic comparison, when we start getting into all those evaluations, and determine the most preferable routes for Phase 1.

And it's very important to us. I think we

touched on it a little bit earlier, on the repurposing. But we are going to be looking at primarily the areas where we have existing right-of-ways, so existing infrastructure, and this is really to mitigate the potential impacts to the communities.

So I think we touched a little bit -- so overall, we're looking at third-party storage evaluations as part of this, so -- and we are looking at the potential to -- as I said, the studies feeding into it, so where our demand and production locations are, so Yuri will be talking about that next.

And as far as -- I think that's about -- yeah.

Next slide. Sorry.

So these are the three areas that our scoring will be based on: Constructability, evaluation criteria, and route selection.

So constructability, we're looking at different things like workspace, open trench, trenchless installation, construction methods, and valves, a lot of things that our current field operations does today, but looking at it through the lens of hydrogen.

And then our evaluation criteria will be in three areas: Engineering, social, and environmental.

And then finally, the routing selection, as I said, will be a weighted value and scoring.

So we're incorporating all of those different studies and data, and we'll be evaluating them at the end to put forth potential routes for Angeles Link.

So that's the approach that we're taking for the study. Obviously, there's a lot of moving pieces in this one, comparative to the ones we just went over, so I'm opening it up. I know there's probably a lot of thoughts and lots of comments on this one as we move forward.

MR. BRITT: All right. Thanks, Amy.

It looks like, Marna, you might have joined us. I want to give you the opportunity to introduce yourself to the group.

If you're there, just unmute your microphone, and we should be able to hear you.

MS. ANNING: Good morning. This is Marna Paintsil Anning with the Utility Reform Network. Thank you for allowing me to introduce myself. It's good to see everyone.

Following along according to the requirements of the proceeding, TURN is very interested in compliance with the decision and also in making this configuration affordable and also making this configuration not have a detrimental impact, including looking at funding sources from -- from the federal government that were discussed during the proceeding.

And so, again, thank you for allowing me to introduce myself. And I don't have enough bandwidth to have my camera on, but I've enjoyed the presentation so far. So thank you.

MR. BRITT: Thank you, Marna.

All right. Arthur, you were the first to raise your hand, so I'm going to call on you. If you could unmute your microphone.

And, again, for those of you online, please state your name and your organization for the court reporter, please.

MR. FISHER: Again, my name is Arthur Fisher. I'm with the Public Advocates Office.

I've got one observation. This presentation being given is so high level as to what impact and as to time.

We haven't had the opportunity to actually

look at the scope of work or who's actually going to do this, because I can't get anything out of this.

I know what these words mean. I've done this sort of construct and as a consultant in the past, I kind of know what it should look like, so I would like to see it on that, so being as presented, this is just not -- so that's my question.

My second kind of question is, again, we keep focusing on the pipeline here. You have other alternatives in your statements that you want to analyze, including the hydrogen home.

So -- but there are other solutions than actually transportation. You can do that in electricity and then have a -- there are alternatives to look at.

How is that getting built into this particular configuration analysis? So that's my question.

MS. KITSON: Yeah. Thank you, Arthur. I can try to touch on your first comment, and thank you for that, because I appreciate it.

I know the study descriptions that came out, I know, have more detail than what's on the

slide today. The slides were intended to be a bit more high-level analysis.

And I think in Angeles Link, we have technical approaches coming out in August that will have further detail, especially because many of the engineering studies that you're seeing today are feeding into this one, so this is just getting underway.

So what we're looking at now is: Do we have the high-level scoping requirements that you're looking for. And then the idea is that we show the technical approach in August that will have, hopefully, the detail that you're looking for. I hope that helps.

MR. FISHER: I'm sorry. I think this is just getting in your way.

Have you written the state of work for your consultants or not?

MS. KITSON: Yes, we have, but we're --

MR. FISHER: Have you written your statement of work for the consultants?

MS. KITSON: Yes, we have, but we still have the opportunity to include the feedback from this group.

MR. FISHER: But there's nothing to feed

back on here. That's the problem. This is such a high-level statement you've made here that I can't give you feedback. I don't know where the workspaces are. I don't know what's --

MS. KITSON: Did you receive the study descriptions, Arthur?

MR. FISHER: Is that the document called 04 newsletter that have signal or paragraph descriptions?

MS. KITSON: No. So we'll look at getting that to you, because you might not have gotten it, and that would give a lot more insight into your question.

MR. BRITT: Yeah. So we've got a 32-page document, Arthur, that was sent out about a week ago. So you should have gotten it, but if you didn't, we can forward that to you right now through the chat.

We can also make it available to you through the chat so that anyone online can grab that document.

MR. FISHER: Can you forward that to me?

MR. BRITT: That document has more detail than what's in this presentation.

MR. FISHER: Thank you.

MS. KITSON: Sorry about that.

MR. PEDERSEN: I didn't get it either.

MR. BRITT: We have copied.

MR. FISHER: My second point was the alternatives analysis. But I know you're focused on the pipeline from Arizona or from wherever and Utah to the ports, but there are other ways of moving that energy, and I think any study of this nature needs to look at that.

MS. KITSON: Yeah. I think I heard it, but if I -- I know Neil has an uncanny ability.

So the electricity evaluation is part of our alternatives analysis, Arthur, so this is straight pipeline routing that you're talking about. But what you're referring to would be part of our alternatives analysis in there?

MR. FISHER: To reiterate, I'm talking about building a transmission -- an electrical transmission line, not a pipeline, and those are two different ways.

MS. KITSON: Yep.

MR. FISHER: That's what I'm saying. For the court reporter, I wanted to say that.

MR. BRITT: All right. Neil's going to go ahead.

MR. NAVIN: Maybe to respond to your statement or question, Arthur, we do have an alternatives analysis process to look at other methods of moving hydrogen, so by truck.

So as you know today, most of the hydrogen that's used in California for the mobility -- mobility use is moved by diesel trucks, as you know. So we'll be looking at that as an alternative.

We also will be looking, as part of our alternatives analysis, to the smaller hub elements, so essentially moving electrons to a smaller system that would provide a hub, still likely a pipeline, to connect some of those systems to the other.

Those two studies -- there are two studies -- will interact with each other, one looking at sort of economics alternatives; the second one, this one, looking at, well, what are the -- if one were to build a purpose-built new pipeline, what would it look like, and what are the considerations that you would need to entertain?

So Arthur, I do think that we are segmenting some of this work, recognizing that the individual elements do need to complement each other as well.

MR. HELLER: So sorry to hog this, but I'm not hearing what I expected to hear, which is I am looking at the construction of the electrical transmission line and a hydrogen as an alternative to a pipeline.

MR. NAVIN: Yes. So the answer is yes.

MR. FISHER: Okay.

MR. NAVIN: This is part of the alternative study.

MR. FISHER: But not as part of the routing study?

MR. NAVIN: Well, the routing study would suggest that if one of the alternatives is a pipeline, what would the pipeline look like and where would it go?

MR. FISHER: So you're not looking at routing the electrical lines?

MR. NAVIN: We would be looking at the total cost, the total impact of electrical lines. I don't know if we'd be looking -- I don't know if we'd be looking at an electrical study to figure out where those electric transmission lines would go at this stage.

MR. FISHER: Okay. So I'm correct. You are not looking at potential electric lines?

That's the issue there.

MR. NAVIN: So, Arthur, maybe you could slow down a bit for the court reporter. She's struggling.

MR. FISHER: So you are not looking at the entirety of electrical -- of the hub projects? Because a hub would require potentially the new hydrogen lines and the distribution lines, and the routing -- I'm sorry. Let me just finish. I'll try and be as slow as I can.

Because the routing for transmission line is different than the routing for a hydrogen pipeline.

That's what I'm trying to get at. You have potential alternatives that you would not be looking at; okay?

MR. NAVIN: So, Arthur, just to respond to your question, we will be looking at alternatives.

What I would suggest is maybe you should look at the 30- or 35-page document we provided on this and look at the detail that we intend to examine each one of the alternatives -- trucking, I would say moving electrons instead of moving molecules, so the transmission. So we are looking at those.

I think your question is in what detail are we going to look at them, and I would invite you to look at that first, and I'd be happy to have a conversation once you look at that.

MR. FISHER: Okay.

MR. BRITT: All right. Thank you, Arthur.

Tyson, you have your hand raised, if you could unmute yourself.

MR. SIEGELE: Hello. Tyson Siegele on behalf of the Utility Consumer Action Network.

I am just taking a look at the description of work, and I had gone through it before the meeting.

One of the things that -- and I mentioned this before, but I think it's worth noting again, which is that a lot of these pieces and parts that are being reviewed in the different studies depend very heavily on demand.

So if we don't have a good understanding of demand to launch some of these other studies, it seems as though there is going to be a difficulty in writing a scope of work for some of the studies that depend on demand.

For instance, in a routing configuration study, if the demand is 100 times what the

preliminary routing study assumes, then, then there might be issues that would come up with a configuration that was planning for a lot less hydrogen.

And the same is true in the opposite direction.

So that's something that I really would encourage SoCalGas to do, which is take a look at demand, do that first, release that for the Planning Advisory Group to comment on, to make our recommendations on, and once that's been done, put together a scope of work for some of these other studies that uses the initial studies that need to be completed.

So that's my first recommendation related to this.

My second one, I do really like what Arthur was saying about the statement of work for your consultants.

I really appreciate the 30-page document that was sent out. It does have some detail in it. It would be helpful to just simply have the statement of work for each of the consultants, and so if we had the actual statement of work, the actual scope that you are contracting for, then we

would be able to take a look at that and be able to say, "Well, okay. We see these pieces and parts. We think that maybe this scope would be better in this other -- in this other contract," or, you know, "Make recommendations for a couple of the contractors to work closely together in order to make sure that they are considering the interactions between the various studies."

So I think that that would be helpful, to have the actual statement of work instead of a summary here.

And then in terms of the routing configurations, one of the things that I mentioned in the previous meeting was redundancies, and I'm assuming that that is something that is going to be -- is going to be integrated into the routing configuration.

One of the reasons I mentioned that, for instance, going back to the existing system, going back to how the natural gas system is functioning right now, it is functioning at a significantly lower than full design capacity because pipelines are not running at full design capacity.

For instance, since the rupture of Line 235, that pipeline has not been running at

full design capacity. It's been about six years.

And so when you're taking a look at this routing configuration for the hydrogen system, be it hub, be it, you know, long-distance transmission line, what sorts of redundancies are you including in case, for instance, you have similar issues with hydrogen that you have with natural gas, which is that, you know, some pipelines are off for many years in a row.

Can you share a little bit about what redundancies you're building into the routing configurations?

MR. BRITT: Thank you, Tyson.

Amy, do you have any thoughts on the routing or redundancies?

MS. KITSON: Yeah. Thank you, Tyson.

One of the things that we are looking at as part of the study is reliability and resiliency in our system similar to what we have in the natural gas system, because it's important for us, as an open access common carrier pipeline for hydrogen to have the reliability for the customers that we put on the system.

And that is one of the things that we will be evaluating as we look at the different routes

and what is most beneficial to maintain that with the demand and production along that, like, to your point, which is the next study that we will -- that Yuri will be touching on coming up next, so --

MR. SHAW: Ernie Shaw Chester?

MR. BRITT: Yes, please, Ernie.

MR. SHAW: Ernie Shaw. Don't forget me, Chester.

MR. BRITT: I won't forget you.

MR. SHAW: What's up, everybody? Ernie Shaw, once again, 43.

So looking at -- just to kind of fill in the blanks once again, you know, I'm kind of working off of Mr. Fisher there saying about the workspace and all these other things, alternative methods and all of that.

So just to kind of, like, fill in the gap here and what I see with all this, with us, right, for 43, all of us, we have that, you know, unique expertise and experience and background where, you know, before coming in, transmission and storage for some of us, we came from distribution and other departments that dealt with other methods here, for instance, installations and all that.

I guess another way to say that is putting

pipe in the ground.

So we are definitely experts on putting pipe in the ground at any cost, any way, any how. Fifty years, 60 years ago, maybe 100 years ago, all these pipelines that are running in the hills, mountains, whatever -- I don't know how they did it back then with such limited resources, but they were able to accomplish it, you know, getting it in somehow, some way.

And it's still good to this day, up-to-date, and everything being unique and everything like that.

So I guess one thing I'll kind of, like, just say with all this, that's a delight to see because, if anybody knows how to put pipe in the ground, it's us.

So I don't know if that will put your mind at ease, how to get there from Point A to Point B. So -- and, you know, we definitely work hand in hand with our contractors as well to get it done, so -- and we work safe as well to get in and out.

MR. BRITT: Yeah. Thank you, Ernie.

Norm, we're going to go to you next. But before we do that, just as a reminder, all the materials that we're referencing were included in

the invitations as links, because they're large documents.

So if you go back to your invitations, you should find those links. We're also posting them on the chat, so you should have access to them in real time right now, during the meeting.

But go ahead, Norm, and ask your question.

MR. PEDERSEN: Okay. Well, first a comment and response to Tyson: SCGC has not supported the construction of a redundant system. You shouldn't build two H2 pipeline systems.

Instead, you should -- just as SoCalGas has done, you construct a reliable gas transportation system.

So we do not support the expensive redundancy, and we've expressed that repeatedly in gas proceedings at the PUC.

But next point, the one thing I saw as missing from what Amy presented kind of goes back to something that Neil was talking about in our last PAG meeting.

Neil suggested that the way that the construction of the Angeles Link system, if we get to the system level, may proceed is you start at the local level with the hubs within the L.A. metro

area and then later would come longer lines that would go to points of production, for example, in the San Joaquin Valley.

And I missed that temporal dimension in what Amy was presenting. And so how -- the question is: How do you plan to factor in and present the potential for there to be a temporal feature? In other words, you won't have a full-blown system right at the beginning.

MS. KITSON: Yeah. That's a very good point, Norman. We'll make sure to make that more clear moving forward, because that's exactly the approach that we're taking, is that we know we're going to start at the high-demand center and look at how this will be built out over time as per the demand and production over time.

So we'll definitely take that note and make sure that's more clear in the future.

MR. BRITT: All right. Does anyone online have any thoughts about existing pipeline corridors or rights-of-way specifically or new corridors specifically?

Again, I want to make sure we're exploring all the things that Amy's presentation discussed. What about technical considerations for major

crossings, elevations, train types, other challenges that you might see, other things that we should be paying attention to when we do this study.

Also, the idea of potential storage technology both below and above ground. Anything in terms of details that we would want to make sure that we're focusing on as we're doing this study, I would love to hear any thoughts on that both from our online participants as well as in person.

I do see, I think, Marna -- you've raised your hand now.

So Marna, if you unmute your microphone, you should be able to speak.

MS. ANNING: Hi. Can you hear me?

MR. BRITT: Yes, I can. Thank you.

MS. ANNING: Yeah. Thank you.

So I do have some --

MR. BRITT: I'm sorry, Marna. Can you just state your name and your affiliation for the court reporter?

MS. ANNING: Okay. Yes. This is Marna Paintsil Anning with the Utility Reform Network. And my comment has to do with the cost effectiveness study.

One thing that I haven't heard specifically as to Amy's presentation is whether the cost effectiveness of various alternative routes is going to be included as part of the study.

So I'd be interested -- when the cost effectiveness analysis or conversation comes up, whether the cost effectiveness of the various alternative routes or models will be incorporated.

Thank you.

MR. BRITT: So that -- that presentation is this afternoon after lunch, Marna. We are going to be covering high-level analysis and cost effectiveness specifically.

Does that answer your question?

(No response.)

MR. BRITT: You went back on mute. If we need to unmute Marna so she can reply --

MS. ANNING: Okay.

MR. BRITT: Yes. Sorry about that.

MS. ANNING: So it does answer my question.

But my comment specifically is that there have been comments regarding alternatives in various routes. And so as part of the cost

effectiveness study later in the afternoon, we would be interested in whether the cost effectiveness of each route or each alternative is going to be incorporated in that presentation.

MR. BRITT: Yeah. So Amy will go ahead and address that.

MS. KITSON: Yeah. Great question, Marna. Sorry. Now we fully understood what you were getting at.

Yes, that is part of the -- one of the results of the study, is that we will be feeding the cost of each one of these routes to the cost effectiveness study. So that will be considered as part of that.

But we will make -- again, that's a great point. We will make sure we make that more clear in our materials. Thank you.

MR. BRITT: Any other thoughts related to routing and configuration? I thought this would be the most popular subject. People love to talk about routes.

Anyone online?

(No response.)

MR. BRITT: All right. Arthur, you've raised your hand again. Go ahead and unmute

yourself.

MR. FISHER: I'm trying to find the mute button.

So yeah. People do love to talk about routes when they actually have routes to talk about.

So what we have is -- so just an observation, we can't talk about the routes until we see where the routes are.

I've just gone through the 36-page documents, and I see that you have -- it's two separate studies. You have the alternative study and you're doing your engineering study.

And this is -- so I understand, this is the engineering study specifically for a pipeline. I understand that. I understand that you're all capable of building that.

My point still stands that you need to -- there needs to be some way of looking at actually engineering the design for a transmission line, electrical transmission, along with a hub; so you have the whole project.

You understand? That's -- you have pure pipelines, engineering of pure pipelines, and you're doing an alternative analysis in a different

document. So those are two different statements, potentially two different sets of studies.

I would like to understand how those two studies are going to interact, because the risk from a public advocate's perspective, a cost perspective, is you can shape an alternatives analysis to favor your pipeline, and I want to ensure that that doesn't happen; okay?

So that's what I wanted to say here.

MR. BRITT: All right. Thanks for your input.

Any comments?

(No response.)

MR. BRITT: No?

Again, we are documenting all your input. And, again, this is a long meeting and a long process for this week. We'll be getting lots and lots of input. We'll be documenting it all.

And Insignia has been hired specifically for the purpose of not just documenting it, but also routing the answers back through the process of our technical study and making sure that all those issues are addressed.

Anyone else?

(No response.)

MR. BRITT: Okay. I think we're going to take a quick five-minute break, and then we have one more presentation before our lunch and our actual tour.

So if we want to just take five minutes to just grab some water or go to the restroom, and then we'll meet back, let's say, at ten after 11:00, and we'll get started on the next presentation. Thank you.

(Recess.)

MR. BRITT: All right. We're going to go ahead and get started.

I want to introduce Yuri Freedman. He's the senior director for business development for SoCalGas. He's going to be making the presentation on demand, and I'll turn it over to him.

So with that, go ahead, Yuri. Introduce yourself and go ahead.

MR. FREEDMAN: Thank you, Chester, and good morning. As Chester mentioned, I'm going over the demand analysis and several slides.

Demand is a very important analysis because ultimately we will want to be able to want a project that serves the purpose and the need.

Our previous work at SoCalGas identified

the need of clean molecules as a very essential element as it gets to the emissions-free resilient energy future.

This work does this on a project-specific basis.

So what this work is analyzing is a hydrogen demand by end users. We should say by categories of demand, and also by specific types of end users, which includes current natural gas users but also the entities, the customers that aren't using natural gas today, but may need hydrogen to function in an emissions-free future.

This analysis is what we are executing. It is something which is going to be focused on multiple sectors, priority sectors, and then a list inside of this slide are the mobility sectors with an emphasis on heavy-duty transportation, power generation, which is the special generation, which is going to be complementing renewables as a share of renewable shares as the state grows, and also the sectors which is a fairly large and broad needs of business and industrial facilities that use hydrogen or use natural gas today as a heat source or also use hydrogen as a chemical feedstock for their processes.

So these are the three sectors that I want to focus on this Phase 1.

But, again, we are going to catch up on other sectors, and eventually we'll go deeper into all of them.

I'll go to the next slide.

This slide lays out the technical approach, the logical sequence of how we are going to do it. It starts with identification of the top subsectors, which is what I just mentioned, and then we're going to look at the specifics of quantifying that demand, which is to say, for example, it is the vehicle inventories. For high heat application, this is the natural gas consumption factors.

Then we are developing the demand model, which starts from the assessing of total potential market, forecasting the percentage of the market, which is going to transfer to zero emissions, which obviously, as we mentioned, is a multivarious process.

From that, we are going to assess the viability of clean, renewable hydrogen play in this role as the alternatives, and last but not least, of course, develop demand scenarios in a range of

outcomes, which is ultimately going to capture what may happen 25 or 30 years from now.

The last section, right, is quite important because, like any model, modeling is by nature an easier process. Therefore, we are going to validate the results that make more sense or less sense to go back and define some of the structural features of the model, some of the assumptions, and some of the logic that makes the model run.

So that effectively is the structure of the work on the demand side.

So next slide.

And market validation is going to be a very important area of demand, because, again, predictions need to be assessed vis-a-vis what we believe, what any other parties believe, and needless to say, the range of what is examining the carbon-free future in California is wide.

And we are going to go into all that Industrial companies are examining this from the perspective of what is going to happen with them. How are they going to adapt to the emissions-free future?

And not just use, but these companies are

putting their real shareholder money into those options, so we are going to interface with them and understand better what customers think about this.

We're also, more importantly, going to engage with entities such as sports, which are very, very involved to make sure that their action plans are going to be executed most effectively.

On the generation side, they are going to interface with, first of all, the end-use parties, such as the Department of Water and Power, which, as many of you know, is actively working on hydrogen in their power plants, but also going to engage in what they call OEMs, original equipment manufactures Mitsubishi, GE, and others, because many of them are developed today into equipment that is compliant with 30 percent hydrogen and many of them are working on alternative major equipment that is going to be able to work on 100 percent hydrogen.

They need to understand that to be sure that our forecasts are actually in line with the actual steps of equipment manufacturers.

And last but not least, there is a broad spectrum of the public agencies and consortiums, including this very forum, where we are looking to

take input and bring it into our study, which includes the California agencies, such as the California Public Utility Commission, the California Energy Commission, the South Coast Air Quality Management District, and many others that are not listed on all this slide.

But again, there is no question that the model analysis underway is very significant and we are going to be sure that they are going to tap into this in the fullest degree possible.

This, in a nutshell, is a view of the demand study. This is a good opportunity for me to pause and ask for questions and comments.

MR. BRITT: All right. Thank you, Yuri, for that presentation.

So you heard his presentation. I want to know what your thoughts are about the subsectors, the demand model, market validation using industry research, and academia, public agencies.

Again, let's try to keep our focus on the subject matter. We have this presentation, this dialogue, and then we're going to have a break for lunch.

So what are our thoughts on the demand side?

All right. Tyson, you raised your hand. You're first.

MR. SIEGELE: Hi. Tyson Siegele with the Utility Consumer Action Network.

Yuri, thanks for the presentation. I -- when I was going through the document as well as viewing the presentation, one of the things that comes to mind is price with demand and how important price is with what hydrogen demand is going to be in the future.

As you pointed out, there are a few end uses that I really have not seen alternatives to hydrogen. For instance, you mentioned feedstock.

The two others that I see as probably needing hydrogen or a hydrogen-based fuel like ammonia is long-distance marine shipping, long-distance air travel.

So those are the three that I sort of anticipate being in your demand analysis.

Beyond that, I think that price has a huge impact. I think Neil, if I'm remembering correctly, the DOE's one dollar per kilogram goal for pricing of hydrogen in the future, and, you know, I think that if it was delivered at 1 dollar per kilogram, there would be a significant demand

from other sectors.

If it was being delivered at a significantly higher cost, then there may be no demand from other sectors, or very, very little.

So when you are taking a look at demand and when you're taking a look at -- and how the cost affects demand, can you expound -- expand a little bit on how the demand analysis is going to approach that?

MR. FREEDMAN: Absolutely, Tyson. Thank you for your question. And, again, there's no doubt that any product is only going to be needed if customers -- consumers are going to use that.

I'll also say something that, of course, we all know is that demand is a function of price. So the cheaper a product is, the more demand is going to be for it, and conversely, if it's very expensive, people can't afford that.

I will say to that that the way I think about this in a carbon-free future is not to compare the price of the zero-emissions alternatives with the carbon-intensive fuels, being diesel, gasoline, and jet fuel, but actually to compare the decarbonization alternatives, because if we're going to reach carbon neutrality, then our

choices are, quite simply from batteries, fuel cells, and perhaps other alternatives such as combustion of hydrogen.

Now, closer to the question, mobility has multiple sectors. We are going to look very carefully at the heavy-duty sector, where I believe there is a broad interest and perhaps a degree of consensus in the potential of fuel cell electric vehicles.

And by the way, let's be clear. When we talk about electrification of transport, fuel cell electric vehicles and battery electric vehicles are both electric vehicles, so we are electrifying transport in both channels.

The cost of that is going to be important. So is going to be what are called the duty cycle. An ability for vehicles to function, which is to say the charging time versus the refueling time, the availability of charging.

So the multiple variables will go into that, and we are very closely going to look into this in our alternatives analysis. That goes to the point that Amy made about our studies interlocking with each other.

But there's no question that we are going

to look at the sectors where we think hydrogen's got a potential to be economic for its users.

Again, I'm sure you know the rule of thumb that one kilogram of hydrogen is roughly energy-content-wise equal to one gallon of diesel. That's maybe one rule of thumb to think about.

And as we think about prices of carbon fuels here, you can imagine that with the subsidies from the federal government, it is likely that hydrogen is going to find very broad application across the sectors. And again, heavy-duty is the one we are going to look at, but air and marine is definitely on the map as well.

So I'm hoping that answered your question.

MR. SIEGELE: Actually, I think that the -- what I was trying get at more is cost and how -- are you going to, for instance, have a demand that you project -- you forecast for a dollar per kilogram and then $4 per kilogram and $10 per kilogram, et cetera, or are you going to approach the demand analysis in a different way related to cost?

MR. FREEDMAN: I think we are going to make -- this actually moves a little bit into the production conversation, because obviously the

price is a function of the capital and operating expenditures.

So we can talk about this more on the production side. I think that the production analysis, not to jump too much ahead, is going to result in some preliminary assumptions about the price level, and that price level is what we're going to use for our demand that I think is structurally how this is going to flow.

MR. SIEGELE: Do you have any preliminary assumptions at this point in terms of hydrogen costs that SoCalGas is going to be targeting for its delivery either through a hub or byproduct, et cetera?

MR. FREEDMAN: I'm not sure we have the high-level assumption as of now. We definitely will have one, and we definitely will share it.

MR. BRITT: All right. We're going to go now to Joon. I think your hand is raised. If you could unmute your microphone, we should be able to hear you.

MR. SEONG: Yeah. Hi. My name is Joon Seong, S-E-O-N-G, for the court reporter, with the Environmental Defense Fund.

Sort of to piggyback on Tyson's earlier

question and the answer you just provided, Yuri, in addition to price, are there key variables or considerations that go into determining the demand levels?

And also, in terms of determining the price of hydrogen, what are some key variables that you guys will be looking at? Thank you.

MR. FREEDMAN: Sure. And great question. Thank you.

And maybe -- let me go back up a couple of slides, because that may give some high-level frame for that.

So first of all, the question is the assumptions about the pace of conversion to zero emissions is important because that is, for obvious reasons, going to be the trajectory on which the customers will need zero-emissions solutions, if you will. If we believe it will be happen faster, then the scale will go up faster. Conversely, if it takes longer, then it will be in a slower glide path.

Another important assumption, which interlocks with a cost -- with an alternatives -- with a part of an alternatives analysis is let's say you decide to decarbonize by a year certain.

What are your options? And if you are a trucking company, for example, what are the options for your sleeper cabs, for your drayage trucks, for your short-haul transportations, so on and so forth?

And the answer will differ, naturally, as a function of the duty cycle, as a function of the distance, as a function of geography traveled, and a way to return to base or one-way travel.

So there are multiple variables which -- again, I'm just trying to gather a little bit of a sense of how many variables go through this model. The answer is a lot.

And nonetheless, we are going to make sure that the model is not turning into a black box, which I think, again, many of us maybe have experience with. We will make sure that we have transparency, that we understand why change in a variable, in an input drives certain outcome.

That may be the easier example, because, again, mobility, if you think about this, we use is this as one word, beginning from on land and marine and air mobility and all the very -- a multitude of land mobility, on and off road and within on road and land and so on and so forth. There's a lot that goes into it.

But it's a very large demand. It's a very large sector in terms of energy demand today, as we all know. That's why emissions from transportation are the largest sector of emissions in California.

Accordingly, it's going to be a complex analysis, but, again, we'll make it transparent and comprehensible, if you will.

I hope that that goes some way to answer your question.

MR. BRITT: I don't see Joon with a follow-up, so I'm going to go move to Marna.

Marna, I see your hand raised, so if you could unmute yourself.

MS. ANNING: Yes. This is Marna Paintsil Anning with the Utility Reform Network. Forgive me if I missed this, but are there any potential non-mobility uses that are going to be considered as part of the demand study?

MR. FREEDMAN: Yeah. Great question, Marna. And, yeah, I brought one slide up.

So we are going to look at other priority sectors as a demand for hydrogen in addition to mobility.

And the first of them is power generation, where we are going to examine hydrogen as a fuel in

power plants. Again, the path for that has been obviously blazed by the Los Angeles Department of Water and Power, first working on their intermountain plant in Utah, and then recently them making the decision to do this at Scattergood.

Dispatchable generation is going to be in our view and many others, especially if the share of renewables is going to grow, so we want to analyze that from multiple standpoints.

We are also going to look at what we call the industrial applications. Again, I think many of us know that the Los Angeles metropolitan area is actually the largest manufacturing area in the country. There is a lot of it that is using high heat, and a lot of it that is formed in the molecular form today will need to be delivered in the molecular form tomorrow, and if that molecule cannot emit CO2, carbon dioxide, quite likely a large part of that will be a mix of hydrogen.

So we need to look at several sectors where the use of this high heat is in demand for them on the various scenarios, if you will, conservative, moderate, and ambitious.

(Reporter clarification.)

MR. BRITT: Tyson, I think you raised your

hand again, so we'll go back to you.

And, again, before Tyson makes his comment, if you have a chat or anything else you would like to put into the chat, please go ahead and feel free to do that as well. You do not have to make a verbal comment for us to receive your input.

Tyson, go ahead.

MR. SIEGELE: Hello. Tyson Siegele representing the Utility Consumer Action Network.

So in addition to cost, one of the other items that we are most interested in taking a look at is timeline.

So there are a variety of -- there are a variety of possible demands, and there are a variety of possible timelines, and I wanted to make sure that that is something that you all are taking a look at and considering. I'm assuming it is.

And then the other piece that I wanted to ask about here is when you're taking a look at demand, the -- clearly the pricing of alternatives sort of sets a cap on what the price can be for hydrogen if hydrogen plans to have a demand in that end-use sector.

So you had mentioned a second ago that

industrial heat is a possible demand location, and so when you're taking a look at industrial heat, that one specifically is one where electricity has a -- an opportunity to compete, and there are some storage options at this point that are either available or under development that provide 24-hour storage for heat that's provided by the electricity.

So when you're doing the demand analysis, do you have a tie between those two studies? Are the contractors for the alternatives, again, the demand analysis the same, or are they going to be working closely together? How's that going to be addressed?

MR. FREEDMAN: This is a great question, Tyson. And it goes, I think, to the heart or significant part of our work in this Phase 1, where if you look at the study we are all executing, the rest of this team, at some point, they'll need to be integrated to come up with a unified view, and that is going to be work that is going to be upon us once the studies are finished.

And frankly, we'll start this integration work before they're finished because many of the studies, again, will involve some degree of

configuration to make sure, as you mentioned, the inputs, if you will, tie, that there is a logical relationship between the conclusions of one study in the process and another one.

So that's the general answer. The answer is yes.

With regards to the industrial specifically, as you correctly said, the analysis is going to matter to the extent there are alternatives. So obviously, cost comes into play.

In some locations, the alternatives are fewer.

And, again, it's easier to think about something like dispatchable power, where I think everything that at least I've seen to date suggests that there will be some need for some dispatchable power and arguably why it may not be a lot automatically, but the need for that to maintain green stability is going to be larger as we have more intermittency.

So this, again, is something we are going to approach sector by sector and make sure that we are -- we have the studies related to each other and that leverage each other, if that makes sense.

MR. SIEGELE: Absolutely. Thank you,

Yuri.

I do have one more question. Should I go ahead and ask it now or return it back into the queue?

MR. BRITT: Why don't we go to Joon, and we'll come back to you, Tyson, just to make sure we have everybody else's comments.

So Joon, go ahead and unmute yourself.

MR. SEONG: Yeah. Joon Hun Seong.

So just to clarify, this demand study is for the demand of hydrogen supplied through Angeles Link; right?

So, I mean, there's a larger demand for hydrogen that we can expect in California and in Southern California specifically, and then there is demand we can expect to come from hydrogen supply by Angeles Link.

How does the demand study differentiate the two, and what are some methods that you go about doing that -- or plan to go about doing that?

MR. FREEDMAN: Thank you for the question. I think it is, indeed, a demand study for Angeles Link, as requested by the Commission.

As you have heard from Amy, their alternatives analysis -- and that actually goes to

the point that Tyson made before you.

Their alternative analysis is still underway, and the purpose of the analysis is to identify the high-priority routes.

We are conducting our work right now for the greater Los Angeles metropolitan area in parallel. So we're waiting for the high-mobility routes to be identified for those at work.

We know ultimately that the Los Angeles area needs to be part of that, at least this part of the state goal. So our analysis includes a broader area with the mobility associated with that.

A lot of it is, as you all know, traffic from the port, power generation facilities and industrial facilities in this greater Los Angeles metropolitan area.

MR. BRITT: All right. Joon, did you have a follow-up, or is that a sufficient answer for your question?

MR. SEONG: That is sufficient. Thank you.

MR. BRITT: Okay. Thank you.

We're going to go back to Tyson, but before we do, I would encourage others who are

online who haven't spoken, please, we really want to hear from everyone today. I know there are different subject matters that maybe mean more to each of you than others, but if we can encourage you to find a way to provide your input.

And those in person as well.

Sal, we'll get back to you. So we'll go from Tyson to Sal.

So Tyson, keep going. Tyson?

MR. SIEGELE: Thank you. Tyson Siegele with the Utility Consumer Action Network.

So the -- what was just mentioned there of other hydrogen is -- sort of wraps into where I was going with this next question, which is: Where -- how is SoCalGas going to address the elephant in the room, which is something that Arthur touched on earlier, also? SoCalGas.

If a long pipeline is built, SoCalGas and SoCalGas shareholders will make a huge amount of money, billions of dollars.

That is something that is clearly an incentive to show that the long-distance pipeline is feasible, that other options are feasible for SoCalGas to build.

In initial comments in Q1, I had mentioned

a couple different options for SoCalGas to consider, a red team/blue team type of approach, where you would have one consultant working to show that there is high demand, another consultant working to show that there is low demand, and being able to then take that to the Commission and establish for the Commission, "Look, you know, we get it. We understand that there is a conflict of interest here. We understand that any analysis that we do is going to have to address that."

And so when you are taking a look at how to establish credibility with the demand analysis -- and you mentioned a couple times, for instance, that LADWP is taking a look at hydrogen.

You know, one of the things that is really important, for instance, in the demand analysis is to show that LADWP actually, for instance, has signed a contract with SoCalGas or will sign a contract with SoCalGas, what price that contract will be at.

LADWP has gone through and said that they're going to use hydrogen. Hydrogen is available for almost 100 percent combustion at this point in turbines, but they're going to use it initially in a pilot at a much, much lower

percentage than that. So clearly cost is important to them.

LADWP has water and power. Those are the two things that you need to put into an electrolyzer to make hydrogen.

If LADWP decides, "Look, we can do it cheaper than we can get it from SoCalGas," then all of a sudden that's a customer that just disappears.

So with that -- that's a lot of information, but -- a lot of thought on how to establish that this demand analysis is rigorous, is something that the Commission can depend on, how to show that the conflict of interest that's inherent has been reviewed and addressed and considered within the overall presentation of the work.

MR. BRITT: Go ahead, Yuri.

MR. FREEDMAN: Thank you, Tyson.

If I understand the question correctly, the core of it is with -- is about the professional integrity of the consulting firm that we're engaging.

We are using a firm -- firms which are nationally recognized, well-known for the work that they've done across the aisle, actually, which is to say for the electric power industry, for the gas

industry, for many sectors of the energy industry.

The results that are going to be published, as you know, are going to be publicly available. And as I think about this, the best assurance of having a robust discussion, debate opportunity -- part of this is the same conversation now.

So I guess what I mentioned also is that we are going to have a range of cases, beginning from conservative and then going to ambitious.

And I used the word "ambitious" to some degree purposefully, because I believe the state of California is ambitious in its climate goals, and it is our responsibility to make sure that these goals are met in an affordable, safe, and resilient fashion.

But that's probably the best answer I can give you right now. We would be happy to go through those assumptions and methodologies in more detail, as this work gets done and becomes publicly available.

MR. SIEGELE: Thank you.

MR. BRITT: Why don't we go back now to a question in the room. We'll go to Norm and get your question.

And before we do, just a reminder, all of these work studies that we're going through, we're here today to talk about scoping methodologies.

We're going to be coming back to you in the fall, talking about preliminary findings. We're going to be coming back to you later when the final results are achieved in the final study. And we're going to be looking for input at each of those steps along the way.

So you'll have a chance to look at what's going on.

And the CPUC as a regulatory agency, it's also watching with very keen eyes what is going on here. So the process is very transparent, very open. We are here today to get your input so that the study can be meaningful.

If you have -- after this meeting, again, you have until the end of the month to weigh in on these studies in particular, as the scoping process continues through the end of the month, so we can inform our technical consultants as they are doing their work.

So Norm, if you would like to ask your comment.

And, again, as we're asking these

questions and comments, please try to be as concise as possible about the subject matter we are trying to talk about and stay as focused as we can about trying to get on schedule, because we're getting close to lunch, and I don't know about you, but I'm getting hungry.

MR. PEDERSEN: Norman Pedersen from ACGC.

First of all, regarding Tyson's comment about the shareholders making billions of dollars, if there is one thing that I would be willing to take to the bank, there is going to be economic regulation of hydrogen pipelines, by the FERC, by the PUC, by the regulatory agency, and that regulation will be just as strenuous as we see regarding natural gas pipelines.

So we are not going to have a situation where shareholders are going to be running to the bank.

Second point, I am awed by the number of variables, Yuri, that you mentioned are being taken into account by your consultant. There's a technological variable. You know, where do pipe -- where do airplanes stand with regard to the technology, being able to use the pipeline?

As Tyson pointed out, there's the pricing

variable. You know, where is the trend in production going to be going? Are we going to hit the 1 dollar per kilogram that we target? It's mind-boggling how you would pull this all together in a model.

That is not how natural gas pipelines are built. But pipelines are not built by, you know, an academic -- on the basis of an academic study. You assess the production area; the viability of the production area; you assess the market, which means who's going to be willing to sign contracts.

And so I'm wondering, at what stage are you planning to build -- bring in that part, going to the prospective market -- or are you there now? I do not expect that if you are testing the market, you would make it public.

But you could tell us whether or not you are feeling the market for the appetite of the market for the pipeline, separate and apart from the, if you will, academic study.

MR. FREEDMAN: Thank you, Norm.

And I'll start by saying that I think, again, that the parallels between the natural gas market and the hydrogen markets are fascinating.

And, again, it's a separate topic, which

I'd love to engage in. We can talk a lot about this, more than most people care to listen, but not on this.

On the demand side, we think that the time frame of development of pipelines is prolonged, and the time frame -- you know, there will be a time when the future customers are signing their commitments. That time is probably some time off.

I think right now what we can do and what we are embarking on right now in the process of demand understanding is to understand the momentum and the direction of the market, so to speak.

And, again, I'm going back to the transportation sector and looking at the heavy-duty as the sector that, due to the size of the engine and the utilization of the engine is actually a huge driver of demand, if you think about that.

And then if we combine this with the state-level managers, the clean fluids rule, the clean trucks rule, that actually paints a picture that what we need to find is zero-emission solutions, which then go through a model and ask, "Okay, so which of these could be battery electric, which will be fuel cell electric?" At which point, we talk to OEM. We all know who they are. Not

only are they Hyundai on the light-duty side, but also Daimler and Volvo and others and comments on the heavy-duty side.

That ultimately is conversations we are having. And, in fact, just last week there was a transportation conference in Sylmar, the annual conference.

There's actually a lot of relief that fuel cell vehicles are going to play a large role in the zero-emissions transportation, and we want to capture that too.

So that is to say, commercial agreements are not being struck, because we're not there yet, but it is the stage where we are assessing the market and starting to bring close the participants and development of the market, for all parties, including you all, for discussion for zero emissions.

MR. BRITT: Thank you, Norm, for your question.

Sal, we'll go to you.

MR. DICOSTANZO: Okay. Thank you.

Yuri, on your point, first of all, there were references made to marine travel and air travel. These are obviously uses for large

quantities of hydrogen products, like ammonia, et cetera.

But your point about heavy-duty transportation is well-taken. On the road, for example, I remember, as you were speaking, recalling a study from the American Transportation Research Institute. It's ATRI.

They did a very, very nice side-by-side analysis of legacy diesel trucks, battery electric trucks, and hydrogen fuel cell trucks.

And, you know, in my looking up here, they even have a 2023 update that might be helpful to you. So I just wanted to mention that as a resource.

The long and the short of it is that hydrogen fuel cell came out as the winner of the three, and this body, as I understand it -- I have no stake in the game. I don't know if anyone here is from Harbor Trucking, if they want to chime in.

But they really did a thorough look at all of the costs, what I would call maybe -- not just Scope 1, 2, and 3, but Scope 4, which is how do we produce a battery? What emissions are involved in getting the minerals, where they're coming from, emissions of the people there, where they are

coming, transport it, turn it into a battery, and then dispose of it after it's over.

Okay. So we'll get back to that. That's a resource.

Number 2, in the port area, one of our threats is automation, and automation, as we all know, is a threat to many industries, not just our own. Whether you are a lawyer or whether you are a dock worker, you have a threat for automation.

In our particular situation, it is not less expensive, and it's not necessarily more productive than human operators.

So we feel why should our community lose the benefit of good jobs that have taken 100 years to bring to where they are now and take those costs that go right back into the community, in terms of wages, business, taxes, et cetera, and just turn it into a capital cost, which moves it somewhere else, right, Geneva, or where have you?

One of our most automated terminals in L.A. and Long Beach is LBCT. And it is a marvel. If you go there, you see all these robots moving around. It's almost all electric, hardwired into the ground, AGVs that are plugged into the ground, battery exchange locations.

And they just put out a document. I'm sure it's not technical on the level that you would appreciate, Yuri, but it's Net Zero 2030 Action Plan.

And it goes into a lot of detail, but I will read a couple of highlights there because I think it's relevant to the conversation of demand.

It talks about the ships and trucks -- our cargo handling equipment is a major source of hydrogen.

And one other that Toyota Tsusho and others helped, hopefully we're hoping to get into a -- we have demonstration projects at the Port of L.A. with Phoenix Marine, another terminal operator on retrofitting, which is being done now. It is demand that is going to ramp up pretty quick, pretty fast; right?

So one comment here that spoke to emissions is that "There is a tension between this pathway and the readiness pathway, adding even more zero-emissions electric equipment will cause a corresponding increase in electricity use, potentially increasing scope to carbon emissions.

"The increase in scope to emissions would have" -- and I'm jumping around a little bit --

"would have outweighed the significant reduction in Scope 1 emissions resulting in a net emissions increase absent the purchase of renewable electricity that benefits the regional carbon budget.

"Additionally, renewable energy credits are being applied to LVCT's Scope 2, not Scope 3, which is our current supply chain."

So essentially the negative credit market is how you actually make it look like you have a zero-emissions product.

So, you know, I appreciate that, but I'm glad that they put that in here, but that truth needs to be understood by everybody, that electricity is clean at Scope 1, but it gets murkier as you get to Scope 2.

And then Scope 3 -- this is a conversation under Scope 3. "This pathway is fraught with uncertainty. A wholesale shift from fossil fuels across all sources will take creative thinking and technologies that do not yet exist. LVCT must ask itself tough questions: Is electric equipment the best way to go in the long-run.

"This is a terminal at $2.5 billion that is fully electric. Should we consider fuel cell

equipment with renewable hydrogen generation on site? And should we accommodate more on-site solar or off-site hydrogen generation?"

This is a company that's all in on electric, and they're looking past their horizon.

So the demand is going to be huge, and it's going to start at the port or places like the port, and then it's going to filter out everywhere else.

So please build this thing, build it right, and build it fast.

MR. FREEDMAN: Thank you very much, Sal. And we will make sure to capture that, because that is really one of the key purposes of this forum, to make sure that we are fully adapting to the base of technology, which has been developed to date. So thank you very much.

MR. BRITT: All right. We've had a great discussion. We have one more person with their hand raised.

Marna, we're going to take your comment, and then we are going to break for lunch. So please unmute your microphone and make your comment.

Thank you, Marna.

MS. ANNING: Yes, this is Marna Paintsil Anning and I don't have a comment; I have a question.

Do you -- does SoCalGas anticipate -- in light of the conversation turning to potential for regulation, does SoCalGas anticipate that there will be any out-of-state demand that it intends to meet with the Angeles Link project?

MR. FREEDMAN: Thank you for the question, Marna.

The purpose of Angeles Link is to serve the demand in the greater Los Angeles metropolitan area, as directed by the Commission. So I think on that, it is quite clear.

Maybe the broader point I'll make is that if we do expect hydrogen to become a major element of the energy mix and forecast in that range varying from 10 to 20 percent, which is actually a lot, then to Norm's point, there will be a hydrogen market in America in 20 years or so.

There will be movement perhaps -- there should be movement in the -- there should be movement just as there is movement of natural gas today. So maybe the markets will apply to that.

But that is the future that is going to

get developed over the coming years and next few decades.

As Angeles Link is concerned, it is going to serve the greater Los Angeles metropolitan area.

MR. BRITT: All right. Thank you, Yuri, for that.

So that gets us to lunch. So there is a lunch behind us that you are welcome to go and get.

We are going to have a tour option for those in person. If you want to take the tour, it's probably about 20 to 25 minutes. It will start right at 12:30, but I would ask that you start congregating near those double doors around 12:25, and we will take you on the tour.

So with that --

MS. TRACY: Hey, Yuri, do you want to give the folks a preview of what the tour is, so they have an idea of what they might be missing if they just go through e-mails and stuff.

MR. BRITT: And just for the people online, we are going to start back right at 1:00 o'clock, so if you would like to be back at your desk or online, that would be great.

Go ahead, Yuri. Give a preview.

MR. FREEDMAN: Yeah. Thank you.

Without stealing the show, what you may want to see here, right there in the parking lot, is a micro grid that is powered entirely with renewable energy and provides, I would say, virtually unlimited resilience, which is to say -- the question ultimately is how to get zero emissions and yet do not lose resilience.

The answer is that if you put solar panels and you put electrolyzer and a hydrogen storage tank and a fuel cell, you are going to be resilient in perpetuity.

For example, that project is able to supply up to 100 homes for critical load for several days. So this is what we built.

It also demonstrates blending of natural gas and hydrogen in a safe and reliable fashion, 20 percent hydrogen.

If you really like it, there will be cookies, the hydrogen cookies, which contain fewer calories because hydrogen is less dense than natural gas.

But, again, this is the combination of features, which frankly made this project destination of many parties worldwide interested in seeing, as well as many of the policy makers on the

federal and state level.

So we more than welcome you to ask questions on the tour.

MR. BRITT: All right. So with that, we will return at 1:00 o'clock.

(A lunch break was taken.)

MR. BRITT: We were going to be talking about now production. We ended our morning session talking about demand, and the opposite of that is production, similar to when we were talking about safety and workforce planning and training, how those two go together, demand and production go together as well.

So Yuri, you're going to go ahead and kick us off for the afternoon session, and go ahead.

MR. FREEDMAN: Thank you very much, Chester, and good afternoon. For those of you who went on the tour, I hope you enjoyed the tour.

We'll talk about production.

My vision, shall we say, is that aside from this supply-and-demand equation, it needs to be put in place for this commodity to gain scale to become an important element of the energy base.

And, again, because I think, like most of you know, hydrogen today is produced predominantly

by using fossil fuels in the U.S. In North America, it's the most natural gas, which is combined with water, which is called steam method information, which produces hydrogen, and unfortunately the carbon dioxide.

What we are proposing is to transport hydrogen, which is going to be produced from a zero emissions from renewal/able sources.

And for the purpose of this conversation, the two categories of this production are first electrolysis, which is quite simply taking a molecule of water and using it like a power to split it into hydrogen and oxygen, and then using this, what we call green hydrogen, to transport it to end users.

Again, they call it various terms, like electrolytic, they call it green, sometimes they use both words, but electrolytic is the right term to describe the process by which hydrogen is being made.

The other, but equally important from this conversation, is biomass, where biomass is where both carbon and hydrogen is being gasified, which is a process which ends up in the effect of separating out hydrogen and carbon.

Most of the time you have the carbon in the solid form, and then it is either being sequestered or utilized, and then hydrogen, again, is being transported to the end user.

California has an abundance of multiple types of sources of feedstocks for hydrogen. Of course, the renewables are what we know very well, and California has an abundance of renewables, both from solar and wind.

California, again, as all of you know, is a very large agriculture state and those agricultural feedstocks -- I apologize, somewhere between my accent and the background noise, I think we may be losing some.

And so some of the feedstocks from agriculture are also quite suitable for production of hydrogen in large amounts.

And that is what the study is focusing on. It is ultimately going to explore the feasibility and the magnitude of the production of hydrogen through electrolysis as well as through the gasification of biomass.

This slide lays out various, if you will, topics, but really it's meant to give you a sense of the sequence and logic, much like the slide from

the demand slide was laying out these steps.

If you go from left to right, you see going from potential sources of production, which, again, I just listed them -- it's solar, wind, and biomass.

We need to understand where we have the most potential and also how this relates to demand.

Quite simply, the location of these sources plays a role. Needless to say, the further away from supply from the demand center, the more complicated it is going to be bringing this to the law to demand as part of the equation.

We are going to make sure that we analyze procedures to establish compliance of this clean hydrogen with the clean hydrogen standards.

As you may know, the federal government and then the Commission's decision specified a certain amount of conditions of CO2 per kilogram of hydrogen, and they quite simply asked us to consider only clean hydrogen, which is what we'll do.

The question then becomes: How is this going to measure, and what is the process, and what is the methodology for measuring that?

And it's a deep topic, not the least

because green hydrogen is now getting up to scale, so the methodology of calculating the greenhouse gas emissions associated with this production is being developed.

We are going to take a very close look at that because we need to be sure that we will comply with the direction of the Commission, but also the direction of the policy at the federal level.

We are going to assess technologies, again, going back to scale. The chemistry and the physics of making hydrogen from water is well understood. That is not to say that it exists in scale today.

Today, if I were to guess the production of clean hydrogen from water is in megawatt, we are looking to make a step change to produce this effectively in gigawatts, which is a massive scale-up, which represents a big opportunity because scale-up is what reduces the costs, but scale-up is obviously also associated with supply chain questions and quite simply who is going to make those electrolyzers, the devices that are used to split water, where are they going to be made, will the scaling up in itself create supply chain challenges.

We are going to look at that.

And last, we are going to look at this for various types of electrolyzers. Some of them are better suited to working with renewables than others.

So you'd have to look at this as a trade-off between the costs and their operation performance and importantly their ability to ramp up and down, because some are going to work well with intermittent resources, such as renewables.

Again, like many other questions, it becomes a fairly involved, fairly technical analysis, but that's what we need to do to understand the pathway to scaling this in production.

And last but not least, just like on the demand side, we are not going to do this in isolation. We are going to reach out to market participants, including, very importantly, developers.

By the way, the same developers that have developed renewable projects in California for decades now, in solar and wind, are very interested in developing hydrogen products because for them, this green hydrogen is the next leg of their growth

because once they building solar and wind -- and, by the way, that solar and wind gets increased and curtailed, hydrogen sounds like a very reasonable option to make it first from curtailed power and perhaps from other projects.

So I am going to be talking to developers. We are also going to be talking to developers of technology because electrolyzers in themselves are a niche that is being developed right now.

And I'm happy to report that the best and brightest minds in academia are forming the companies backed by venture capital, where we are exploring in real time how to make, if you will, a better mousetrap, how to make a cheaper electrolyzer that have fewer or no rare earth metals that can be coupled with renewables.

So this is the, frankly, sound that we have seen in California 15 years ago when development of renewables drove that technological innovation. We are observing it right now, in real time, and we are going to work with this community to capture these data points in our analysis.

Again, to sum all this up, the key building blocks are: Let's find where hydrogen can be produced at scale; let's understand what

technologies are better suited to its production, between electrolyzers, between gasification, between alkaline and what they call PEM, product exchange membrane, technologies.

Let's make sure we understand that the market's direction is consistent with what we're finding out; that the real-world dollars and time of people is going to spend on those very opportunities we found out; and let's ultimately along the way understand that -- let's make sure that hydrogen that is being produced is clean, which is to say, let's establish a process by which we can measure and establish the fact that this hydrogen, indeed, has few greenhouse gas emissions.

Let me stop here. That was a very high-level overview, but I think it gives you all the sense of directions of the supply analysis.

MR. BRITT: All right, Yuri, thank you so much.

So in this presentation, obviously he was focused on the potential sources of hydrogen generation, to be clean, renewable hydrogen standards that were said in the decision, and I want to know what your thoughts are for this study.

He talked about solar, wind, cost of

production, policies and procedures.

There's also the issue of production capacity modeling, which -- we had a robust conversation about the demand modeling, but what about the production focusing on the renewable power, I think renewable hydrogen, potential supply chain issues, and third-party interviews that will need to be done to make sure the analysis is complete.

So does anyone have any thoughts about Yuri's presentation or the issue of production planning and assessment?

All right. Norm.

MR. PEDERSEN: Chester, I'd just like to get one, but you had already called me.

Excuse me. Norman Pedersen, SCGC.

When we went on our tour of the hydrogen home, we saw the roughly 6-foot by 6-foot square box. It has one electrolyzer, and it produces one kilogram, I believe the statistic was, per hour; correct? Wasn't that the statistic we heard on our tour?

MR. BRITT: I believe that was the case, yes.

MR. PEDERSEN: One electrolyzer, one

kilogram per hour. That box, 6-feet-by-6-feet, could contain four electrolyzers.

So Yuri, how are we going to scale up electrolyzers so that we can have commercial scale at scale electrolyzing the water to generate hydrogen?

MR. FREEDMAN: It's a very good question, Norm. I think maybe there are a couple of levels that can answer that.

The most macro level is a -- maybe not invoking directly Moore's law, but things that get better at scale.

And what it means is that not just -- they became cheaper, although that's true too, those become neutralized.

And we saw that with computers. If you look at the first computer, which was the size of a big room, you wouldn't guess that we would be wearing them now on our wrists, and yet that is where we are today.

So that's a very, very high-level answer, but technology and innovation and evolution almost inevitably result in cost reduction.

What it means for electrolyzers, we had the privilege of seeing the 6 megawatts project in

Germany. It is the size of a room, a large room, maybe a small hangar, but it is not what you think if you had to multiply -- it is more compact per unit of production than you saw that box.

So as you make the electrolyzers bigger, the economy of scale help you to make it more complex per unit.

That's one.

The other part of the answer is that in our company, we have research and development program, which, among other things, supports these very electrolyzer technology developers. It's quite remarkable, actually, how many bright ideas people come up with, and I'm talking about people with the highest level of academic activity.

So although we don't know to date which one will win in five years, there is no doubt in my mind that looking at the efforts that these people do and, frankly, the amount of capital they are able to raise from the most non-companies in the world, I think we are on a very good track.

And frankly, we saw this very -- happening with renewables. If you look at the efficiency of renewables, when they started to be applied at scale in California in maybe 2007 and '8, and you

looked at the price of those agreements, the price went down by order of magnitude in the space of a decade.

I think hydrogen has the same chance, because ultimately, it's economy of scale. Scale plus innovation.

MR. BRITT: Thank you, Yuri.

We're going to go now to Miles Heller. I think, Miles, this is your first question, so if you could unmute yourself and ask your question or make your comment.

MR. HELLER: Sorry about that. I was having trouble with the mute functions.

So yeah, I asked a few questions in the chat, including one related to this earlier.

So my question is really: To what extent when you study the impasse of the electricity sources, grid, transmission, distribution that would be required for the hydrogen production?

There was a comment made earlier that, you know, we need hydrogen as an alternative to electrification. We actually agree with that as well.

But to the extent that your hydrogen is also made from electricity, typically in

California, some of those same grid impacts may occur regardless. I'm just wondering how detailed the studies will be in that regard.

MR. BRITT: Miles, before you disconnect your microphone, could you just state where you're from?

MR. HELLER: Sorry. Miles Heller with Air Products.

MR. BRITT: All right. Okay.

MR. FREEDMAN: Thank you, Miles. Great question.

And I will start by saying that the scope of our analysis is going to be focused on renewable production, which is to say solar and wind as well as biomass.

So within this particular analysis, we are not going to look at the -- what we call the T and D, what we call the transportation and distribution on the electric side.

I think we are going to be assuming the core production of hydrogen. Next to those, solar and wind and maybe the biomass sources.

That partially gets into the topic that was raised earlier today with regards to the alternatives, and I think that is going to get

picked up.

The transmission of energy by pipes over wires is an important topic, and we need to be sure that what we are involved in is the least cost alternative.

I'll go back to the other point, and that while I appreciate and agree with this, I don't know that hydrogen necessarily is an alternative to electrification. I think that these two are going to work in concert just as molecules and electrons work today.

And maybe make a broader point, today in our world, as I'm sure you well know, 80 percent of our energy that is being used today, we consume in molecular form. Only 20 percent we use as electricity. So that's just two level sets.

Clearly, these two work together. In fact, the analysis of how it is going to look like in a zero-emissions world suggests that it is going to be more or less half and half, which also makes sense. We need molecules and electrons to firm up, to back up each other.

And maybe the last point I'll make is that using fuel cell's mobility is the electrification of transportation. In fact, fuel cell electric

vehicles are often made in the same factories as battery electric vehicles, they are both electric vehicles. It's just that the souce of power is different.

I just wanted to make the point because, frankly, I think it's important for all of us in society to think about how clean molecules and hydrogen in particular relates to other initiatives. So that's important.

So I'm hoping I answered the question. But, again, part of it will be definitely dealt with in the alternative study.

MR. BRITT: All right. Thank you, Yuri.

Sal, did you have a comment?

No? You're okay?

All right. Then we're going to go to Arthur.

Arthur, if you could unmute yourself.

MR. FISHER: Hi, there. I'm Arthur Fisher from the Public Advocates Office.

Can you just clarify for me how the study is going to break down looking at in-state versus out-of-state analysis of these different feedstocks and technologies?

MR. FREEDMAN: Our intent -- Arthur, thank

you for that question.

Our intent is to focus on in-state sources for production of clean, renewable hydrogen.

MR. FISHER: Oh, okay. So there's no intent to go out of state for either the biomass or the electricity?

MR. FREEDMAN: Not at this point. And that's not to say the question -- that it shouldn't be looked at, at some point.

Again, as we look at hydrogen becoming a regional commodity across North America, that approach makes fundamental sense.

For our purposes, and given that we are a company that serves our customers in the state of California, we are going to look for now at the in-state resource.

MR. FISHER: So just an observation, the -- a lot of the economy of scale in the electricity sector is being gained by getting out-of-state resources by using it to take electricity.

MR. BRITT: Arthur, we're having trouble, again, hearing you. So if you could just talk a little bit slower, our court reporter would appreciate that.

MR. FISHER: Okay. Sorry about that.

Just an observation, for the sake of completeness, would it be preferable to look at both in state and out of state? A lot of the economies made on the renewable sector has been as a consequence of out-of-state resources.

So I think just for completeness of you for the future, it would be important to look at both. That's my comment.

MR. BRITT: All right. Thank you for that.

Anyone else in the room?

Okay. We're going to go now to Tyson.

Tyson, if you could unmute yourself.

MR. SIEGELE: Hello. Tyson Siegele with the Utility Consumers Action Network.

So there are a couple things that have been mentioned so far that I think really are interesting in the production piece of the analysis.

One is, Yuri, you were just talking about how hydrogen fuel cell vehicles are electric vehicles just like battery hydrogen vehicles. I completely agree with that.

The -- I think the interesting piece

becomes the round-trip efficiency of hydrogen for use in fuel cells and taking, essentially, electricity, turning it into hydrogen, turning it back into electricity, compared to taking electricity, putting it into a battery and taking it back out.

I'm sure you're aware that the battery electric vehicles have a much higher round-trip of efficiency than hydrogen, and that's the case both for vehicles as well as the production of hydrogen just generally.

When you create hydrogen, it's a very energy-intensive process, and you lose energy in that process.

So the question becomes: How do you -- how do you take a look at the production cycle such that you have hydrogen-produced electricity competing with either electricity that either goes straight from the solar or wind directly into the grid or going into the battery.

Either way, more efficient than going through a -- an electrolyzer, becoming hydrogen, and then, you know, back into electricity, or combustible energy.

So you have, basically, hydrogen as a

competitor with a product that makes the hydrogen.

So I'm assuming that your take on this would be that anytime that we could put that electricity that's produced through solar and wind directly into the electricity grid instead of turning it into hydrogen, that is a better use case simply because you're using less energy, you're wasting less energy; is that correct?

MR. FREEDMAN: Yeah. Thank you. That's -- it's a great topic, and we may not be able to cover it in all the details here, but I'd love to get engaged into this conversation even after we are out of time, if we may.

I'll start with your second point, Tyson.

I think that the way, at least that I think about this, starts from this very macro level: Do we or do we not need clean molecules in our world?

So the question -- sorry, I'll slow down.

So the question may be not what you do with the wind and solar farm that you build, and where you put this extra marginal electron.

The question in my mind is: Do we or do we not need those clean molecules?

And I think the analysis by the bodies

that are not suspect of being less than environment oriented, for example, Bloomberg New Energy Finance, that analysis suggests that we do.

Again, we actually need a lot of them. Again, half and half of what they come out with.

So if you think about all the effort we spent scaling up clean electrons, we should have spent as much effort and capital and public support to push forth green molecules because they're not at scale to date. That's the first point.

The second point, if you accept that first point, then the question is: Which of those green molecules can scale up?

And the answer, I think, several. Biogas can scale up. Liquid -- the efuels can scale up. But hydrogen has potential to scale up probably at least as much or maybe more than many other clean molecules because of the potential to use it across a very wide range of sectors.

Frankly, not unlike natural gas, and they went wide there. Because if you think about our priority sectors, if you talk about the demand analysis, you can use hydrogen transportation. For electrification of transport, you can use the power generation and you can use the industrial sector,

and that's far from a complete list.

So once you come up with a view that you need those clean molecules, the question becomes what is the cheapest way to make them?

And the cheapest way to make them is to find the highest quality source; to make sure you have all the ingredients in place; to make sure the technology is mature; and to make sure you can bring it from where it is being produced to where it's needed.

That is the, again, very high-level logic that maybe gives a part of the answer to that, to your question, but, again, I'd be happy to dig deeper given the time.

And very briefly, on your first point, the efficiency argument is being brought up frequently.

The way to think about efficiency -- and first of all, on a lighter note, someone said that if we wanted an optimally efficient mobility vehicle, we would be using a bicycle, not a car, which is actually true, technically. It is significantly more efficient.

It also, however, cannot perform many of the tasks that a car can.

So my serious point is that efficiency

should be looked at in the context of whether I can make it -- what is the cheapest way to make it.

And if the production of hydrogen is going to go down in scale to the point where it is competing or it is superior in cost, then that is the preferred path.

Important point to wrap it up with is think about the value of what you've produced, not just of its cost. When you are going to live to experience multi-day power interruption, I am not familiar with any better setup that's going to keep your lights on.

As long as you have enough solar panels and electrolyzer capacity in a storage tank to keep hydrogen and fuel cell, you will never lose your power.

So better for resiliency, even though it's poorly quantified today, is undoubtedly something that we in society focused on a lot, and hydrogen should be thought of as the model that provides that resiliency.

Again, there's lots of ground to cover here; I'm just trying to give you some high-level response.

MR. BRITT: All right. Thank you, Yuri.

Do we have any other thoughts or questions from the group?

Again, I want to encourage those of you that are online that have not had a chance to speak yet, to think through, you know, some questions that you might have related to these subjects.

I also just want to remind everyone that today's meeting is -- there's a lot of information going on here. We produced the 32-page document that you also have access to. We encourage you to spend some time in that and give us some additional feedback by the end of the month. Insignia is going to be capturing all of that and making sure that all of that gets put into the formal technical process.

So with that, seeing no other questions or thoughts, we'll go to the next presentation, which is -- oh.

Actually, theoretically we have a break, but I think unless anyone is dying to have a break again, we can keep going. I think we have one more, so let's go through it.

All right. Oops. I went too far here. High-level economic analysis and cost effectiveness.

You're up again, Yuri.

MR. FREEDMAN: Indeed. Yeah. Thank you, Chester. So this is the third and maybe last for today.

MR. BRITT: Yes. It's the last for today.

MR. FREEDMAN: Again, this is a very important analysis, and we touched upon several aspects in previous conversations. You can appreciate that it very much dovetails with the production work because this is about cost effectiveness of hydrogen, and then this slide lays out three key levels on which this analysis is going to take place.

I know we spent a lot of time earlier today talking about the box on the left, talking about the levelized cost of hydrogen.

But just to be -- and to be clear, this is something that is going to be calculated using the capital cost, operating cost, and several other parameters that are going to be input, because ultimately this is how we calculate a commodity over a period of time.

So think about some which are going to make one-time investments in capital and then the operational expense, and over the essence life, you

are going to calculate something which provides a return on that investment. That's what we mean by LCOH.

It is not a new concept to the energy world. You may have seen many of the analyses that talk about LCOE, levelized cost of energy. So this is effectively used in the same approach to calculate the cost of this.

We are going to examine -- that's the box in the middle -- where is the decarbonization alternatives, and that's something that, again, was covered in a fair amount of depth today.

Electrification is the one that was covered most about power analysis, but we also have energy efficiency, which obviously is the pathway. You're reducing your energy use while going to explore different clean molecules, such as, for example, biogas.

And then we are going to look at the pathway, which actually keeps using potentially what the users use today, but evacuate carbon dioxide and then either sequester it or utilize it, which is called sometimes CCUS, and in this case, we note it as carbon management.

So this effect will have various

decarbonization pathways, which always are going to, again, vary and we are going to look at them all.

The last, the box on the right is ultimately going to look at -- double-click or zoom in on the hydrogen to say: Okay. If hydrogen seems to be the best molecule to decarbonize a given sector, what way of using hydrogen, what ways of transporting hydrogen is going to be the best?

And today, as you know, hydrogen is being trucked to the stations in California. There are ways of transporting -- if not hydrogen, but its derivatives -- by train.

There's also the marine sector that is going to look -- again, the jury seems to be out on the various pathways of decarbonization of marine sector, whether it's methanal or efuels or hydrogen or ammonia. The jury's still out.

And last but not the least, we are also going to look at the production of hydrogen next to demand. That's what we call in base in production. It may be the one that is going to be able to come out faster because that is something which we'd love to produce it to the lowest demand.

It just so happens that typically for

every commodity, the production scale takes place reasonably far away from the demand because of the availability of the source, because of cheaper land.

But we are going to examine the possibility of producing some amounts of hydrogen closer to demand, closer to the Los Angeles basin so we don't have to carry it from far away.

That is the multilayered scope of the study.

So this may be the only slide I have on this. This slide clearly understates the level of quantitative analysis, which is going to go into that, but make sure we are going to look very closely at all the numbers.

And what we didn't mention here, of course, is we are also going to incorporate in this analysis the range of recent legislative developments at the federal level, quite simply, the support for hydrogen that is received in the Infrastructure Investment and Jobs Act, as well as in the Inflation Reduction Act, which, of course, is very significant.

Let me pause here for questions and comments.

MR. BRITT: All right. Tyson, I think I see your hand up again. And you might have raised it as we were leaving production, so if you wouldn't just mind clarifying what your comment or question is about, and then go ahead.

MR. SIEGELE: Hello. Tyson Siegele with the Utility Consumers Action Network. Thank you, Chester.

Yeah, I did have another follow-up on the production topic before. I have a couple questions on this new topic as well.

So in terms of the production, one of the pieces that we keep coming back to is that cost will come down and that the DOE has a goal for a dollar per kilogram, somewhere around that range, for the future.

I think that cost will come down. I think that is correct. I think that electrolyzers are definitely a technology that will benefit from scaling.

So the question then becomes: When do we invest? When do we -- when do we look to produce hydrogen? Do we look to produce hydrogen before costs come down or after the costs come down?

One of the things that we see when we take

a look at the scaling of other technologies, like solar, is that when California invested in solar, it invested before the majority of the current capacity for producing solar had been built, and solar was fairly expensive.

And so that has led California to have much higher electricity prices in their solar production than places like Texas.

So then are we better off to put electricity into the electric grid, which we need to decarbonize that also, right now, and wait for electrolyzers to come down, or are we better off to put electricity into electrolyzers where we lose a good chunk of the electricity when we do that?

And so my -- and I think that it's probably pretty clear from what I've said so far, but my recommendation is that we optimize the purchase timeline of these types of technologies.

And right now we know that solar is very inexpensive. As you just mentioned, the Inflation Reduction Act put in a lot of subsidies for a lot of things, including renewable energy generally, wind, solar, in addition to hydrogen.

And so we have an opportunity to buy a lot of solar at this point.

And the SB100 report has said that we're going to need about 120 gigawatts worth of new renewable energy just for the electric grid, which means that we have a long way to go before we are at 100 percent clean energy for the electric grid, where we are going to be using that electricity much more efficiently, where we are going to be eliminating a lot more emissions when we put it there instead of put it into an electrolyzer.

Like I mentioned earlier, I think there are three places that we probably will have a demand for hydrogen in the future.

The question is: When do we move forward with that purchase of hydrogen, that purchase of infrastructure?

And I think the other thing that would help to inform when we do that is to take a look at those places where we will need hydrogen, like long-distance train travel, long-distance air travel. And do we have commercialized technologies in those areas that will be able to accept hydrogen that's being produced right now.

So the question for you, Yuri, is: What are your thoughts on that? When do we make that investment? Does it make sense to make it now

versus later?

MR. FREEDMAN: Thank you, Tyson.

Again, that's a lot to cover, but let me -- I would say I actually agree with, I think, almost everything you said.

I think that the reduction of cost of renewable energy is a tremendous -- I wouldn't call it a gift; I think it's a success.

And that success came only because the state of California made a strategic decision to invest in renewables early on, which is to say, we like to look at those cost curves, the costs do not reduce themselves.

And if you look at the initial power purchase agreements, they were, if I recall correctly, way over $200 per megawatt hour, which was extraordinarily expensive at the time.

And the only reason that we were able to bring those costs by a full order of magnitude to world-surprising envy in the space of one decade is because we applied all the support, which drove scale up, which drove costs down.

So I think it's really important to understand that what happened was not a coincidence or was not fortuitous outcome; it was a direct

result of the policy application and initial investment where, on short-run economics, were absolutely unprofitable.

Who would sign purchase agreements at $200 per megawatt hour?

So it made sense then, and that's exactly why we find ourselves today as the global leader in renewable energy, in clean electrons.

If you combine that fact with a conclusion, which is really unavoidable, that we will need as many clean molecules as we need clean electrons, there is very little question in my mind that we will need to do exactly with clean electrons as we did with clean molecules, which is to facilitate the production and then the transportation at scale to see the same result as we observed in clean electrons.

That is my observation. Again, I want to come back and say the cheap renewable power price is one of the best things, and that is one of the game changers that is going to make green hydrogen here a reality.

So these are not the competing narratives; they are deeply complementary.

MR. BRITT: Thank you.

Tyson, we are going to take one in person, and then we'll come back to you.

MR. SIEGELE: Sure.

MR. BRITT: Sal, go ahead.

MR. DICOSTANZO: Thank you, Chester.

So I know we can only speak from our perspective or our point of view, but once again, in the harbor, we are in a space that is particularly suited to the use of hydrogen.

I see on the board up here various forms of the word "efficiency," whether it's effectiveness or effectiveness again. It's all efficiency.

For something to be efficient, it has to work in the first place; right? Then how well it works is a measure of its efficiency.

So our two port partners, L.A. and Long Beach, have been on the forefront of doing their community action plan since 2007. So for a long time, different iterations have been trying to clean up our local environment.

And one example of it is the green omni terminal in L.A. It's been around since 2015. They've done a lot of good work there on demonstration projects, trying to move things

forward.

But I'll be honest. From an end user's standpoint, we are on a third generation of battery electric equipment, and it still doesn't work. It's still failing; in other words, not doing the work that it needs to do, at least in our space.

Even worse, it's catching fire. This is not just L.A.; on the Long Beach side too.

That terminal that I mentioned before had an AGV, an automated guided vehicle, catch fire. The battery just caught fire. I mean, the plume went on for hours. It took eight hours to put that fire out.

I would imagine that the emissions from that one event probably compensated for, I don't know, months', if not years', worth of emissions reductions that their equipment has put in.

So, you know, battery electric is not without its problems.

In the eight years that I've been quoting since the omni terminal started -- eight years, that's a long time. I've been focused in the hydrogen space, reluctantly, I have to admit, only for about a year. I'm at a very basic level of understanding of the engineering, et cetera, so I

appreciate all the input from everybody else.

However, I have to say, from our experience, hydrogen just works better. In the few months -- less than a year, for sure, that we've been working on the retrofit at Phoenix Marine, this piece of equipment really works.

It's our top handler, and it picks up containers and stacks them five or six high in deep piles, and it goes through a duty cycle, which means that that piece of equipment can work for at least eight hours, and they're going closer to 20 on this next iteration that's coming back.

So that solves a host of problems. Safety for the operators. Safety for the cargo owners, that it won't be damaged, it won't be dropped.

It eliminates the need for charging of infrastructure to be put in and precious land to be dedicated towards this is where the truck -- this is where the top handler drives to and parks and charges for six or eight hours or however long it takes.

So those are extra costs that our employers have to bear and ultimately we all have to bear.

So as we're looking at all of these costs,

I keep coming back to the point there are hidden charges around electrification that don't get enumerated, that don't seem to get included in the final analysis. Maybe it's just too hard to account it all that way.

And I won't get into minerals. But we have a 2030 timeline on cargo equipment and a 2035 timeline on over-the-road trucks, drainage trucks and -- to get to zero emissions.

And we have -- we can't ding around on the edges and try to nibble here and there. We have to push this thing through and have the resources we need to get the job done.

The small stuff, people's cars and appliances, whatnot, electricity does that. We don't need to reinvent that, but there are short-term goals and there are long-term goals, and we need them both.

So that's my comment.

MR. BRITT: Thank you for your comment.

Joon, you have your hand raised, and then we'll go back to Tyson.

MR. SEONG: Yeah. Hello. So I wanted to come back to this slide that we have up right now.

And as -- Yuri, as you might know, and as

your folks in SoCalGas might know, leakage -- hydrogen leakage is a growing concern, and there's concern that hydrogen leakage may negate a lot of the climate gains that are potentially possible with the adoption of hydrogen.

And I assume SoCalGas is concerned about that and will take actions to mitigate that.

And I would also assume different delivery methods to carry hydrogen would mitigate the risks and, therefore, the associated costs of leakage mitigation.

Would the high-level economic analysis take that into account in conducting that analysis? Thank you.

MR. FREEDMAN: Thank you for the question.

I would say that leakage is a topic that is quite important, and it's not going to be addressed in a technical element study.

I will say that -- and I'm sure a familiar source, the California Public Utilities Commission, issued a report which was performed by the University of California Riverside, which took a rigorous view on leakage in laboratory conditions.

And I encourage you to, if you haven't, read through that report, because what it indicates

is that the subject of leakage is today understood, I wouldn't say "poorly," but incompletely.

And I think the paper, which was published by Environmental Defense Fund, actually supports that statement. Because, if I recall correctly -- and correct me if I'm wrong -- they took the view of leakage between 1 percent and 10 percent, which was not supported by any real-world data.

So I think what we need to do is to collect hard data on leakage so that we can with confidence understand the impact that hydrogen leakage can have on the -- on the environment and its greenhouse effect.

I think it's an important topic. I think it deserves rigorous and supporting conversation.

MR. BRITT: All right. There will be a whole study on leakage as well, I believe, what we talk about separately.

We're going to go back to Tyson now.

Tyson, if you could unmute yourself.

MR. SIEGELE: Hello. Thank you. Tyson Siegele with the Utility Consumers Action Network.

I am -- one last item on the production and then I'll also go ahead and provide some

comments here on the alternatives.

The -- in terms of production and in terms of driving down costs, California did invest in solar, but as a percentage of overall world investment in solar, it was just a very small percentage.

The -- that wasn't -- that did not account for electricity -- that did not bring down costs for electricity for California residents, and at this point, we see that Texas has surpassed California in wind production supposedly in May.

I'd have to double-check this, but supposedly in May, they surpassed California in solar production, and Texas has electricity costs there about one quarter what California's electricity costs are.

So that is -- that's my concern in terms of investing too early, is that Californians will be stuck with a bill that will not be -- will not be the most cost effective way to move to a clean energy future.

With the alternatives research, one of the pieces that was mentioned earlier -- I think Arthur mentioned the production of -- production of hydrogen through electrolyzers, electricity brought

in through transmission or, you know, producing hydrogen outside of the L.A. area and then having that hydrogen-based electricity, that electricity brought into the L.A. area.

One of the alternatives that was mentioned was building new transmission lines. I also would like to recommend an alternative of simply using the existing transmission lines.

Right now, if you take a look at the amount of transmission that we have in California on the TISO system, which serves about 80 percent of California, on average, on a daily basis, there is 50 percent spare capacity.

So there's a lot of electricity that could be transported through that transmission without having to build a new transmission.

So that's an interesting alternative to take a look at.

And then the other piece is taking a look at once the electric grid is decarbonized, whether or not it makes sense to focus on that and then to distributed electrolyzers, essentially behind the meter type of generation either at the ports or at the airport, you know, within whatever facility that needs hydrogen, use the fully decarbonized

electrical grid to produce that hydrogen on site and to do it in a way that doesn't require a large -- a large pipeline.

And so those are a few different alternatives that I wanted to mention in terms of technical alternatives.

The other question becomes -- and I've sort of referenced this a few times -- is it better for Californians to have SoCalGas provide hydrogen or a public utility to provide hydrogen?

LADWP is a -- has a lot of union -- a lot of union workers that are doing great work every day. LADWP provides electricity at lower rates than Sempra electric utilities do.

So then the question becomes does it make sense for California to have another utility for hydrogen or to create hydrogen through a public utility that is owned by the bio consumers, by the ratepayers?

So using that as another option and looking at the cost of that is definitely worthy of being in the Alternatives section.

And that's the last of my remarks there.

MR. FREEDMAN: Thank you, Tyson.

Let me go over your comments. I'll start

from the first -- I apologize if I miss some -- I think that your comment about California investing a little capital in solar, I think you're right.

I also think that that's not something we should be, as a country, in any way proud of because what happened in solar is that China came in and dominates solar production today to a degree that we are probably going to find somewhat, you know, poison thoughts to the rest of the country.

If you look at the production of the solar panels and the other equipment in that sector, we would be doing this hearing in California. We would be creating California jobs. We could be providing us energy independence and energy security, which I think in this day and age is a very important attribute at all levels.

So that, in my mind, is something we can learn from the solar industry.

Yes, we were pioneers, but we could have created more value, in my mind, for the state and for the country if we had gone to larger scale and we had the opportunity to do this in hydrogen.

That's my point on your comment on the -- on what country is in best position to invest in real resources.

With respect to alternatives, we are going to take your advice on the consideration. We are going to examine the electric transmission as an alternative to hydrogen. We are going to consider looking at the existing lines.

As for the qualitative production, again, I think the example that I'd like to bring is maybe the rooftop solar. Yes, there is a helix to scale solar in California and there is a community solar and there's a rooftop solar. And I think if you look at the cost of that level and the cost per unit, rooftop solar is significantly more expensive than helix to scale.

The economies of scale are kind of a stubborn thing, and if there are economies of scale, then there is a decent economy of lack of scale, which is to say, I think there are some applications -- there are some applications where hydrogen may make sense to produce close to demand, but I think -- that's the my hypothesis, which we need to prove.

What we will find out is that the large scale is going to result in overall lower cost, which is ultimately the benefit of the consumer.

And I'm sorry, but I think I may have

missed your last point.

Would you repeat that?

MR. SIEGELE: Sure. The last point was: Does it make sense for SoCalGas to do hydrogen, or does it make sense for a different utility to do hydrogen?

One of the -- one of the just things that you see in study after study is that public utilities are producing electricity and providing gas at lower costs than investor utilities, and it makes sense because investor utilities have to provide a profit to their shareholders, and investor utilities have a higher cost of capital and just higher costs generally that they have to make sure to cover.

So the question is: Does it make sense for SoCalGas to be a provider of hydrogen, or does it make sense for a municipal utility?

AltaSea, a lot of the -- a lot of the need for electrolyzers is through the electricity side.

So then the question also becomes: Does it make sense for SoCalGas versus, say, Southern California Edison or a different utility to provide hydrogen? Because there's elements of both electric and gas.

And so that is the question in terms of alternatives. Why SoCalGas, I guess is the question. Why?

MR. FREEDMAN: Thank you.

So I'll start by saying I think I heard you say -- make several statements, and I'm personally unfamiliar with any of the data that must be underpinning your statements with regards to higher costs or -- again, I'm unfamiliar with the facts and numbers that would support what you assess.

But that aside, if you look at the history of Southern California Gas Company, one interesting fact is that for maybe half of our life as a company, we have been transporting hydrogen.

And what I mean by that, the natural gas was discovered as a fossil fuel to scale that happened around the 1950s, 1960s. We actually were transporting and delivering to customers town gas. And that's, I think, well-known.

What I think is maybe less well-known is that town gas comprised anywhere between 40 to 50 and more percent hydrogen.

So again, we have experience in dealing with gases containing hydrogen as a company, and

that's for the basis among, I think, our safety culture and all the policies and procedures that we at SoCalGas have and have had for -- now for 150 years.

I do not know -- I do not have an opinion whether the Los Angeles Department of Water and Power is well-equipped or has any interest in making hydrogen, but, again, we at SoCalGas believe that we have a right to deal with this molecule, and I think for users to be shared by the California Utility Commission, as evidenced by their decision in December.

So I think that what we propose, we believe has the potential to be the most beneficial path for the ratepayers, for Californians, who I think deserve affordable and reliable energy.

MR. BRITT: All right. Thank you, Yuri, for that answer.

Katrina, I know you've been patient with your hand up.

I also see, Marna, your hand up.

And then I think Sal -- or Ernie has something to say as well.

So we'll take Katrina, and we'll do Ernie in person and then back to Marna.

Okay. Go ahead, Katrina.

MS. FRITZ: Hi. Going back a little bit to some of the end uses, I want to reiterate the transit bus side as well.

Many California fleets are now converting all or part of their fleet to hydrogen and fuel cell buses, and that is based on real-world testing. And there's a lot of performance data that has come out of those tests as well, and cost data.

So to the point of Tim before, we're seeing that the overall cost can be much more on the electric side than on the fuel cell side, sometimes because of the upgrades that are required.

So AC transit had a significant data that they put together, in part, with Stanford University and some of the national labs. Foothill transit recently conducted these studies, and they also have a set of data.

So that's something that I think should be included in here and certainly looked at when looking at demand, is the transit agencies.

I have a question now for Yuri, and this goes, in part, to some of what Tyson's bringing up,

which is timing.

So if we are looking at development being on carrier for a hydrogen pipeline, this is not a short-term activity; it is a long-term activity.

So I would like Yuri to respond to the idea of costs coming down in the supply chain for electrolyzers, for fuel cell technology over the same time that the development and build of the Angeles Link pipeline is taking place.

So could you comment to that, please, and whether -- how is that integrated into the plans?

MR. FREEDMAN: Thank you, Katrina.

And your point on transit is very well-taken. We are going to capture transit, which is a very important element in our world.

With regards to timing, there is going to be a synchronization and a synergy between the post production on the production side and the development timeline for pipeline, because, as you said, it does take time to develop a pipeline.

So I think if you look at the cost occurs and then extrapolate what has happened to date and look at the scale and the magnitude of the production that is going on economy, which, I think it is going to be in alignment with the timeline of

the infrastructure development, as it should be, because ultimately, it all needs to be in place in time in order to provide this cost benefit to the consumer.

MS. FRITZ: Thank you.

MR. BRITT: Thank you.

Ernie?

MR. SHAW: Ernie Shaw. Thank you, Chester. Thank you, everybody. We need to wake up. I know we ate a good lunch.

Yeah. So big Tyson; right? Once again, he also has good information, man. I'm always listening and trying to absorb anything, but I wish he would smile more. You've got a little smile going on. You almost had it.

So anywho, so to the point that you had mentioned, you know, can and should another utility pretty much, you know, kind of take control of this whole hydrogen thing instead of SoCalGas.

My response to that -- my question to you is: Are you prepared, then, to deal with, you know, SoCalGas potentially laying off all my brothers and sisters, you know, utility workers saying, "Sorry, guys. This ain't going to work. You're all fired."

Now, that would increase unemployment, homelessness, I mean, all that potentially.

So Question 1: Is that something that you're prepared to deal with, kind of lying on your consciousness with that? If you want a statement like that, say, "Give it to somebody else."

And two, you know, earlier when you had mentioned, like, you know, as far as playing on the defense, like should we wait and see, you know, if we need it now rather than, you know, as opposed to later, you know, if later happens, later happens, but we've got what we've got going on now. We're moving. We're seeing what we're going to deal with. And if we're going to wait, then, in between, let's just say costs might go up when they realize hydrogen is going to be a great thing. Now you need it? This is what it's going to be.

So all those costs would go out. The rates potentially. Supply and demand, as they say; right?

And then we potentially box ourselves in. So say if everything's highly reliant on solar, wind, and electrical, could their grid -- I'm not an expert, right. Could their grid, as great as they are, support that?

Now you've got blackouts, especially with all the record, you know, heat waves that we have going on.

Say if we had blackouts with that or everything shuts off as a result to kind of conserve and save energy.

Now you might have deaths, right, from people dying from the heat in their homes and not being able to control their ACs and all that.

So that's my question to you, Tyson.

MR. BRITT: So I want to just interject something because the temptation when we have these technical studies is to try to jump to the end of the studies to draw what conclusions that we should make as a result of the studies.

I think the important thing, and why we're here today, is to focus on the studies themselves, because the studies are going to answer all these questions; right?

The issue of looking at cost effectiveness is exactly for that point. Like, is it cost effective to do it as SoCalGas has proposed to do it? And if it's not, the studies are going to show that; right?

Is the demand sufficient to support doing

this? Is there safety issues that would be a fatal flaw to this process or not?

So I think I would just challenge all of us as a group to really focus on the studies themselves because the studies, if they're done right, as neutral parties, you know, these third-party vendors and technical consultants that SoCalGas is hiring, experts in their field with great reputations -- they're going to do the work.

So a lot of the conversation is about -- is becoming qualitative, and that's okay. We're taking it all down. We're noting it all.

But we really need as much input as you guys are capable of giving us related to the scopes and exactly what it is that we may or may not be including in the scopes that we should be looking at.

So those studies, when they're done, no one is poking holes in it and saying, "Why didn't you look at this? Why didn't you look at that?" Now is the time to look at that.

So I'm not chastising anyone's comments. I love the conversation. I think we're having a good conversation. But I just don't want us to wander away from the purpose, which is that we're

looking at how the studies are structured to get the results that we're looking for that can answer all of these discussion topics that are coming up.

So I'll just get to that. Then I want to get to Marna. Marna's been patient. She's had her hand up for a while. So let's get to Marna and take her comment.

If you're talking, Marna, we can't hear you. You need to unmute yourself.

MS. ANNING: Okay. Can you hear me? I was trying to unmute.

MR. BRITT: No worries. We're patient. Go ahead.

MS. ANNING: Again, this is Marna Paintsil Anning with the Utility Reform Network.

I do have some input, after listening for some time, and my input is kind of merged into some questions that I think respond to the comment that you just made about providing input into the scope of some of these studies.

So cost effectiveness is something that TURN is very interested in, particularly with respect to the impact on nonparticipating ratepayers.

And I just want to start off by mentioning

that because that was part of the application preceding discussion, essentially looking at who would be responsible for eventually paying for this large-scale project. And so cost effectiveness is something that is very prime -- a prime consideration for these studies.

I wanted to start off a little bit by talking about the cost effectiveness methodology that is being proposed.

Something that we would like to see is not just that the use of CAPEX and OPEX -- forgive me if I'm not saying those correctly -- are based entirely on SoCalGas's cost.

We would like to see a comparison of CAPEX and OPEX -- excuse me -- to existing market inputs, comparative analysis for what is already being produced on the market, because -- I say that because I think the elephant in the room with respect to this discussion is that hydrogen is not currently cost effective at the price point that it is at compared to other alternatives, and that is the basis that we're starting from.

And so the idea with this economic analysis and cost effectiveness analysis is to determine whether or not it can be cost effective,

especially given the inputs that would be required to develop a pipeline versus other alternatives that were discussed in the proceeding.

So one of the things that we would like to see is a comparison to existing market inputs and how SoCalGas is planning to essentially make this more cost effective or how this project can be delivered in a cost-effective method.

I also wanted to provide input as to whether or not the cost-effective methodology is going to utilize some of the existing standards that the Commission has promoted for distributing a generation project.

Because we're considering hydrogen as another alternative -- or alternative energy source, and there are methodologies and standards that the Commission can establish, like the resource task, the ratepayer impact task and things of that nature.

And so one of the things I'm wondering is whether SoCalGas is planning to give the consideration to apply some of the existing standards and if not, what is the reason?

Are we developing a new standard? Forgive me if I didn't hear this earlier. Or, you know,

will we be able to utilize the standards that are existing in order to determine what the real impact of the project is as a whole and not just the delivery of hydrogen or hydrogen as an alternative, but really focused on the project itself, the pipeline, building of the pipeline, the cost involved and things like that.

All of those things -- the operational expenditures -- all of those things that would go into a TRC or an RIM -- R-I-M -- forgive me if I'm not using the right terminologies -- that would help us have a clear view of this project that is a viable alternative -- or it does provide a viable alternative for energy.

And then finally, I wanted to, you know, on that note and also kind of -- in listening to the discussion of whether this would be better handled by an affiliate or another -- or existing -- or the existing hydrogen market, when we're looking at something like the ratepayer impact, you know, SoCalGas was, you know, directed by the Commission to join the California's hub ARCHES effort and apply for federal funding in order to reduce the overall cost to ratepayers of this project.

Because, again, I think the conversation is becoming a bit convoluted because we're not just talking about hydrogen as an alternative; we're talking about this project that has potentially billions of dollars of ratepayer funds to build a pipeline or alternatively build hydrogen hubs.

So I think that one of the things that we would be looking for in this study of cost effectiveness is whether the participation in ARCHES or in the California hub, or whatever they're calling it now -- it has the potential to reduce the cost of the project and not just the cost of hydrogen as an alternative fuel.

And I think one of the last things that I will bring up is the fact that as we're looking at cost effectiveness, we do have to consider the fact -- and I think EDM has provided us some initial, you know, study on this -- that hydrogen does require, you know, the use of -- production of hydrogen does require the use of water and also the use of solar energy, and so it's not an independent resource.

And so I think that in the cost-effective analysis, we do have to look at the inputs and whether the inputs in the production of hydrogen

itself, not just, you know, the building of the pipeline, warrant this as a cost effectiveness -- excuse me, as a cost-effective project.

And so those are my initial thoughts -- or those are our initial thoughts -- excuse me -- on cost effectiveness, and I'm hoping that these considerations will be incorporated into the study so that we have a full view of not just, again, the resource of hydrogen, but the cost effectiveness of this project independent of the fuel that it will be transporting.

And thank you for allowing me to take some time to comment.

MR. BRITT: Thank you, Marna. I think you took a lot of notes as you were listening. Great input.

I don't think that was a question. I think it was a comment, right, Yuri? Yuri's, like, sweating over here.

I think Tyson has his hand raised, but if anyone in the room has something to say, we want to go there first. Otherwise, we're going to end with Tyson because we want to come in on time, because we want to end at 2:30 because you guys have been here for a long time.

So does anyone else in person have anything to offer for the good of the order?

(No response.)

MR. BRITT: So Tyson, you're going to have our last say today. So if you could just unmute yourself and make your last comment.

MR. SIEGELE: Hello. Tyson Siegele, Utility Consumers Action Network.

First of all, Ernie, I do appreciate the dialogue, and I absolutely -- I want everybody to have a good-paying job. I want to make sure that the world is as good a place as we can make it. So that's Number 1.

Number 2, you had mentioned, you know, do we invest now or do we invest later? Let's move forward with what we have now.

One of my concerns with that is just how high the costs are with hydrogen right now. I -- honestly, I have to admit, I have not taken a look at the AC transit studies. I definitely will do that before the next meeting, but the Department of Energy publishes retail costs for filling stations for hydrogen, and they do it on a quarterly basis.

One of the data points that Neil mentioned before is the 1 dollar a kilogram for hydrogen, and

right now on a gasoline gallon, the cost of hydrogen in the April 2023 study is $23.63 per gallon of gasoline equivalent. It's very high.

And so we do need to make sure that we're not too early to the party so that when we are -- when we're creating hydrogen, when we are making our world a clean energy future 100 percent, we definitely need to do it in the right order.

And so I think that taking a look at the prices -- Yuri, you mentioned the cost curves. Of course. Absolutely. Let's take a look at the cost curves and how that works in with actually building the infrastructure.

It doesn't hurt us, though, to focus on the electric grid first and then hydrogen second if that's the most cost effective way to go about it.

And so right now at $23 per kilogram, I think that's too high a price for California to pay.

And so then the last thing, Ernie, that you had mentioned was: Can the electric grid support the need.

And I think that that is definitely something that we need to continue to review and continue to study, continue to make sure that we do

have a reliable grid, we do have a reliable energy system.

And the California Energy Commission and the California Utilities Commission does do a lot of analysis on that day in and day out. So, you know, hopefully we can continue to keep up that good work.

And with that, I'll go ahead and conclude my comments. Thank you.

MR. BRITT: Thank you.

Did you have anything?

MR. FREEDMAN: Yeah. Thank you, Tyson. I appreciate it.

Again, I realize we are all short on time to have a more meaningful discussion on that. Maybe a couple quick points.

So I agree with you about 100 percent on the cost preservation. I think we -- you and I are on the same page. Hydrogen costs today are high. They are as high today as renewable costs were in, let's say, 2005.

And do you know what needs to be done to reduce those costs? That's to build this at scale. That's what we did, and that and only that is what dropped the price of renewables down by a quarter

of magnitude in one decade.

We found the molecule that can serve a very important role in the state. We need to drive down its costs. To drive down its costs, we need to produce it at scale, and federal legislation gave a big push to that, and we need to bring it at scale at low costs, which is what the pipeline does. It's as simple as that.

And we in the state know the path to travel. That's one point.

My other point would be -- and I don't mean to just quote because I know we can have a conversation, but when you say it doesn't hurt to focus on electrons today and molecules tomorrow.

I actually disagree with this fundamentally. It hurts a lot to focus on electrons and ignore molecules because it is what is going to keep your lights on, not just your lights on, but the medical facilities and the police stations and the airports and everything else in the state when the renewables are going to be -- are going to exhibit their intermittence.

We saw this last September. This was not an isolated event. Intermittency is here to stay.

And, by the way, the more you believe in

climate change, the more you should assume that the interruptions will be more prolonged and more severe.

So we should not be planning for yesterday; we should be planning for tomorrow. And molecules are as critical tomorrow as they were through the history of mankind.

So that's why hydrogen is absolutely indispensable. The resiliency in your reliability of energy to take this excessive energy, which we overproduce in March, when no one needs that around, and to bring it into August or to September, when we need it badly and transmission lines are overloaded, that's when molecules play a key, important role, and we absolutely need them to play an important role.

MR. BRITT: Thank you, Yuri.

All right. We got to the debrief and wrap-up, if you can believe that.

We started off this morning where I couldn't get you guys to speak, and now we're at the end where I think you guys are all exhausted to speak.

I wanted to just give my thank-you to all of you for just participating. I know it's a long

day to spend six hours in a room talking about very technical subjects, and I want to give an immense thank-you to our court reporter. I can't imagine sitting there and staring at people's mouths and trying to interpret what they're saying, because it's hard to hear in this room a little bit.

So she deserves a lot of credit. I want to thank you for that.

I want to just remind ourselves -- you know, we started out this morning talking about safety. There was discussion about lessons learned from other events, like Aliso Canyon and 235.

We talked extensively about the importance of public awareness and education and how important that is. We talked about a lot of things, but those were some of the things that I heard.

You know, workforce training. You know, Ernie made a really strong point about laborers and amendment to training and how they take it seriously every day. It's part of what they do. And he was talking about updating the procedures from natural gas to hydrogen.

And then we talked about preliminary routing.

We had a robust conversation about

alternatives analysis. And really the distinction between alternatives and options to hydrogen as well as the alternative evaluation for routes and constructability.

We then went into Yuri's section when he was talking about demand, and we talked about the issue of cost and pricing being a significant factor, also the timeline.

He went on to talk about production.

We talked about the need to ramp up innovation and scaling, which we just were talking about again.

And then we finally concluded with economic analysis and cost effectiveness, and we talked about the complexity of comparing other energy sources and costs to hydrogen as well as scaling up and who best to do this.

There's a lot in between what I just said. I gave a very quick summary to a six-hour day. We have a lot of information -- all of the information -- not a lot of it. We have all of it. We have all of it documented. It will go into a summary report. You will get that as well.

I just want to remind you, this is the first of a two-part series. We will be meeting

again with you on Thursday, and we would encourage you who are online, but didn't have a chance to come today in person, to try to come. It does make a difference. We have lunch together, break bread together. It's all good; right?

And I know that I'm getting to know all of you as well. I think Ernie and I are going to be friends for life, you know? And I think it's just healthy to be together.

So if you can come, please come. If you cannot come, we understand. We're making it as a hybrid meeting on purpose so that you have the ability to participate online.

I want to also point out that we are having kind of parallel meetings starting tomorrow with the CBOSG, the community-based organization, that we did -- we have been having kind of a shadow of the PAG process, so they will be meeting tomorrow and meeting again on Friday, so they are having very similar meetings.

So I will be back tomorrow and Wednesday -- or Thursday and Friday. I keep thinking that yesterday was Sunday, but yesterday was Monday.

So unless anyone else has anything else to

offer.

Alma, do you have anything?

Oh, yeah. I think Alma wanted to mention the closed survey.

MS. MARQUEZ: Yes. In order for us to improve our meetings, because we are having a CPO meeting tomorrow, I think it would be great to hear feedback from you all.

We do have a QR code in the back. As you exit out, if you could just click on that and give us your feedback to make -- improve these meetings. I know it's six hours, and that's quite a bit of time, but we want to make you as comfortable as possible for this process, and whatever we can do to make that better, we want your feedback.

And there are some -- quite a bit of leftover food, so please feel free to take some home with you because we don't believe in wasting food. So please make sure you take some to go. Thank you.

MR. BRITT: And then, I think, Arthur, you have your hand raised. We all want to make sure we hear from you. I don't want to ignore your hand, so --

MR. FISHER: Okay. I think I'm unmuted.

Thank you very much.

This is just a question. Is there a mailing list or e-mail list of all participants that can be circulated?

MR. BRITT: Yes. The short answer is yes.

Actually, one of the things we were going to talk about tomorrow at the CBOSG is we got that request of the CBOSG as well.

We don't want to assume that we can pass out that information to everyone and everyone is just comfortable with that, so we want maybe an opportunity for someone to tell us that they would not like their information passed around.

If that's the case and you would not like your information passed around, you should let us know, because our intention at some point is to pass out that list that Arthur is recommending so everyone has connection to everyone in the group.

We're not afraid of that, but we want to respect everyone's privacy.

MR. FISHER: So timeline on that would be?

MR. BRITT: This week.

MR. FISHER: So by the end of the week, we could have a mailing list?

MR. BRITT: Yes. Absolutely.

MR. FISHER: By the way, I'm more than happy for people to have my e-mail so --

MR. BRITT: Yeah. I appreciate that.

MR. FISHER: That was my question, so thank you very much.

MR. BRITT: Yeah. Thank you very much.

Anyone else for the good of the order?

(No response.)

MR. BRITT: All right. I apologize for being a few minutes late, but here we go. 2:30. Have a safe trip home.

(Whereupon, the proceeding was adjourned at 2:32 p.m.)

CERTIFICATE

OF

CERTIFIED SHORTHAND REPORTER

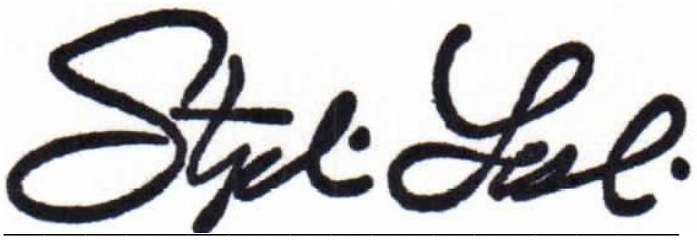
* * * *

The undersigned Certified Shorthand Reporter of the State of California does hereby certify:

That the foregoing Proceeding was taken before me at the time and place therein set forth.

That the Proceedings were recorded stenographically by me and were thereafter transcribed, said transcript being a true and correct copy of the proceedings thereof.

In witness whereof, I have subscribed my name, this date: AUGUST 1, 2023.



STEPHANIE LESLIE, CSR No. 12893

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REGAL
COURT REPORTING

In the Matter Of:

PLANNING ADVISORY GROUP MEETING

TRANSCRIPT OF PROCEEDINGS

July 20, 2023

Case No:

CERTIFIED COPY

PLANNING ADVISORY GROUP (PAG) MEETING

Thursday, July 20, 2023

Reported by:

Stephanie Leslie
CSR No. 12893

The Planning Advisory Group (PAG) Meeting taken before Stephanie Leslie, Certified Shorthand Reporter 12893, for the State of California, commencing at 9:00 a.m., Thursday, July 20, 2023, at 9240 Firestone Boulevard, Downey, California.

APPEARANCES:

Chester Britt
Alma Marquez
Emily Grant
Jill Tracy
Ernest Shaw
Nicholas Connell
Edith Moreno
Arthur Fisher
Miles Heller
Katrina Fritz
Matthew Taul
Tyson Siegele
Chris Myers
Rizaldo Aldas
Hope Fasching
Julie Roshala

APPEARANCES (CONTINUED):

Armen Keochekian
Norman Pedersen
Marna Paintsil Anning
Yuri Freedman
Rodney Cobos
Sebastian Garza
Sonia Rodriguez
Anthony Gomez
Hector Carojada (phonetic)
Nat Williams
Brian Goldstein
Alisa Lykens
Darryl Johnson
Aaron Katzenstein
Eric Hoffman
Kaj Peterson
Maddie Munson
Matt Scrap
Maryam Hajbabaei
Jack Brouwer
Anthony Flores

Thursday, July 20, 2023, 9:00 a.m.

Downey, California

MR. BRITT: All right. Good morning.

I want to welcome everyone online who is just joining our Planning Advisory Group workshop Number 2.

We'll get started just in a moment, but we're just waiting for people in person to grab their seats. So if you're online, please grab yourself something to drink, and we'll start in just a minute.

(Brief pause in the proceedings.)

MR. BRITT: All right. Here we are again. It's good to see you, Norm. You're, like, right in front of me every time. I love it.

I want to welcome everyone to today's Planning Advisory Group workshop Number 2. I want to thank some of you who have come in person for the first time, Katrina, Miles.

I don't want to ignore anyone else who might be here for the first time, but it is good to see -- excuse me -- fresh faces this morning.

For those of you who have joined us online, again, thank you so much. We would --

we're going to continue to provide this hybrid option so that you can participate both online and in person.

And as we go forward in our workshop series and our quarterly meeting series, we want to make sure you have the opportunity to come in person, if you can, because it is a different experience.

I was chatting with Katrina when she first came about how I think it's good. You get to rub elbows with people next to you and break bread, and so I'm excited to have some new people here today.

We're going to go ahead and jump into the agenda. Again, we have another full day. I want to be respectful of everyone's time. We want to provide the opportunity obviously for you guys to weigh in on everything you have to give us input about.

Let's just start with introductions to myself. If you haven't met me yet, my name is Chester Britt. I'm the executive vice president with Arrellano Associates, and I am serving as the facilitator of the PAG and the CBOSG meetings.

One of my counterparts is Alma Marquez, and I'll let her introduce herself. She is the

lead for the community-based organization stakeholder group, which -- we had our first meeting with them yesterday, which was similar to the meeting we had with you on Tuesday.

So another great meeting yesterday. This is our third in a series of four this week. But let me just turn it over to Alma, and she'll introduce herself and do land acknowledgment as well.

MS. MARQUEZ: Good morning, everyone. Thank you, Chester.

Yes, it is a pleasure to be here this morning with you and some of you we saw on Tuesday and again on Thursday. So thank you for staying with us throughout these workshops.

My name is Alma Marquez, and I'm the vice president of government relations for the Lee Andrews Group, and excited to facilitate the CBOs through this process. So thank you again. I would like to give a land acknowledgment.

We respectfully acknowledge the indigenous peoples on whose ancestral land we gather, of the diverse and vibrant communities of Tongva, Tataviam, Serrano, Kizh, and Chumash people, who for generations have cared for these lands and make their home here

today.

We honor and pay our deepest respect to their elders and descendants, past, present, and emerging, as they continue their enduring stewardship of these lands and waters for generations to come.

We acknowledge our collective responsibility and commitment to elevating the stories, culture, and community of the original caretakers of this region and are grateful for the opportunity to live and work on these ancestral lands.

We celebrate the resilience, strength, and unwavering spirit of indigenous peoples and are dedicated to creating collaborative, accountable and respectful relationships with indigenous nations and local tribal governments.

MR. BRITT: All right. Thank you, Alma.

Just a couple quick housekeeping items to get us started this morning. Again, this meeting will be recorded.

I don't see her here in person. I know she mentioned that she might be doing it virtually.

And I've asked Katrina and Miles, who have been participating online, if they were able to

hear, and they said the audio quality on the online experience is good.

So I'm expecting that she'll be able to do her job there and we'll have a transcription of this meeting, so that will be good.

The Zoom microphones are muted if you're online by our host, which is us, to eliminate the background noise. You will need to unmute yourself when we call on you to speak.

Both in person and online, if you could please speak directly into your microphones, that would be great. We have a number of wireless microphones around the table. When it is your turn to speak, if you notice, if I talk directly into the microphone, it sounds much better. If I talk like this [demonstrating], it sounds much worse; right?

So if you could please speak directly into the microphone, it will help our court reporter and it will help us as well in the room just being able to hear.

I would ask also the court reporter, if you are having trouble hearing and you need us to slow down or repeat something, please just raise your hand and Steve or Nancy, who are our staff on

the side managing the Zoom meeting, will interrupt the meeting and make sure that we slow down so that you can hear.

We would also encourage you to turn your cameras on if you're online, when it's your turn to speak especially. It helps for the people in the room here to be able to see your face.

We have your images up behind us on a big screen, which you can't see, but it is there, and it helps in person to be able to see the people speaking to us. It helps me as a facilitator as well to be able to see you as well as you're talking to us, so if you could please do that.

We would also ask that you could use the Zoom chat, if you want to give us input and you don't want to verbally speak. Please feel free to chat in the chat.

All of that is being documented. All of that is part of the process. We can read off your chats for you if you are so inclined, and that will just help the process as well.

If you would like to speak online, you could just raise your hand. And then when we get to the sections where there is opportunity to provide input, we'll call you off in the order that

we receive them and manage between in-person chats and people raising their hands. Wireless microphones will be passed around to those speaking in person.

And so that's just the general housekeeping. We're all getting good at this, so I'm not sure how much of that we need to cover completely, but we'll make sure that those who are new know what's going on.

We're going to start with introductions, quick introductions today. So I'm just going to start to my right with Emily Grant, and we'll just go around the room.

After we do the room introductions, then we'll switch to the online introductions. If you could please just state your name and the organization you represent, that would be great.

MS. GRANT: Thank you, Chester. Good morning. Emily Grant, public affairs manager with Angeles Link.

MR. GARZA: Good morning. Sebastian Garza, SoCalGas gas project manager.

MS. TRACY: Good morning, everyone. Jill Tracy, senior director, Angeles Link regulatory and policy.

MS. RODRIGUEZ: Good morning, everyone. Sonia Rodriguez, safety and health manager, SoCalGas.

MR. GOMEZ: Good morning, your Honor. Anthony Gomez, Utilities Workers Union of America.

MR. SHAW: Good morning. Good morning. Ernie Shaw, everybody. Good to see everybody. Wake up. President of Local 43, Transmission and Storage.

MR. HELLER: Miles Heller, greenhouse gas government policy, Air Products.

MR. PEDERSEN: I'm Norman Pedersen for Southern California Generation Coalition.

MS. FRITZ: Katrina Fritz, California Hydrogen Business Council.

MR. HECTOR: Hector Carojada [phonetic] Local Union 250, steamfitters.

MR. WILLIAMS: Nat Williams, Local Union 250, steamfitters.

MR. GOLDSTEIN: Good morning. Brian Goldstein, executive director of Energy Independence Now.

MR. COBOS: Good morning. Rodney Cobos with the Southern California Pipe Trades.

MS. LYKENS: Good morning. Alisa Lykens,

Insignia Environmental supporting SoCalGas in the environmental proceedings.

MS. MORENO: Good morning. Edith Moreno, regulatory strategy policy manager, Angeles Link.

MR. JOHNSON: Good morning. Darryl Johnson, environmental services manager, Air and Greenhouse Gas.

MR. BRITT: All right. Now we're going to switch to people online. And I think the first person I see is Aaron.

Aaron, if you could unmute your microphone.

MR. KATZENSTEIN: Hi. Good morning. Aaron Katzenstein, South Coast Air Quality Management District.

MR. BRITT: Okay. The next person I see is Arthur Fisher.

MR. FISHER: Good morning. Arthur Fisher, California Public Utilities Commission with the Public Advocates Office.

MR. BRITT: All right. Thank you.

The next person I see is Chris Myers.

MR. MYERS: Hi. Chris Myers with Cal Advocates.

MR. BRITT: All right. Eric Hoffman, I

think. Eric.

MR. HOFFMAN: Good morning. Eric Hoffman, Strategic Initiatives of SoCalGas.

MR. BRITT: Welcome.

Hope Fasching?

MS. FASCHING: Hi, everyone. Hope Fasching, policy analyst at the Green Hydrogen Coalition. Thank you so much.

MR. BRITT: Thank you.

Julie, it looks like, Roshala.

MS. ROSHALA: Hi. I'm Julie Roshala, environmental planner with Insignia Environmental.

MR. BRITT: All right. Kaj Peterson.

MR. PETERSON: Kaj Peterson with Cal Advocates.

MR. BRITT: Thank you for joining us.

It looks like Maddie Munson?

MS. MUNSON: Hello. Maddie Munson on behalf of the Agricultural Energy Consumers Association.

MR. BRITT: Thank you for joining us.

Marna?

MS. ANNING: Good morning. This is Marna Paintsil Anning with the Utility Reform Network.

MR. BRITT: Matt Schrap?

MR. SCHRAP: Good morning. Matt Schrap, Harbor Trucking Association.

MR. BRITT: Matthew Taul?

MR. TAUL: Hello. Matthew Taul, engineer with Cal Advocates.

MR. BRITT: Welcome.

Nicholas Connell.

MR. CONNELL: Nicholas Connell, executive director with the Green Hydrogen Coalition.

MR. BRITT: Welcome.

Rizaldo Aldas.

MR. ALDAS: Hi and good morning, everyone. Rizaldo Aldas from California Energy Commission's Energy Research and Development Division. Thank you.

MR. BRITT: Thank you.

Tyson Siegele.

MR. SIEGELE: Hello. Tyson Siegele with the Utility Consumer Action Network.

MR. BRITT: Welcome.

Stephanie Leslie?

THE STENOGRAPHIC REPORTER: Good morning. I'm your court reporter today.

MR. BRITT: Okay, Stephanie.

I see so many names, but not all their

affiliations, so I have to make sure I'm not missing anyone.

I think I covered everyone. Is there anyone else who joined us that I did not name? If you did, just raise your hand in the Zoom function at the bottom of your screen. We should be able to see that and let you introduce yourself.

Anyone else that we missed? You can also -- okay. Someone raised their hand. It looks like Maryam?

MS. HAJBABAEI: Hi. Good morning. This is Maryam Hajbabaei from South Coast Air Quality Management District.

MR. BRITT: Welcome, Maryam.

MS. HAJBABAEI: Thank you.

MR. BRITT: Anyone else that we missed?

(No response.)

MR. BRITT: Okay. We have a good group online. Great. That's terrific.

Okay. We're going to go ahead now and switch to, as I multitask, our agenda.

So we have a robust agenda. Again, lots of information that's going to be presented today.

We'll start with a safety message in just a moment, and then we'll go into the environmental

social justice analysis.

After each of the sections, we'll have a member discussion.

We'll then talk about hydrogen leakage.

We'll move to greenhouse gas emissions.

Talk about nitrogen oxides emissions.

Then we'll also have a discussion about stakeholder feedback and tracking.

We'll talk about water resources.

And then we'll have a debrief and wrap up at the very end of that process.

So, again, a full agenda and lots of discussion.

I want to now turn it over to Sonia Rodriguez, who's the safety and health manager with SoCalGas, and she's going to give us our safety message this morning.

MS. RODRIGUEZ: Thank you. Good morning, everyone. Sonia Rodriguez, safety and health manager.

I have a safety message for you today that I hold dear to my heart, and I will share why. I have a personal story. But I also have a couple talking points because I want to ensure that I'm sharing this message loud and clear.

To get started, I have a question for you: When was the last time you noticed how your body was feeling? When was the last time that you really paid attention to your body and how your body is feeling? Has it been a day ago? A week ago? A month ago? A year ago?

Our body is always sending us messages, not just when we have a headache or when you're tired or you have heartburn or a stomachache after having a spicy meal; right? Our body's always sending us messages.

And in our busy, high-tech lives, it's really easy to operate detached from our bodies. That's really easy to do.

So my safety message for today is about the importance of listening to your body and how listening to your body is a crucial step in identifying and treating illnesses.

So I'm going to share with you three steps that you can see up on our presentation.

The first step is to pay attention to your body and identify symptoms that may be out of the norm to you. Don't ignore these symptoms.

For example, losing or gaining weight too quickly. Again, out of the norm, because that's

easy for me to do, right, depending on your diet, losing or gaining weight too quickly.

Excessive tiredness, excessively hungry or excessively thirsty or using the restroom very frequently at night.

These three things -- these three bullet points are examples of symptoms of diabetes.

Maybe your head -- your hands or feet or arms swelling up, maybe having headaches. That could be a symptom of hypertension.

Anyways, you have some examples there. The point is: Listen to your body. Take a moment. Incorporate mindfulness in our daily activities as part of our routine. Don't ignore these symptoms, especially if they're out of the norm to you.

And an example of other signs, let's say, you know, you're used to going for a walk. Going on a walk around your block. And it's easy for you to do because you're used to it. But all of a sudden, you're realizing, wait. This simple walk that I'm used to doing is now getting difficult because now I feel tingling in my toes or, you know, why am I, you know, out of breath all of a sudden? Don't ignore these symptoms.

So if you do experience symptoms that are

out of the norm, this is your body telling you to stop and, you know -- in our work life, we utilize the "stop the job, stop the job" work -- or authority, "stop the job" authority. Use that authority on yourself. Don't brush it off is Step Number 2.

And three, don't wait to go get yourself checked out by a medical health care provider.

These are all symptoms, again, that your body is using -- these are signs that your body is using to tell you that there's a problem. This is your body's check engine light. Don't ignore it.

I will share a personal story because I sometimes -- you know, growing up, I didn't realize why my grandparents were so afraid of going to the doctor, so they always left -- you know, things get worse because in their -- you know, growing up for them, you go to the doctor, and you die. You go to the doctor, and you die.

Why? Why is that? Well, because they would wait so long until things got really, really worse or bad that, you know, by the time you go to the doctor, the doctor's only trying to make you feel -- get comfort, right, and alleviate the pain of you going through the death -- you know, the

death process.

So for me, you know, and for my family, having a history of diabetes, these are now symptoms that I now know of -- my family history of things that I look out for.

Next slide, I want to share a -- really important information about stress. Although stress is a normal part of our lives, it can become overwhelming if you don't manage it properly. Stress can influence our physical and mental health, also our relationships and productivity.

Not all stress is bad; right? Not all stress is bad, but also some stress -- some stress can be good; right?

For example, good stress, that feeling when you're going on your first date or, you know, looking forward to meeting up with family and friends or your kids' graduation, your grandkids' graduation, spending time with them.

That's all good, right, because you're planning and looking forward for that event.

The birth of a baby or a birth of unexpected quadruplets. I mean, that's just for everyone; right?

Some stress can, you know, be bad; right?

It's initially your -- it's good stress, but then it turns into bad stress because you're not planning for four babies.

These are not my babies, by the way. Yeah.

Recognize the symptoms of stress. It's really important, you know, that you recognize how stress affects you and your body because stress affects everybody in different ways. Learn how your body deals with stress.

But the best advice I've ever received about stress has been to develop ways that you can cope with the stress; right? Whether it be you're meeting up with your buddies and you're going on a round of golf; right? Or we're going shopping, right, all the sales that are happening or, you know, going for a run. That's another way.

But learning how stress affects you and learning how you best deal with stress and how you cope. That is the key.

So in closing, I just really want to emphasize the fact that it is really important to listen to your body. Don't ignore that check engine light.

And if something doesn't seem right and

it's out of the ordinary for you, go get checked. And, again, recognize symptoms of stress and what are the best that work for you to cope with that stress. And, you know, go talk to somebody. Go seek help if you need help. Thank you.

MR. BRITT: Thank you. All right. We're going to now turn it over to Jill Tracy, the Angeles Link senior director with regulatory and policy, and she's going to do some opening remarks.

MS. TRACY: Hi. Good morning, everyone. And thank you, Chester. And thank you, Sonia.

My dear friend -- I was on field assignment several years ago, and Sonia was our field safety advisor, and every day I went out into the field at 6:00 o'clock in the morning with my hard hat and safety vest, and Sonia was always there every day, always made us feel safe, and I really appreciate all of her prioritization on safety, and also your creative thought process behind being -- thinking about safety as well.

So thank you for your safety message. I really appreciate it.

I would like to take a moment to welcome all of you to our second PAG workshop. Today, I think many of you know, we are going to be covering

a lot of very interesting environmental and land use topics.

We have subject-matter experts from SoCalGas and Insignia Environmental for each of you to listen for about ten minutes for each of those subject matters, and then we're going to turn it over.

The majority of the time today is really dedicated to getting your feedback, and that feedback can be questions or comments either through, you know, speaking up here in the room. We've got a great turnout today, so thank you so much.

Then we've got a lot of folks in the -- on the Zoom call. And as Chester noted, it will be either through raising your hand or in the chat function.

And then we also have a special presentation for the group on the stakeholder feedback tracking system that we developed with Insignia Environmental.

Insignia Environmental is going to be presenting on the system that we're proposing to track all of your feedback, not only on the Planning Advisory Group, but also the

community-based organization stakeholder group level, and those will all be tracked in a transparent fashion.

Those -- after they are tracked and cataloged, all of those comments will then go to our subject-matter experts either at SoCalGas or the consultants that we've retained for each of our 16 Phase 1 studies. And then that feedback will be considered and addressed as part of our feedback protocols.

And so it's really important. We want to hear your voice. And so we can't hear your voice if you don't speak up or if you don't reach out to us.

So please -- Insignia is here this afternoon to present on that process, and they're also here to present -- to get your feedback on the process. Right now the way we've developed it, it looks a lot like a tracking system you would use in a CEQA public comment time frame.

We're obviously nowhere near that in this process. We're very, very early on in this process, but it will be very familiar to many of you, and so -- but please speak up and give us your feedback.

And the format is designed, based upon your feedback, on wanting these meetings to be more about getting your feedback and listening rather than having our folks present to you.

And so you do have the study descriptions for all of the 16 studies. Those are in the packets of materials that were sent to you on July 6th. If you need those again, we can put them in the chat so you'll have access to them.

And then so you can ask questions on the presentations, but also feel free to ask questions about the study descriptions that were sent to you previously.

And so it's -- our subject-matter experts are here for you to -- or are availing themselves to you guys to provide feedback.

You'll also notice that we are only presenting on five environmental and land use topics; whereas, there's six. The five were the top five that we received impact -- input from you guys on what you wanted to hear from at the June 28 PAG meeting.

The one topic that we did not present on for today is land rights, which are private and public rights-of-way and easements. And so if you

would like us to present on that another topic [verbatim], please let us know, and we'll try to accommodate that.

With that said, I'll turn it back to Chester, and thank you.

MR. BRITT: Thank you, Jill.

All right. Now, as you heard Jill mentioned, we're going to get into the meat of our agenda today, and we'll start off with Sebastian in just a moment.

I just want to remind you of something Jill mentioned, which is that the packets have been sent out for all the project work descriptions, and during the -- for the feasibility studies, and those are available for input through the end of the month.

So July 31st is when we're asking for you to provide any input today, and the verbal comments, chat comments, any comments you give us today is not the only way for you to provide input into this process.

The other thing I'll just remind you of is that we have 16 work studies. We're -- this process of these four meetings this week is really focused on scoping. It's really focused on making

sure the methodologies for these studies, that we've gotten your input, that we have vetted this through, this process with you, and that you've been able to weigh in on the methodologies and the things you think we should consider.

And then as we get through the process with each of the technical studies, we will have interim meetings in the fall as we develop some preliminary results that we can share with you, and then we will have a final report out on all the studies later this year, early next year, which will also be another opportunity for you to weigh in on each of the individual studies.

So I just want to be very clear on the process. There's lots of opportunities for you to weigh in.

I'll just remind some of you who maybe are joining us for the first time. These meetings today, this week, are really workshops. You know, we have our normal quarterly meetings, which we have with -- set up with you to cover various topics. These meetings are really workshops. Roll up your sleeves. Let's talk about the subject matter.

I'm going to ask, as we get into each

subject matter, that the comments that we get from you are really focused on the subjects that we're talking about at that moment.

Again, there's opportunity to talk about other subjects. We have a full agenda. Some of the subjects that you want to talk about might be in the afternoon. We'll eventually get to those things, and we would just ask, so that we can be respectful of everyone's time and input, that we really do focus on the subject matter at hand.

And, again, what we're really looking for is things that you see in the methodology and the scoping that we're doing, that you say, "Hey, why don't you consider looking at that."

Maybe there's a methodology that you think we should tweak or how we're doing it. Maybe there's another case study or an example of something that you're aware of that you would like to share. Those types of feedback are valuable to the technical team and the process that they're going through.

So with that, I will now introduce Sebastian Garza, who is the SoCalGas Gas Angeles Link project manager, and also Alisa Lykens with Insignia. She is a director there, and she

will be participating in this discussion of environmental social justice.

And I'll send it over to you, Sebastian.

MR. GARZA: Great. Thanks, Chester.

Good morning, everyone. Great to see everyone here. Some new faces.

Thank you, Sonia, for the safety message.

As Chester just explained, I'm Sebastian Garza, and we have Alisa Lykens from Insignia Environmental. We're going to be discussing the environmental analysis and the social justice analysis scope of work.

Before we get into the meat of the preparation, I do just want to say that both of these studies are absolutely integral to this project. SoCalGas takes environmental compliance with policy and regulation very seriously. We have a robust environmental services group, which Darryl is a part of, and yeah. We take this analysis very seriously.

And then the social justice component is also extremely important to this project. We're looking for feedback from community members, you all, the CBO, not only how this project can benefit community members, but also what the risks are.

So I'm really glad you're all here to participate in this workshop.

Next slide. I have it. Never mind. First time here. Great.

Okay. So the objective of the environmental analysis is really to identify the existing environmental conditions consistent with public policy.

We're at the early stages here of the project, but really the intent here is to identify all of the various environmental considerations and risks that are out there.

The scope of what we'll be looking at through this desktop environmental analysis is going to cover a few different items.

First, we're going to look at the potential pipeline routes and the associated facilities. Our engineering group presented on the routing studies, so we'll be working in tandem with them. And as the routes are identified, we'll be doing a desktop analysis of those routes.

And we'll also be looking at, you know, potential existing -- excuse me -- existing environmental conditions for our above-ground appurtenances, like compression, regulators, stuff

like that.

I will emphasize that this is a desktop analysis. At this time, we do not have any plans to do any fieldwork in Phase 1.

The second part of the scope of the desktop analysis is third-party production facilities.

As we've mentioned before, SoCalGas will not be producing clean hydrogen, but we are going to be identifying -- once those potential production facilities are identified, we'll be looking at, you know, analyzing the existing environmental conditions for those sites as well.

And then third, we'll be looking at the third-party storage facilities.

And, again, we won't be doing any storage ourselves. We'll be looking at the third-party storage, but same -- same process here for that, identifying those existing environmental conditions at those storage facilities.

Jill already mentioned, you know, CEQA. I will say for this Phase 1 environmental analysis, we are nowhere near CEQA or NEPA. We do expect that at some point, this will -- this will come into play.

The lead agency has not been identified. Discretionary permits have not been identified, which could potentially trigger CEQA. But we are aware of that process, and we are -- we are looking at that as we move along this process into potentially Phase 2 and 3.

Okay. So how is this work going to be done? I mentioned it's desktop, no fieldwork. But basically we'll be using GIS, which, I'm sure a lot of you are familiar with. But if you're not, it's basically a desktop geographical mapping system. We'll be collecting publicly available and confidential data sets and using the GIS to analyze these data sets.

Some of those data sets include land ownership, conservation areas, vegetation areas, California national -- natural diversity database information, cultural resources information, et cetera.

So all of that will be put into our GIS and Overlane and looked at in conjunction with our routing studies.

Exactly. So I just hit that second point there. We'll be looking at, yeah, those potential project components and how they intersect with

those sensitive areas.

And then really we're going to analyze how we can best avoid or minimize any potential impacts to these different resource areas. And, again, that will be in conjunction with our engineering team and our routing studies.

Okay. So what are we going to be looking at, you might be asking. If you're familiar with environmental reviews, this should look pretty consistent and familiar to you, but here's, you know, some of the -- I can barely read this here.

Here's some of the items that we're going to be looking at. Aesthetics, agricultural and forestry resources. Biological resources. I mentioned cultural and tribal resources, energy, geology and soils, hazmat, water, hydrology, land use and planning, noise, and transportation.

So these -- these are the areas we've identified so far as to what we'll be reviewing in this process. I'm definitely interested to know what your thoughts are when the time comes.

With that, I'm going to turn it over to Alisa. Thank you.

MS. LYKENS: Thanks, Sebastian, and good morning, everybody.

The objective for this study, the environmental social justice analysis, is to identify potential impacts to disadvantaged communities and other environmental justice concerns.

So the very first undertaking to begin our process is to use that desktop analysis mapping that Sebastian talked about, the GIS, and use it together with the available environmental justice screening tools that we have.

So we are going to be using the CalEnviroScreen tool, which is the State's version, and the climate economic justice screening tool, which is a Biden administration tool that I'll talk about in a second.

So as you're probably aware, the CalEnviroScreen is developed by the State to identify disadvantaged communities and considering project planning, development and infrastructure improvements.

So the CalEnviroScreen is administered by the Office of Environmental Health Hazard Assessment, and the current version we are using is Version 4.0.

The other tool that I mentioned, the

climate economic justice screening tool, is a federal screening tool. That's administered by the Council of Environmental Quality, which was created for President Biden's Justice40 Initiative, which is an executive order that directs federal agencies to adopt a goal of having 40 percent of overall benefits of certain federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution.

So this includes federal investments in clean energy projects such as the Angeles Link project.

The climate economic justice tool considers climate and socioeconomic indicators that are not considered by the CalEnviroScreen.

So using these tools together will give us a more thorough review for discerning the potential environmental and health burdens and to -- and other socioeconomic factors in the affected communities.

Once we have all the data, we'll identify the hot spots for disadvantaged communities of concern based on the threshold comparisons in the data collected.

This step may include -- is going to

include noting the U.S. census blocks that score high in minority or poverty levels when compared to demographics of the county, state, and federal levels. That's just kind of the start.

And then once we dive in, we can look a little bit different a little further into the details of those statistics.

Let's see. Next, the study will be prepared, which will include a comparison of environmental indicators to county, state, and federal populations and will include race and ethnicity data.

These indicators will include -- could include known pollutants in air, groundwater, and contaminant soils. Those are just some of the ones we can consider.

The study report will also include any recommended mitigation measures to minimize impacts. Examples of this could include new routing or siting alternatives for specific project components or alternate project configurations to reduce the project footprint in a given area.

And once the study is ready, it will be shared with the CBO and PAG organizations for your review and comment. And that's what I have for you

today.

MR. BRITT: All right. Thank you, Alisa.

Okay. So I want to just make sure that things are in context before we start taking input from you guys.

We are in Phase 1, as we've talked about. We would need approval from the CPC -- or SoCalGas would need approval to go into Phase 2.

The Phase 1 activities are really feasibility studies. These 16 work streams that we've been talking about are really looking at different topics preliminarily.

And as you heard Sebastian mention in his presentation, this is not a full environmental document yet because there is no defined project. So it's an assessment of the environmental issues related to the Phase 1 activities that are going on through these technical studies.

So they're going to do what he's calling a desktop analysis using GIS and covering what are very standardized GIS topics typically that you would look at and doing a very -- what I would consider a very high-level assessment of some of these issues, which will begin to flesh out some of the things that you might see come out of some of

the technical work and what that would look like environmentally once we get into that process.

I would fully expect that if we get approval to go into Phase 2 and we have a defined project, then there would be a full-blown environmental document that would need to be done related to this project.

So I always want to make sure we keep all that in mind as we start to take input from you guys. But if anyone has any thoughts -- I already see -- Arthur, you've already raised your hand. You're always first in line. I love that about you. You make my job easy as a facilitator. Don't worry about awkward silence.

So I'm going to let you start us off, Arthur. If you could just remember to state your name.

MR. FISHER: Thank you. My name's Arthur Fisher with the Public Advocate's Office.

Is that a good pace for the court reporter?

MR. BRITT: I'm going to assume yes unless she raises her hand.

So go ahead.

MR. FISHER: Okay. Let's go from there.

So I've sat where you are, which is why I was joking, because I appreciate your position.

So just as a very small bit of my background, I have spent 14 or 15 years working for the public advocates office and the Commission as -- but either in the Commission or as a consultant to the Commission on environmental issues.

I've worked on, listing them off, just off the top of my head, Ten West Link, Eco Substation, Line 1600, Line 3602, North South project.

Just to say that I'm very familiar with linear projects in Southern California as an analyst, as a senior consultant on CEQA.

I'm very familiar with both General Orders 131D and GO177. In fact, I helped author 177. We were very active in that. So when I make these recommendations, it comes with that 15 or 16 years of background knowledge; okay?

My first statement, my first concern is just a reiteration of what I was saying two days ago. I've read your scope of work. I've heard what you've had to say here. I do genuinely believe you need to expand the scope to include non-pipeline alternatives.

So even if you're doing a desktop analysis, a constraints analysis of linear projects, you can look at a hub, a transmission line and a hub alternative. Transmission lines may come through very different linear corridors to a pipeline. You may be able to take advantage of those corridors.

So it's just with that -- I'd just like to point that out, that that is not present in the statement of work, and it's not present in how you set this out.

My concern, again, is that you talk about alternatives as being a completely different study. This -- the alternatives analysis is going to be essential to make this make sense and actually get a good view of what is the best project to solve the objectives of this -- of this project.

So you lay out the objectives in your early study, in the first study, and, you know, those objectives are to decarbonize, et cetera, et cetera. Your objectives are very much driven by regulation.

A pipeline may not be the optimal solution. You -- I know, at SoCalGas, it is the optimal solution for SoCalGas, but it may not be

the optimal solution.

CEQA might not view it as the optimal solution. And so you know from the get-go, we need to start -- and you need to start looking at non-pipeline alternatives and build that into the environmental analysis; okay?

To that end, I will just, again, request a copy of the statement of work provided to all the consultants for all the project -- for all these studies and potentially the extent of work provided by the consultants back to SoCalGas on how they understand these projects -- these studies. I'm going to request that, that SoCalGas volunteer this information so that we can better provide comments.

That's my general comment on this at this point in time. Thank you.

MR. BRITT: Thank you, Arthur.

I don't know, Sebastian, if you have anything to weigh in on that. It wasn't really a question as much as a comment, but we are -- this is exactly why we're doing these meetings, Arthur, is for that kind of input.

So we are documenting everything that everyone is saying, and I can tell you that SoCalGas is very interested in not only your

comments, but other comments that are coming through, and they are going to be incorporating their comments.

Insignia is here for that exact express purpose, to make sure that the comments are not just heard, but they're facilitated through the process and incorporated into the studies as much as possible.

And, again, I value your input very much as a facilitator, and I know other people on this panel do as well.

Anyone else have any thoughts besides Arthur? He got us started, but any thoughts on environmental?

(No response.)

MR. BRITT: I mean, one of the things that I'll bring up is that -- okay. I'm sorry. Yes? Rodney?

MR. COBOS: On Arthur's comment regarding non-pipeline, I mean, what other option -- I mean, as far as safety, does he see trucks going down the highways transporting the hydrogen, or what ideas does he have regarding non-pipeline?

MR. BRITT: Arthur, did you hear that? You can reply if you have the ability.

MR. FISHER: I'll reply -- now I'm unmuted, so I can reply.

Yeah. You've suggested a hub -- an end-basin hub alternative. That's a major alternative. I mean, that would be distribution pipeline from the hub.

You bring the energy in. You bring the water in. You can use existing -- you may be able to use existing facilities to do that.

That's a major alternative that SoCalGas has suggested, and it's not reflected in the extent of work description that we've been provided.

So that's the one I'm interested in. When I say "non-pipeline," that's what I'm thinking of as a non-pipeline alternative.

You may have a distribution pipeline. You may have a hub you're developing, but you don't have a long major -- you're not trying to get a 36-inch pipeline or a 16-inch pipeline through urban areas, basically.

MR. BRITT: All right. Thank you, Arthur.

I see our court reporter has her hand raised, so I want to make sure, Stephanie, we take your comment.

THE STENOGRAPHIC REPORTER: Yes. I just

wanted to know who that last speaker was.

MR. BRITT: You have to give us your name and organization first. No worries.

If you can just state your name and organization for the court reporter. I know. Go ahead. Just turn it on. It takes a second to register once you flip it up.

MR. COBOS: Oh. There we go. I have to turn it on.

MR. BRITT: There you go.

MR. COBOS: Rodney Cobos with the Southern California Pipe Trades.

MR. BRITT: I'm sorry. I'm interrupting him while he's eating too. I have to balance eating and the court reporter.

Thank you, Arthur, for that feedback on Rodney's comment.

I also want to point out that the methodologies that Sebastian mentioned include utilization of GIS and aerial imagery, online research to public data.

There's other sources and tools and data that need to be considered.

I just want to make sure -- any thoughts on that, on the tools?

Nathanael? Is it Nathan? Can I call you Nathan?

MR. WILLIAMS: Nat. Nat Williams, UA Local 250, Steamfitters District Council 16.

I wanted to ask: When does the plan go into effect to start using hydrogen? And are we going to use the existing infrastructure pipelines that are there now to do this?

MR. BRITT: So we discussed that yesterday, actually -- or, actually, in this case, for the PAG two days ago. That's part of the analysis of siting and routing, is to look at utilization of existing pipelines or new pipelines or retrofitting. Those decisions haven't been made, so that's just what I would say.

I don't know if anyone else wants to chime in, Edith, or anyone on that.

MS. MORENO: Hi. I wasn't ready. That's a good question. And like Chester, we did -- sorry. Edith Moreno for the court reporter, SoCalGas.

As Chester alluded, we did get into that quite a bit during our first PAG meeting, and so right now Angeles Link has proposed to be all new pipe build, brand-new hydrogen pipeline, but we are

evaluating the possibility of using some existing portions of our pipe.

But, again, this is all preliminary, and we're currently assessing that.

Thank you for your question, Nat.

MR. BRITT: Yep. Marna, I see your hand raised. If you can unmute yourself, we should be able to hear you.

MS. ANNING: Hi. This is Marna Paintsil Anning with the Utility Reform Network.

I just had a question about the environmental impacts analysis. Something that I didn't see was whether the analysis is going to consider the potential impact of leaking or any emissions on these environmental justice communities.

I can see here that incorporated into the analysis is a look at how construction of the pipeline might affect, you know -- you know, the communities as far as location.

But I see that SoCalGas has organized and -- a separate greenhouse gas emission evaluation and a separate hydrogen leak evaluation.

And one thing that I'm curious about is whether those assessments will also consider the

impacts to environmental -- to social justice communities, because I didn't hear that scoped within the study.

So if there are potential emissions, they would have a harsher impact on disadvantaged communities, and so I would want to see the study analyze any potential impacts to those communities.

MR. GARZA: Thanks, Marna, and good observation. The scope of work that I reviewed did not include any air. We actually have three distinct air studies that Mr. Darryl Johnson will be reviewing, I think, next -- starting next.

So as far as leakage is concerned, I think, you know, hopefully Darryl's presentation will touch on that, and you'll hear more shortly.

MR. BRITT: Sebastian, can you expand on the notion of -- like, with your assessment, your environmental assessment, is it focused on just one specific thing or literally all 16 technical studies?

Like, how do you incorporate the other technical studies into your assessment? Because we don't have a defined project yet, so can you help the group to understand a little bit, like, what is your focus of your assessment?

MR. GARZA: Sure. So there's a lot of interdependencies on all these different studies.

If you look at our schedule, there's a lot of, you know, relationships between the different studies, and as I mentioned, the routing study is really driving the scope of our environmental work.

So working in tandem with Amy and Katrina, who were up here on Tuesday, they'll be feeding us information basically using GIS again, and from there we'll provide that -- those KMZs and those GIS layers to our consultant, Insignia, and they'll start to review the different subject matter areas that we identified for those potential -- or for the existing conditions for the potential routing that we have.

MR. BRITT: All right. Great. Thank you.

Arthur, I see your hand raised again.

MR. FISHER: Arthur Fisher, Cal Advocates.

In response to Marna, I would expect to see hydrogen leakage as being part of the hazmat study, which was laid out. You know, hazardous materials -- it falls firmly into that section or should do.

So unless they use -- unless they intend it to be a constraints analysis, where it's looking

at existing conditions and where existing hazards are -- so initially, I guess, it's going to be -- the constraints of existing conditions, and then they're going to layer on top hazardous materials, including hydrogen.

So I'm just trying to think of how -- could Insignia elaborate on how they're thinking about this?

MR. BRITT: So as Sebastian mentioned, the person to my left, Darryl George, is -- I'll make sure -- Derek Johnson, sorry, basketball player -- Darryl is going to be presenting information related to hydrogen leakage, also GHG and NOx.

So he has three presentations come up that are going to specifically deal with those issues, and we can obviously get into that as a fuller conversation during his presentation.

I want to make sure that we're, again, focused on any other comments that we have regarding the environmental and social justice analysis.

I also want to make sure we get some comments, if there's any interest on Alisa's presentation about the analysis of environmental justice, which will include the utilization of the

CalEnviroScreen and comply with the CPUC's Environmental Social Justice Action Plan 2.0 Assembly Bill 617.

So if there's any thoughts on that process, I want to make sure we weigh in -- and Katrina, I see you have -- oh. Brian?

MR. GARZA: Thank you for the comment, Arthur, as far as including potential leakage or hydrogen leakage into that hazmat section.

Again, I think our intent with the hazmat section is to identify existing potential sites that exist, superfund sites, et cetera, and then I'll just add that hydrogen is not a hazardous material, but I do thank you for your input and your material, and then we'll get into deeper conversation on that.

MR. BRITT: Brian, you had your hand raised. If you could chime in.

MR. GOLDSTEIN: Yeah. Brian Goldstein with Energy Independence Now.

So I think that, you know, kind of the phrase "environmental assessment" or "environmental impact report" oftentimes has a negative connotation because we're looking at how much harm this will cause.

But I think it's important to kind of balance out the information that you're providing in terms of the impact of this project with what's already happening in those communities in terms of both the quantitative and qualitative impacts of air pollution on, you know -- excuse me -- on public health on these communities and then similarly on the quantitative and qualitative impacts of climate change on the communities as well from GHG emissions.

And then I think you could take that data and also suggest, you know, what would be the positive impact of a pipeline in terms of, you know, vehicle miles traveled, reductions from other modes of hydrogen transportation, and then ultimately from the end-use applications that the hydrogen would support.

So if it's going to support trucking, you know, in a different part of the state or of the region, what impact would that reduction in emissions resulting from that end-use application have on the communities that the pipeline would travel through as well.

So, you know, I think oftentimes the, you know, positive health care impacts and, you know,

climate change impacts are kind of omitted from environmental impact studies, and I think it's really important to provide kind of both sides of the equation there. Thank you.

MR. BRITT: Absolutely. Thank you, Brian.

We'll go now to Katrina.

MS. FRITZ: Katrina Fritz, California Hydrogen Business Council.

I'd like to go back to Marna's question. And Marna, correct me if I'm wrong and if I didn't understand, but I think the question was: Does CalEnviroScreen and the Environmental Justice40 and the EPA tool include an analysis of emissions, NOx emissions, carbon emissions, and those impacts on the community as well as something like leakage?

I'm not sure if leakage is, but I think the other areas are covered in those, but I wanted to check with you.

MS. LYKENS: So Alisa Lykens.

Yes. They both do have those indicators as pollutants.

As I touched on, they also have contaminant soils, groundwater, those other factors that we can take a look at. They do not have leakage. That's not something that's in that

itself.

MR. BRITT: Sebastian, I see you taking notes.

Any other things to offer in addition to what Alisa said?

(No response.)

MR. BRITT: We're good? Okay.

Did that answer your question?

Okay. If you could hand the mic to Norm, I think he's next. It should be on.

MR. PEDERSEN: Norman Pedersen from Southern California Generation Coalition.

Two things. First, a question for Alisa.

During your presentation, you mentioned specifically climate economic justice screening tool federal, and at other points, you mentioned federal environmental regulations.

At this point, as I understand this project, it is entirely within the state -- now, there could be a NEPA component if the project utilizes federal land -- you know, a military base or something like that, but otherwise, federal would not be involved.

To what extent are you expanding into the federal requirements as opposed to California,

state requirements?

MS. LYKENS: Alisa Lykens.

One of the reasons to use the federal tool is just to kind of make a comparison between the data that the state maintains and what the federal government maintains.

There's also the environmental -- the EJ tool, which is administered by the EPA. So that's another tool that we could use or look at.

But they all are pretty much based on the U.S. census data, but I believe, like I indicated in my discussion, that the newer climate economic justice does have other indicators and factors that are different than what's in the current CalEnviroScreen.

So it will give us a bigger look at what we're looking at as opposed -- you know, with the census tracks that are affected.

MR. BRITT: And for our court reporter, that was Alisa Lykens with Insignia.

All right. Now -- oh. Go ahead, Norm.

MR. PEDERSEN: I had a comment.

MR. BRITT: Yeah.

MR. PEDERSEN: And this actually goes back to Ian [verbatim] Fisher's comments about the need

to study alternatives. I think that is a terrific comment. There is a need to have a fairly broad range of examination of alternatives.

However, I think that as we pursue the economic analysis, the scope of alternatives will be substantially narrowed. I'm thinking about the conversation we had on Tuesday with Tyson Siegele about Tyson's point that, "Oh, we could utilize under utilized electric transmission facilities."

As a result of our Tuesday discussion and other discussions, it is quite clear to me that we are talking about very expensive equipment.

The electrolyzers are going to be expensive. They are expensive. You can say the cost is going to drop, but there is going to be an interest at using electrolyzers at a very high load factor.

This pipeline, if a pipeline is built, or if it's a transmission line, which could be much more expensive than a pipeline -- if that's built, there is going to be an interest in utilizing that new incremental facility at a very high load factor, certainly not something reflecting 50 percent.

There is going to be a need for storage at

the part of consumption unless we have reduction exactly inset to the point of consumption.

And so I think as we -- going back to Ian Fisher's comments, as we start to look at the economics of the complete chain all the way from production to transportation or transmission to consumption, the alternatives are going to narrow substantially. Thanks.

MR. BRITT: Thank you, Norm.

Okay. I see Marna. You have your hand raised. We would like to hear your comment.

MS. ANNING: Yes. This is Marna with the Utility Reform Network.

First, a facilitation note, I would like to thank Katrina for asking that clarifying question. Katrina, yes, thank you for restating my question and bringing out what the intention of that was.

Yes, we would like for any analysis of impact on environmental and social justice communities to include the potential impact of leakage and NOx emissions in addition to considering the impact of the construction of the project itself under NEPA and EPA -- CEPA [verbatim].

That was the extent of my comment, and it is a recommendation on the environmental impact as well as on the environmental and social justice community impact.

That is because during the course of the proceeding, there was a very hotly contested issue about whether hydrogen is or is not a -- I forgot the term that was used -- a volatile molecule.

The fact that it's odorless and the fact that it has a very high burning point, I think there were some studies conducted regarding -- regarding how it contributes to NOx emissions.

And since CalEnviroScreen has already identified these communities as being under higher pollution burdens, the fact that to add an additional molecule that could potentially cause more detrimental impact is something that should be evaluated, and whatever mitigation measures can be made to prevent leakage instances -- I think SoCalGas has a history of proactively identifying leaks in its existing system.

And so I don't think it's a far cry to evaluate prior to constructing this pipeline ways to mitigate potential leakage events and potential emissions events.

So thank you, Katrina, for highlighting that. And I did hear the response that the ESJ study does not include potential impacts on these communities from leakage, and so I would like for that to be a consideration.

And then just a facilitation point, if there's a question, I understand that this is part of an open dialogue, but if there's a question to a member in the group, I think it would be -- you know, if the group is amenable to that, it would be only reasonable to allow the person to respond. And it's very difficult to do that when you're remote.

And so just a facilitation point, if there's a question to a member in the group, such as Tyson or myself or Arthur, I think it would be reasonable to allow us to respond to that question and contribute to the discussion in a reasonable fashion.

So thank you for letting me speak. And, again, I'm looking forward to seeing how our comments are going to be incorporated in the studies.

MR. BRITT: Thank you, Marna.

And just as a note, I am very open to

letting everyone talk to each other, so I'm doing my best to do that, and I will continue to do that going forward.

So if Arthur or Tyson or anyone else who is being referenced in these comments would like to speak in reference to what's being discussed, please just raise your hand, and I will make sure to call on you.

I also want to just kind of end this section, before we go into the next one, which is hydrogen leakage.

And I see, Tyson, you raised your hand, so I'll get to you in just a second.

But I also wanted to just mention that if there are any sources of data, any sources of aerial imagery or any other things that you are aware of that might contribute to the environmental analysis, I'm sure that Sebastian and the team would be very open to receiving some of those suggestions.

So, again, this doesn't have to happen right now. If you become aware of that or you know that there are data sources that should be considered, please forward those, you know, through the process to SoCalGas, and they will begin to

take a look at that.

Tyson, I see your hand raised, so I'm going to turn it over to you.

MR. SIEGELE: Hello. Tyson Siegele representing today the Utility Consumers Action Network.

Thank you, Chester. I almost felt called upon, so I felt like I needed to raise my hand there, which I'm happy to chat.

So there were a couple different things that I wanted to weigh in on here.

Number 1 is -- good morning, Norman. Thanks for bringing up the transmission issue again.

I think that it's definitely worth a discussion on, and I wanted to see if I understood you.

When you say a 50 percent utilization rate, I -- that's not what I had intended when I was speaking on Tuesday, and so I guess my question is: Was there a -- did you understand me to have said a 50 percent utilization rate?

When I was talking about "50 percent utilization," the current transmission lines on average on a daily basis have 50 percent

utilization in that the total capacity that can be transmitted across those lines is about 50 percent on average at any given time.

And so, basically, I just want to make sure that I'm understanding what you're saying and vice versa.

Norman, did you have -- can you share a little bit more about your thoughts there?

(No response.)

MR. BRITT: Yep. It's on. It's on, on.

MR. PEDERSEN: Norman Pedersen for Southern California Generation Coalition.

First of all, I just wanted to make sure you noticed I was listening.

Secondly, you were talking about the utilization of transmission -- existing transmission lines when capacity is available. And that was an excellent point.

I think it ties in with Ian Fisher was talking about, about examining alternatives, particularly electric transmission alternatives to pipeline transportation.

The point that I was making or attempting to make was that as we have seen equipment that is involved with hydrogen -- for example, the single

electrolyzer at the hydrogen home installation in the parking lot here at the Energy Resource Center, it's very clear that that electrolyzer is being utilized at a very high load factor because it is a costly piece of equipment.

There's a big storage tank right next to the electrolyzer where they store the hydrogen for use when it needs to be used in the hydrogen home.

So the point is that when we are examining alternatives, whether they be electric transmission alternatives, whether they be pipeline transportation alternatives, we are probably going to have to think about utilization of whatever new equipment -- incremental equipment we procure at a very high load factor, and that could preclude using existing trans- -- electric transmission. It could mean new electric transmission.

And, of course, I'm approaching this from the electric utilities side, and on the electric utilities side, we are very aware of the costs of new electric transmission. We are very aware of the environmental impacts of electric transmission and the difficulty in siting electric transmission.

And, indeed, I think Ian Fisher was talking about trying to site a pipeline in an urban

area such as Los Angeles. Well, boy, compare siting a pipeline, which will be underground and not seen by anyone, to siting an electric transmission line through Brentwood. Electric transmission is a challenge.

So as we examine the economics, I think that the alternatives are going to start to filter out, but we're obviously a long way from narrowing down the economics, and that's why there's a need to look at a broad array -- an array of alternatives at this early, early, early stage.

Thanks, Chester.

MR. BRITT: Yeah. Thank you, Norm.

Tyson, if you have anything you need to clarify on that, I'll allow you to do that, but otherwise, we do need to get to the next subject matter and continue our presentations.

But is there anything clarifying about what Norm said that you want to make sure is understood or are we good?

MR. SIEGELE: I think that that works. I think that the -- it is important to make sure that all of the options are looked at, the options that include existing transmission, new transmission, the options of using electrolyzers at very high

utilization rates or slightly lower utilization rates.

And so I really appreciate Norman's comment. And yeah, I think that all options should be reviewed.

MR. BRITT: Absolutely, and they will be for sure.

Okay. We're going to now move to the next subject matter, which is hydrogen leakage, which has already started to come out -- it's already started to leak out that we've been talking about it.

I'm going to turn it over to my new best friend, Darryl Johnson.

We were talking about basketball yesterday, and I just met Darryl yesterday, and I accidentally slipped and called Darryl George, which I'm sure he would not be opposed to being the Darryl George in the NBA.

But I'm going to turn it over to him. He's going to give us a presentation on hydrogen leakage as his first three presentations.

He also will be speaking on GHG emissions, and also on the third one, which is NOx, the famous NOx.

So we'll start with hydrogen leakage.

Go ahead, Darryl.

MR. JOHNSON: All right. Well, thank you, everyone, for your attendance. And just listening to the conversation, I'm glad to be a part of this process.

I want to give you just a little bit of history and why I think I'm the lead on these three studies that we'll discuss.

But first I'll say, as Chester noted, I am a basketball player -- or former, and I do believe in teamwork, and so I look at this as a collaborative process to garner, you know, the best possible path forward. So I'm appreciative of being involved in this.

So as we talk about hydrogen, I'll just say that -- and I am the environmental services manager for air greenhouse gas and climate change, and I guess that's why I fell into this.

So our group does a lot of the work that we're currently going to assess in my discussions; right? Hydrogen -- we currently report the greenhouse -- the greenhouse gas inventory for SoCalGas.

But for a little bit of history, I started

in my early years with South Coast Air Quality Management District as an inspector and then an engineer in the chemical division, and as they say on the regulatory side, I sold myself to the dark side 23 years ago to become, you know, part of industry.

And the reason that I use that history is because I think I've been involved in the three topics the entirety of my career; right? I started the greenhouse gas inventory for San Diego Gas and Electric and SoCalGas in 2003, when we first initiated our voluntary inventory with the California Climate Action Registry. So I just wanted to give you a little foundation.

Hydrogen leakage -- we've already gotten to it. It's important as we develop, you know, hydrogen infrastructure in California that we assess leakage; right? Why is leakage important?

It's very similar to methane. We want to ensure that we identify where leakage takes place -- or the potential for leakage in the infrastructure, and opportunities to mitigate that leakage.

And why is that leakage important to this conversation? It's obviously for a number of

reasons, but as Marna alluded to in her statement just a little bit ago, hydrogen gas, H2 -- and I listened to the last PAG. I wanted to be sure that I separated hydrogen from hydrogen gas.

But hydrogen gas is not a greenhouse gas, but we're talking chemistry here. Everything is related. So hydrogen does have an indirect impact on other molecules that can, you know, retain that molecule in the atmosphere for longer.

So that's being evaluated. I know that there have been at least six studies trying to determine the global warming potential of hydrogen, and those will be evaluated as part of the study and brought to bear; right?

So there is a consideration of how hydrogen may influence the environment from a global warming standpoint, and we will evaluate that.

So that's just a little bit of kind of foundation of why I'm here and some of the things that we will be looking -- and let's describe the process, the scope.

So our objective is to assess the impact on potential of hydrogen in production, transmission, and storage of the projected

Angeles Link project and also identify potential mitigation measures that may come into play.

And similar to what we do currently with carbo and gas and methane, we're going to, you know, identify the source -- potential sources of emissions and then identify potential mitigations associated with those sources.

I'm going to jump ahead just a little bit, but that's really our study approach, is to estimate potential leakage for the identified sources.

And in my next slide, I'll kind of list out what we think some of those sources are, and in addition to identifying those sources, identifying the potential mitigation measures associated with those sources, and to use, you know, the Phase 1 study, existing, emerging research and other studies to determine how best to assess and quantify and estimate emissions.

So that's our overall objective and the general study approach.

I have a heavy hand.

So identifying sources. Hydrogen production, transmission and storage. We consider things like electrolyzers, pipeline venting,

venting -- compressor venting, compressor rod packing, you know, fugitive components, valves, flanks, threaded connections.

All of these are traditional things that we currently report for methane as potential sources of leakage as it relates to hydrogen.

We understand hydrogen is a little more tricky, if you will, because it's a smaller molecule, but generally speaking, in these areas, this would be the source types that we're going to evaluate, and we look forward to any additional source types that this group might have or bring to bear for consideration.

And of those source types are -- we would also identify the appropriate mitigation measures that might exist. You know, needle valves, you know, reduction in numbers of valves. There are a lot of potential ways to mitigate specification of equipment, et cetera, and so on.

There's also a lot of new technology that's taking place in the world. I understand that EDF just kind of brought out equipment that could actually, you know, detect hydrogen, which is a step in the right direction.

And I say all this to say that, you know,

this is emerging; right? Hydrogen has been in the system for quite a long time in different ways, but the impetus to bring hydrogen to the level that is anticipated will also bring new technology and research and drive new interventions.

And the only reason I say that, when we're talking about leakage, you know, I deal with methane leakage and have done for a long time, and in the last 20 years, there have been, you know, six different assessments of global warming for methane by the IPCC; right?

So I'm saying that to say that I would also anticipate as research develops, we'll have more information and developing information as to what impact hydrogen may have.

So for each source and type and mitigation effort, we have an approach for assessment of emissions. So we're going to identify the potential calculation approach using, you know, research and science studies and any information that you all had that you think might be beneficial as well, determine the best calculation methodology for the calculation approaches, and then determine the message by which to select that approach; right?

We have a lot of potential considerations as to what's the best way to calculate the emissions, assess the emissions from leakage. We are going to basically look at all of that information and determine, you know, what is the best possible approach to assess and calculate that emissions.

And once that's determined, we're going to look at that from a unit level, right, equipment level, valves, flanks, separate the equipment, right, so we have identified the leakage from various sources or components in this case.

And then the reason we want to do that is because we want to scale that up. You know, that one piece of equipment might be -- might exist in many different areas; right? But if we develop an approach that allows for scalability, we'll then be able to scale that process to get an overall estimate of the impact of leakage.

That is the general, you know, approach that we have to assess hydrogen emissions. And I have three more that we're going to -- or two more that we're going to discuss, but basically we're talking about identifying, you know, ways to assess emissions, the chemical relationship, and estimate

what the impacts will be. Thank you.

MR. BRITT: Thank you.

Katrina, you're first in line. I like it. If you could unmute your mic, you should be good.

MS. FRITZ: It's not unmuted. There we go.

MR. BRITT: There it goes.

MS. FRITZ: Katrina Fritz, California Hydrogen Business Council.

So Darryl, in the approach when you're looking at the existing body of research and information that's out there, are you also going to look at existing hydrogen pipelines in Europe and Texas, et cetera, and look -- and to use that to refine your approach, what's already out there, or are you really coming at this from this is a new pipeline and we want to take, you know, a distinct approach?

MR. WILLIAMS: That's an excellent question. Thank you very much.

We want to look at the kit and caboodle. So we've hired Stantec and UC -- University of California, Irvine to assist in this process. And what we're doing is we're trying to assess all the information that we possibly can. We're putting it

in a spreadsheet of where we obtain the information, what the information is in regards to. And we're going to use that to kind of define the process of what makes the most sense and what we're going to use.

It's going to be extremely transparent so that we're able to show you what research and studies we've reviewed; right?

And if there's something in addition to that that you all know, that would be great, but we've hired Stantec and UC Irvine to help us put together and research and review the existing science out there today on hydrogen gas.

MR. BRITT: So I just want to expand on what Darryl just said. If you have any recommended studies or you're knowledgeable about something else that should be looked at, again, please forward that information. It would be very helpful.

Miles, I'm going to go to you.

MR. HELLER: Is this on?

MR. BRITT: Yep. It's on.

MR. HELLER: Yeah. Thank you. Miles Heller with Air Products.

I think I know the answer to the question.

I just want to be sure.

It sounds like it's all a paper kind of study based on existing research. I mean, you do have some hydrogen facility.

Is there going to be any plan to include or incorporate any actual measurement data or any testing data that you've done or maybe UCI has done at all in this -- in this effort?

And you mentioned the EDF measurement system work as well. Are you going to test any of that as part of this, or is that perhaps something for a later phase?

MR. WILLIAMS: Well, yeah. I think that's -- thank you very much for the question, Miles. I think that's probably a later phase, but we will use that information where it's pertinent; right?

I mean, when we talk about mitigation measures, you know, as a part of mitigation, I mean, you know, best management practices are a part of mitigation.

So, you know, when we talk about the possible mitigation, it's not just, you know, eliminating everything from, you know, infrastructure, per se, but evaluating the quickest

ways to maybe eliminate emissions is also part of mitigation.

And it's the mitigation that we currently use with methane. We anticipate that there will be some, you know, similar considerations, if you will, for best management practices of ways to detect so that you could repair at a faster and more expeditious process. Those are considerations that will go into and be discussed as part of our assessment.

MR. BRITT: All right. Thank you.

We also have Aaron, who's raised their hand online.

Aaron, if you could unmute your microphone, you should able to speak.

MR. KATZENSTEIN: Hi, Darryl. Good seeing you. Aaron Katzenstein.

Darryl, just when you do the review of the studies for the leakage, it would be good if you could also identify how the leakage was determined, was it a mass balance, you know, what the uncertainties were in the leakage rates.

Because if you look at existing pipeline, you know, hydrogen is pretty hard to detect. It's a little different than methane and then the scope

of a molecule. Were odorants involved, you know, which might have different leakage rates than the hydrogen itself.

So just curious how that's going to go. It's really not possible to have right now sensors detect the hydrogen; right? It's not -- the science isn't there for it right now.

MR. WILLIAMS: No. Thank you very much for that, and we plan on doing all of that; right?

So as we look at the research, as you all well know, there's a lot of approaches or potential approaches to assessing and estimating emissions and one would be activity by emission, if a -- and then emission factors generally have a range of accuracy and plus or minus and, and we'll make sure to include that information because I think it's very important in determining why or how we prioritize the approach that we use; right?

So if we -- for example, if we have emission factors or can discover emission factors that have a smaller plus or minus error value, then that would be a priority emission factor in the approach; right?

So thank you very much for the question, and anything that you have that can, you know,

assist in this process -- we're -- you know, I think we're in a very good position in that we're able to take the body of science and research that's available today and review it and, you know, kind of determine what approach we're going to use.

But in that process, if there's something that we miss or that we haven't considered, this is a good opportunity to edify the process.

So thank you.

MR. BRITT: Norman?

MR. PEDERSEN: Thank you, Chester. Norman Pedersen, Southern California Generation Coalition.

Aaron, did you just say that the science is not there to measure leakage from hydrogen pipelines, storage facilities, and production facilities? Did I understand you correctly?

MR. BRITT: Aaron, can you unmute your mic? Katzenstein?

(No response.)

MR. BRITT: You're not unmuted.

MR. KATZENSTEIN: I'm unmuted now.

MR. BRITT: You're live.

MR. KATZENSTEIN: So in the sensors for hydrogen detection, it's very hard to detect

hydrogen specifically without having false positives or other things, especially at the very low level that you detect it, you know, on a pipeline.

So that's kind of the concern, is what the leakage rates might be and how you would detect those leakage rates.

MR. PEDERSEN: Thank you. Yeah. I didn't realize -- we have quite a few hydrogen pipelines in the United States and certainly in Europe that -- the leakage couldn't -- the science isn't there.

Darryl, how close are we to having the science there to actually measure the leakage?

MR. JOHNSON: Well, I can't qualify or quantify exactly how close we are. I know there is research going on, and I know that there are sensors that are able to detect hydrogen; i.e., the EDF effort.

And I think they just presented that in March of this year. So even that is new technology.

But Norm, I would venture to say that based on our experience with methane, you know, these are all technology-forcing efforts; right?

You build it, and the technology will follow, and I anticipate that there will be a lot of additional development and sensors as the -- you know, the market signal shows that there is a direction to have more hydrogen and utilization.

MR. BRITT: All right. It looks like, Marna, you've raised your hand. I want to go to you next. If you could unmute your microphone.

MS. ANNING: Hi. This is Marna with the Utility Reform Network. Thank you so much for your presentation.

I had a question on how your studies are going to inform the other studies that we discussed.

Is there any plan to provide guidance based on your -- the data that you're gathering or based on your assessments to -- or input to the environmental and to the ESJ studies?

MR. JOHNSON: Marna, thank you for that question. That's also an excellent question.

I think that -- well, I know that all of these 16 studies will have interplay with one another, and I will have, you know, discussions with the other study leads, and hopefully the information that we provide in all three studies

that I'm leading will edify the other studies.

At this point, you know, I would say that we're definitely open and desirous of working together and bringing the best, you know, end product to bear for our assessment, so there will be communication, yes.

MR. BRITT: I don't know if Norm raised his hand and left or forgot to put his hand down.

Does anyone else have any thoughts about this subject matter before we move on to the next, which is greenhouse gas emissions?

Or we could do a break as well. Do we need a break? Maybe a five-minute break?

Okay. Let's take a five -- actually, let's take a -- let's come back at 10:45. How does that sound? That's about a seven-minute break. That will give everyone a chance to use the restroom or grab something to eat or drink and get back to our seats, and then we'll go to the next presentation. Thank you.

(Recess.)

MR. BRITT: All right. Thank you for coming back.

We're going to next go into our topic of greenhouse gas emissions, the evaluation of that.

Darryl will make a preparation, and then we'll have a member discussion on that subject.

MR. JOHNSON: So before I get into the objective and study approach and -- I just want to say that the slides that I have are approaches very similar because we're dealing with gases, right, and assessment and impact of those gases.

So if some of my slides seem a little bit redundant, it's only because we're dealing with chemistry; right? And they're all related in many ways, right, whether we're talking about global climate change, pollutants, or air quality pollutants, or leakage.

So the next topic is greenhouse gas and the impacts of hydrogen and greenhouse gas and the assessment for the Angeles Link project.

I just want to -- and I know we have a lot of technical folks here, but, you know, just a little bit about greenhouse gases.

Greenhouse gases are any, you know, compound or molecule or combination of molecules that could absorb sunlight -- the radiation from sunlight and reflect that back on the planet.

I always like to give a simple explanation because, you know, water vapor has indirect

greenhouse gas effects; right?

So why is it important to consider greenhouse gas as it relates to this project?

I'll just say that, you know, we're looking at the potential greenhouse gas reductions and potential increases associated with hydrogen; right?

We've been discussing this project from a very scientific standpoint, but I think there are a lot of benefits of hydrogen as it relates to greenhouse gas. I think the impetus in the world today is to decarbonize the pipeline because of the global warming potential of methane and other gases and the carbon dioxide associated with, you know -- carbon dioxide, nitrous oxide and methane associated with combustion of fossil fuels; right, where some of that is mitigated by the utilization of hydrogen.

Now that I've given a little bit of Global Warming 101, I'll move to our objectives and approach.

So the objectives are very similar to that of the hydrogen leakage: To assess the potential greenhouse gas emissions and the potential reductions in greenhouse gas associated with the

project, right, and to identify potential mitigation measures to reduce potential emissions; right?

So we'll look at the benefits, what the hydrogen benefits are and what some of the potential increases are and what mitigation measures or opportunities exist.

Again, the study's approach is very similar to hydrogen in that we will estimate emissions associated with the sources of greenhouse gas, identify potential mitigation measures and compile, you know, technical information, including from the other parallel studies, from, you know, research, scientific investigation, and calculation assumptions and approaches that are known and that we currently utilize in other areas like methane, right, to assess the impacts of greenhouse gas.

So identifying the sectors, we're looking at hard-to-electrify industries as our end users and all the potential greenhouse gas either reductions or increases in those areas.

We're also looking at power generation.

Then we're going to focus on existing power plants and greenhouse gas from storage and transmission of hydrogen; okay?

Once we, you know, have a list -- or universe, if you will, of all our potential sources, we're going to look at the potential, you know, equipment measures and activities for mitigation of greenhouse gases that exist, are emerging, or, you know, maybe near term or near future, right, to evaluate where we are and where we think we're going, from that standpoint. And we'll rank that as part of our assessment.

For each of our sources and mitigation measures, very similar to hydrogen gas, we are going to identify potential calculation approaches, determine the best calculation approach to use for our assessment, and then determine the methods, whether it be accuracy, data, variables, what methods for those calculation approaches. And then we're going to prepare that -- those calculations to be made on a unit level.

From that, we'll -- we're using that to scale it up to an overall impact of greenhouse gases on the various source types.

Again, this is a very kind of high-level description of our approach. And, you know, again, our approach won't be that different for NOx greenhouse gas and hydrogen because we're basically

dealing with molecules and gases.

MR. BRITT: All right. As Darryl mentioned, the approach is similar, but this is a different topic, the greenhouse gas emissions evaluation.

Does anyone have any thoughts about how the calculation approach will occur, the different available data sources that might be available to look at this, how this is going to be applied to the environmental process?

Jack, I see your hand raised, so I'm going to go to you first.

MR. BROUWER: Hello. Jack Brouwer from UC Irvine.

I want you to consider, especially when looking at the potential sources of leakage, not only the four items that you mentioned there, but also the production side.

You have storage in transportation, but even if SoCalGas is not going to be responsible for the production of hydrogen, say, via renewable electricity and electrolysis, I think an assessment of that in this effort would be useful.

A second thing I want to think about is how far upstream you should go. So, for example,

when you build the pipeline, you're going to have someone make steel.

There are greenhouse gases associated with making the steel and everything and shipping it from wherever it's being shipped and all these kinds of things. So the life-cycle analysis approach might be considered when doing this.

And then, again, of course, when you do a life-cycle analysis, you should also do the same for the alternative, okay, a full life cycle for any alternative for meeting the same sort of energy demand.

I think those were the main two thoughts I had from that approach.

MR. JOHNSON: I appreciate that, Jack.

We're considering, you know, kind of all the research as we look at ways to do this. You know, when you talk about life cycle, that is obviously one approach and consideration.

We were initially looking at, you know, more of a fixed area, because, you know, you talked about production, for example. We're looking at leakage, hydrogen gas leakage and production.

And consequently, you know, that might inform greenhouse gas input from the greenhouse gas

study, if that makes sense.

MR. BROUWER: Yes. Thank you. And I apologize. I heard UCI was mentioned in the last -- I had to step out for a minute.

Is there a lingering question that I should answer from the previous presentation?

MR. JOHNSON: Oh. The previous presentation? I was just giving kudos and credits to the fact that Stantec and UCI are a part of our team.

MR. BROUWER: Thank you. It's not me. It's other people at UCI. But anyways --

MR. BRITT: All right. Arthur, I see your hand raised. I'm going to go to you next.

MR. FISHER: Arthur Fisher, Cal Advocates.

I'm just going to ask -- I just want a point of clarification here.

You're going to be looking at end users and the reduction of GHG in the end uses. I see that listed out.

Really, there's many potential different scenarios there. Can you kind of list out the sort of scenarios you're looking at? Is there a high or low success scenario? Are you buffer -- bracketing this in some way?

I'm just trying to get -- see whether we have some sort of estimate of a variance of the success. Because fundamentally the whole purpose of this is to reduce this at the end of the end users. And so I just want to understand how you intend to approach that.

MR. JOHNSON: So, Arthur, thank you very much for the question. You know, we haven't fully defined our approach because our research is reaching a point of conclusion, and then we will use that research to define, you know, what is the best approach, as illustrated in my slides.

So we haven't selected the approach. What allows for the best calculation and estimation of greenhouse gas impact will edify our selection because we're going to prioritize, you know, how we choose the approach, and that selection process will be based on, you know, the information that's there, what makes the most sense and what's going to bear the most fruit.

We -- you know, I would venture to say that, you know, an emissions estimate, we could spend a great deal of time researching an area that's going to give us, you know, a fraction of impactful information.

So we are going to prioritize the process, and that will be transparent as well, Arthur.

MR. FISHER: Can I just follow up on that?

MR. JOHNSON: Sure. Absolutely.

MR. FISHER: Sorry. I didn't know if my mic was still on or not, to be honest.

The -- my concern -- and maybe it's not part of your methodological paper, but it's part of something that's further downstream.

My concern is if there are different scenarios in adoption of hydrogen -- I understand the ports are all gung ho for this and they see a very bright future in this.

I'm just -- there are certain offtakers that are all in here, but I don't think -- it doesn't sound to me like all the end users are fully fleshed out yet, so we don't really have a grasp on what those are going to be.

So it would be important from my perspective to understand like a high-success scenario or a low-success scenario as far as GHG reduction is concerned and what those brackets look at.

Now, I don't know that that is part of this methodological paper or something further down

the line.

Is that how you envision it? Yeah.

MR. JOHNSON: So I think that that's an excellent question.

I think that that kind of happens mainly by evaluating what's available; right? Like, when you talk about what's near term, what's the best available information from an emission calculation standpoint.

I think it's going to edify that process in a way that -- you know, we have yet to determine, if that makes sense, Arthur, where we examine the end users and potential end users, what information is available to calculate greenhouse gas emissions with that category of source. And how good and robust that information is will determine how we are able to rate it, if you will.

MR. BRITT: All right. Hopefully that answered your question. If not, we can come back to you.

I also see, Tyson, you've raised your hand, so we'll go to you next, if you can unmute your mic.

MR. SIEGELE: Hello. Tyson Siegele representing the Utilities Action Network.

I -- first off, I think that there have been a lot of good comments on this. I think that clearly Jack's comment of the production assessment is important.

The comment that Brian had earlier was tied in very directly to this, that we need to evaluate the current GHGs and how they're being reduced in comparison to -- in comparison to what the new options are.

And with that, it's also important to take a look at other ways to reduce these GHGs other than through the pipeline or the hub or the transmission, the electric transmission version of hydrogen.

So all of those things I think -- what I'm understanding you say is they'll be looked at and they'll be determined what pieces and parts will be entered into the GHG calculations down the line, which is great. I really appreciate that.

The other piece of this that I think is interesting is from what I was hearing, it really sounds like the demand study is going to be a key component of this process.

And so my first question is: Will this evaluation happen after the demand study has been

completed and after the Planning Advisory Group has been able to see that, take a look at that, and provide our feedback on the demand study?

MR. JOHNSON: Thank you, Tyson, for your question.

I can simply say yes, the demand study will definitely inform the greenhouse gas calculation process.

MR. SIEGELE: Great.

So when -- when we're taking a look at the overall schedule of this, this particular piece is going to happen, what, a month after the demand scenario is provided to us, and then we are commenting on the demand scenario? And then this effort kicks off? Is that the process there, then?

MR. JOHNSON: Well, no, in the sense that I think that there's a little bit of effort that has to take place foundationally even prior to us receiving the demand study.

We have to do the research. We have to evaluate calculations, approaches, you know, what's out there from a scientific and research standpoint, which, you know, we're trying to line that up from a scalability standpoint so that we don't have to wait on the demand study and not do

as much as we possibly can, if that makes sense.

MR. SIEGELE: Of course. Of course.

So with -- with that, one of the pieces that was up on the screen a second ago was to take a look at the calculation methodology.

And I'm assuming that that is going to be something that, again, once -- once these pieces and parts of the evaluation process are determined, is that something that you have a schedule for yet and when the Planning Advisory Group will be able to take a look at those methodologies and provide feedback?

MR. JOHNSON: So I don't have an exact date, but I am shooting for the technical piece that we have coming up in August; right?

So we're working to define the research now, kind of prioritize what we have, what makes the most sense. And we will transparently share that information with you, you know, I would anticipate by August. It's not soup yet today, Tyson.

MR. SIEGELE: Sure. Sure. I appreciate that.

Okay. Yeah. I'll keep an eye out in August for -- for some things to possibly come

through.

The -- that brings up -- you mentioned transparency there, and I appreciate SoCalGas's efforts on that.

One of the pieces that has been requested a few times and SoCalGas has committed to providing is the scope of work for each of the consultants.

I know that Arthur had mentioned in the previous meeting it would be great, you know, if you can just send out the scope of work to the Planning Advisory Group.

I didn't -- in the beginning, there was a lot of coverage of, you know, process and how -- how -- what dates are going to happen, what day things are due on. I don't think there's been a change to the request for feedback by the 31st.

My request is that we get at least two weeks after we get those scopes of work to review those scopes of work and put together our feedback so that basically the date, instead of being the July 31st for when the feedback from the Planning Advisory Group is requested, it be moved to just -- you know, sort of a floating timeline at this point, of whenever the scopes of work come in, then we would, you know, have that deadline be two weeks

after that, at the very earliest. Three weeks would be better, but two weeks at the very earliest.

Is that something that -- and this is really a question for the whole group there: Is there a way to do that? Is that something we can update at this point?

MR. BRITT: I'm going to let Jill answer that.

MS. TRACY: Hi, Tyson. This is Jill Tracy.

So pursuant to your request for scopes of work, when we first looked at the process of distributing the study information at the early stages, we originally contemplated having the scope of work that we sent out to our various consultants sent out.

What we found was that those original scopes of work changed as part of the contracting process and getting feedback from our potential contractors, and so those scopes of work were no longer accurate.

And so what we did is we then prepared the study descriptions, which were circulated to you previously on July 6.

The study descriptions are the most accurate -- we didn't think it made sense, especially under the very, very, very tight time constraints we have right now -- it didn't make sense to send you a scope of work that was outdated and wasn't reflective of what the -- what the scope of work was as we were proceeding. And so those study descriptions are the most accurate description of each of those studies.

So we would ask that you focus on those study descriptions and to focus your feedback on those materials.

Does that answer your question?

MR. SIEGELE: I guess partially.

One of the things I'm concerned about is, just like in a game of telephone, where you get to the end of the line and the result of that game of telephone is hilarious because it doesn't reflect at all what was initially the starting point.

One of the concerns I have is that the document that you sent out -- I really appreciate it, went through it, took a look at it. I'm definitely going to provide feedback on that.

It would be great if we had what the actual contractors are contracted to do. You know,

at some point, there's -- I assume there's an update to the contract, and the scope of work -- when it changed, there's an update.

So would it be possible to send -- just send the updated contract?

MS. TRACY: Well, there's confidential business information in our contracts with our vendors, so we can't just send you that contract.

So that study description is really the most accurate reflection of what the work scope is, and so we're -- and then also, this is an iterative process.

So at the end of the month, we're going to get all the parties' feedback. And that's the tracking system that Insignia is going to go through this afternoon.

Then there's going to be an updated -- you can call it a scope of work or a study description. Once that updated product is complete, it's going to be pushed out to the group.

We would like to probably push that out a month after receiving your feedback, reminding you that this is a lot of work on you. This is also a lot of work on us at 16 studies.

And then by that point, we're going to be

pushing out the technical approaches for the 16 studies.

And so as Darryl mentioned, in mid-August, we're going to be pushing out the technical approaches. So that also is going to be a process by which we send them out, and then we'll be able to discuss that at our next quarterly meeting.

We'll also have these workshops to go over. We'll take polls amongst both of our PAG and CBOSG groups to find out which topics you would like us to focus on.

And then we go into, again, the feedback that Insignia is going to track. Then we go and incorporate that feedback, to the extent it's appropriate in our Phase 1 studies stage. It could be more appropriate in Phase 2 or maybe perhaps Phase 3, depending on the feedback.

And then we will move into our next phase, which is our preliminary findings and data. I think you're familiar with this. I don't think I need to keep going, but we have a process in place.

And so the study descriptions was the first milestone, and Insignia -- I don't want to steal your thunder, guys. You'll be talking about this later on in the afternoon.

So Tyson, maybe we could go through the Insignia stakeholder feedback tracking system discussion and then we could talk about your -- all the groups' feedback on what that process looks like and how we can best incorporate that feedback and enhance that process.

Does that help?

MR. SIEGELE: It does a little bit.

Just one follow-up question on what you said there.

Is there -- when I'm requesting scopes of work, I don't mean to request the entire contract, just the scope of work portion of it.

Is there -- are you saying there's confidential information in the scope of work?

MS. TRACY: I was not directly involved in all of the contracting process with our vendors and supply management, but my understanding based upon my review is that there's not a discrete scope of work.

There was a discrete scope of work that was sent out to our contractors, but that there is not -- it's within a larger document that -- it's just not, like, an exhibit to the contract, Tyson.

So what you're kind of asking for doesn't

exist. And so what we did was we created the study descriptions. And, like I said, that's the best reflection of what that work stream looks like right now.

I'll pass it back over to Chester.

MR. BRITT: All right. So --

MR. SIEGELE: There's a -- oh. Sorry.

So one last suggestion on that, and then I have one other piece on the demand, the GHG, which is if there are confidential pieces within the overall, then redactions are always a possibility. NDAs are always a possibility. A couple different options to consider with -- with that.

The -- and then the last piece with the demand, the GHG emissions, is -- I know that Air Products has a representative here, and so one of the things that I -- I'm interested in is making sure that if there are any existing hydrogen users that are going to be covered within the demand, within the GHG studies, that taking a look at the current suppliers of hydrogen and the current -- and talking with folks like Air Products to make sure that there's not a double counting of the hydrogen that would possibly be supplied either through non-SoCalGas or SoCalGas.

So that was the last piece. Thank you very much.

MR. BRITT: Thanks, Tyson.

Darryl, did you have anything to comment on that?

MR. JOHNSON: I would just say that I haven't seen the demand study, but the greenhouse gas study is looking at the project itself and those elements that I described.

So unless Air Products is going to be an end user somehow of the project, we wouldn't have double counting.

MR. SIEGELE: I appreciate that.

MR. BRITT: All right, Aaron. I know you have been patient. We're going to go to you. There's a couple in-person people.

Okay. Aaron, there you go.

MR. KATZENSTEIN: All right. Thanks.

So just on the note of the end product of this kind of task here, I think what's needed here is what's the carbon intensity, you know, of the end result that's going into the end users.

That's going to be important for the economic analysis also because you can claim the LCFS credits, you know, for the mobility sector.

And that's going to probably change over time. You'll have to look forward, you know, on the production side, as the grid gets more renewables in place, those carbon intensity facilities are going to get even more and more valuable over time for this hydrogen.

MR. JOHNSON: Aaron, I appreciate that. I don't think we had gotten to the place where we're looking at that. We're looking at carbon emissions, both reductions and increases. And if -- you know, that's a good suggestion. It's something that we hadn't considered at this point.

MR. BRITT: All right. Thank you for that.

Now we're going to go in person.

Miles, I think you've been patient as well. We're going to go to you.

And then Norm, we'll go to you next.

MR. HELLER: Yes. Miles Heller with Air Products.

Yeah. We'll assure there's no double counting, Tyson.

My question -- and I apologize if I missed this. So there's going to be this quantification or attempt to quantify hydrogen emissions, and then

there's the quantification of, I guess, I call it, the more classic greenhouse gas emissions.

Are you going to attempt to assign a CO2 equivalency or global warming potential to the hydrogen and look at the net impact of the positive greenhouse gas emissions and the -- you know, and the effect of the hydrogen, if -- if you find one? And then, of course, the net benefit perhaps from fossil fuel displacement?

Is that part of the scope, or is it really just emission quantification on both sides without the CO2 equivalency?

MR. JOHNSON: Well, our research is going to discuss the CO2 equivalency in order to, you know, determine impacts both plus and minus of the greenhouse gas.

We talked about leakage, hydrogen gas leakage, and one of the reasons we're looking at hydrogen gas leakage is because it is an indirect greenhouse gas.

So that discussion and that work also identifies the research that's currently being done on the global warming potential for hydrogen.

And I know there have been about six studies in the last two years. I know because I've

looked at it recently, but, you know -- so that information will come to bear in that study.

MR. HELLER: Sorry. Just a quick follow-up.

So I guess my question is: Are you going to try to put the two together and show some kind of net impact or net benefit?

MR. JOHNSON: Oh, yes. So there are two different things with the greenhouse gas piece. That information will come to bear on the greenhouse gas side of things.

But just answering your question of how the hydrogen consideration for leakage will be looked at and -- from a greenhouse gas standpoint, we can easily take the information that we derived from the global warming potential, research is currently out there, and kind of assess what that greenhouse gas increase would be for hydrogen, whether it be combustion or through leakage.

Did that answer your question, Miles?

MR. HELLER: (Nods.)

MR. JOHNSON: Thank you.

MR. BRITT: All right. We're going to go to Norm.

I just want to make a quick point. On the

microphones, we don't have to turn them on and off. It doesn't squeal. We can have multiple mics on at the same time. So it's cutting out a little bit for folks online.

So let's just leave that microphone on, because that seems to be the heavy used one. And that will work for everybody. Thank you.

MR. PEDERSEN: Thank you, Chester. Norman Pedersen, Southern California Generation Coalition.

A question that's actually a follow-up to Jack Brouwer's comments about life-cycle analysis of a pipeline, do -- we all know that hydrogen can be tough on a steel pipeline.

Do we know what the expected depreciable life of a pipeline -- a hydrogen pipeline might be? We have a really good grip on the depreciable life of a natural gas pipeline, but what about hydrogen pipelines?

MR. JOHNSON: So Norm, that's a good question.

I don't have an answer for you right now, but I can say that there's a lot going on in that area, right, you know, as far as -- you know, I know Italy just certified a pipeline. I know that

they have particular coatings that are being developed to coat current pipelines to, you know, kind of slow down the embrittlement process from hydrogen.

There's a number of efforts and resources -- resource efforts going on; I just don't have that answer for you today.

MR. BRITT: Jack?

MR. BROUWER: Yeah. Let me just mention quickly --

MR. BRITT: If you can just announce your name.

MR. BROUWER: Yes. This is Jack Brouwer from UC Irvine.

And there's a lot of research going on right now all around the world in this very space, but it's quite certain that most of the polymer pipeline materials, so the plastic pipe that we even are currently using today for natural gas, can be quite easily used for hydrogen and not have any increased degradation. It's just certain pipeline steels, okay, that are affected by that.

So I just wanted to make a differentiation between plastic and steel.

Secondly, the phenomenon of enhanced

fatigue crack growth rates, which is the more technical term of embrittlement -- that phenomenon is also very well-known for even the particular materials that comprise SoCalGas pipelines.

And we published a paper a little while ago working with Sandia National Labs and with the University of Illinois and Urbana-Champagne and experts in this field, and the phenomenon is known to be very slow; okay? So it's very slow.

But it's real, and as a result, you have to account for it.

I suggest that you have to study it for the particular steel that you're considering; okay? Okay?

So it's actually a very specific thing that you're going to have to do. Check it out, make sure that you've got this steel, and you know exactly how that steel is going to respond to hydrogen.

But what we have seen for the few that we have investigated, it's so slow that I think a replacement schedule for that pipe, okay, over time would not be that cost impactful overall.

Okay. That was just one of the findings from that paper that I mentioned; all right? It's

a little bit much.

MR. JOHNSON: No, Jack. I appreciate that because, you know, I haven't even seen the litany of research that's being, you know, investigated from, you know, a high-level standpoint, so the more you have to offer, the greater, you know, the overall impact of our evaluation. So thank you.

MR. BROUWER: And I can share the paper with the whole group, if you want. Again, it's just one of hundreds of papers that are being published now, so --

MR. BRITT: You would know; right?

Ernie, I think you have your hand up.

MR. SHAW: All right. Good morning, everybody. Ernie Shaw, Local 43, president of Transmission and Storage.

So I actually have a comment for you, Jack, or a question or two, in regards to what you're saying right now about the polymer and stuff like that and the life units and all that.

So when you say "polymer," are you referring to polyethylene, or is that polymer on a different -- like, on a specific type of plastic material?

And what are the sizes for that? Like,

could that be able to house, you know, hydrogen? Because I believe the maximum -- maximum size for, you know, polyethylene is, like, 8-inch and below.

And then what kind of coating on, like, the steel and stuff like that is used to, you know, combat, like, the brittleness and all that stuff?

Because what I was understanding initially was, like, a -- it would have to be some kind of exotic metal, like aluminum or anything of that sort.

MR. BROUWER: I'll just mention a couple of points here. Indeed, the plastic pipe that is currently being used in the distribution system mainly, okay -- and that's a lot of stuff that you work on.

So thank you -- or used to work on -- your members work on it; right? Okay. But -- no? No. Not transmission. I'm talking about distribution.

Yeah. So in the distribution system, the plastics that are currently being used -- most of them are 100 percent compatible with hydrogen. You're right that they don't go up to the very big sizes yet; okay?

I don't know what's evolving with regard to larger sizes and maybe even starting to use that

in sub transmission or, you know, bigger pipes. I don't know what's happening there.

But I think it's possible that larger plastic pipes will be available in the future that can be hydrogen compatible. That's what I think.

Secondly, you asked about coatings. The one coating that we have investigated, you're correct, has a metal in it. It's a copper epoxy that we have looked at, and it's something that we believe could be spray coated on the inside of pipe -- of steel pipe and protect it from leakage and protect it from embrittlement over time.

And this might be something that, you know, your members could actually help to apply, right, something like that.

MR. BRITT: All right. As a lot of these discussion topics go, we can potentially go off into a whole bunch of arenas of thought, right? And all very helpful to the overall process of the 16 technical work studies that are being discussed.

We've had a really good conversation about greenhouse gas emissions.

Does anybody have any last thoughts before we leave this subject?

(No response.)

MR. BRITT: I think, if we're okay, we're going to end up now going to lunch because I see the lunch in the back. I think we were scheduled to go to lunch at about 11:30, so we're a little -- about five minutes early.

But we will go ahead and take a 30-minute lunch and be back around 12:00 to get started on our afternoon session.

And, again, we appreciate all of your input, and let's reconvene at 12:00 o'clock. And thank you so much.

(A lunch break was taken.)

MR. BRITT: All right. Thank you for your patience online. We're just about to get started here for our afternoon session.

So just to kind of remind everyone where we're at, we have had discussions about the environmental process along with environmental justice, social justice, and then we talked about hydrogen leakage, greenhouse gas emissions. And now we're going to talk about NOx.

We also will have a presentation on our stakeholder feedback and tracking approach, as Jill mentioned earlier, and then we'll end today with water resources evaluation.

So we have three topics to talk about this afternoon, and we'll go ahead and get started with Darryl again to jump into NOx, and then we'll have a discussion.

MR. JOHNSON: Well, welcome back from lunch, and I hope I can keep you guys awake.

So NOx -- basically, I get all the chemistry stuff. And they're so interrelated.

We talked about, you know, the potential for leakage and, you know, global warming, climate pollutants, and now we're going to talk about NOx, which is an air pollutant.

And NOx -- you know, so when we say NOx, I want to say that I'm primarily focused -- or discussing nitrogen monoxide and nitrogen dioxide, which are commonly referred to as NOx, but there are a number of nitrogen oxides; right?

So why is NOx important as we look at evaluating potential NOx emissions from the Angeles Link project -- or proposed project is that NOx is a precursor to ozone.

And in this area and for South Coast Air Quality Management District, that if they're in nonattainment for state and federal ambient air quality standards for ozone, and NOx is a precursor

to ozone.

It's also a precursor to particulate matter below 2.5 microns. So there are health considerations and effects associated with potential of NOx and particulate matter.

Our objective in our NOx assessment, again, as I kind of alluded to, our process is going to be very similar to the previous studies, where, you know, we want to assess the potential of both NOx emission increases and reductions resulting from the project and also mitigation measures to reduce potential NOx emissions.

And NOx will be the primary focus of the study, but it will also include a high-level evaluation of some other air contaminants associated with, you know, combustion of gas.

Okay. The study approach, again, is very similar. We will look and identify the various types of NOx sources and identify potential mitigation measures for those NOx sources.

And in doing that, we will examine the available technical information, which includes other feasibility study in the Phase 1 scoping, and will include the research and scientific information and information from regulatory

agencies and transportation agencies as we look to develop our estimation and assumptions and move forward to also determine potential mitigations.

So the general category of source types for NOx, we are looking at the hard-to-electrify sectors, and there's a number of those high-energy sectors that are hard to electrify.

We're looking at mobility. We'll be focusing primarily on heavy-duty trucks.

We're looking at power generation and initially focusing on existing power plants and, of course, the storage and transportation of hydrogen, and identifying mitigation measures or potential NOx mitigation measures for existing, emerging, and new equipment for any additional mitigation measures that any of you are aware of that you can bring to bear.

So there will be a top-down evaluation of these measures, and we'll prioritize and rank the measures identified by each source.

So for these emission source and mitigation measures, again, I know it's a bit redundant, but we will identify potential calculation approaches, determine the best calculation approach, determine the calculation

methods for selecting that approach, and we will prepare calculations at the unit level -- or unit level for the sources so that we can use that in a scalability -- from a scalable standpoint to ultimately estimate NOx emissions.

Now I'm ready for any questions you might have.

MR. BRITT: All right. Thank you, Darryl.

Just as a quick note, Marna asked a good question on the chat, "Will these presentations be available after the session?"

The answer is yes. We will be making these available, as we always do, as a follow-up to these meetings.

Katrina, you have your card raised, so go ahead.

MS. FRITZ: Hi. Katrina Fritz, California Hydrogen Business Council.

So in looking at the sectors that were identified, I mean, these would be high-NOx sectors that would create a lot of NOx emissions.

What the study's proposing is to look at the NOx emissions from using and storing hydrogen in these sectors.

It seems to me that the sectors that go

into this section would pivot on the demand study and what sectors are ultimately identified, and the study of the end uses; right?

And so it just doesn't seem like you could do this without having it really closely tied to the demand side. Because, to me, this just looks like sectors that are high-NOx sectors without hydrogen.

MR. JOHNSON: Well, thank you very much for that, Katrina.

I would say that everything that we are going to do in our emissions evaluation calculations is going to depend heavily on the demand; right? That's going to inform us and we, you know, are going to use that information to try to project our emission estimates.

MR. BRITT: Norman?

MR. PEDERSEN: Norman Pedersen, SCGC.

Darryl, you mentioned four emissions sources. First, was hard-to-electrify; second was trucks; third was power gen. Those would be all emission sources that would result in emissions as a result of combustion of hydrogen; correct?

MR. JOHNSON: That is correct, yes. And they're --

MR. PEDERSEN: So how do we get NOx as a problem with storages and transmission? If there's a leakage from a storage tank or from a pipeline, what leaks is the most prevalent element in the universe.

MR. JOHNSON: So I should do a little chemistry and say that NOx is only created by the chemical reaction of N2 -- N2 and O2 at very high temperatures; right?

So in combustion is where you're going to get your NOx, right, whether that be, you know, mobile vehicles, their internal combustion engines, primarily.

MR. PEDERSEN: I didn't catch how NOx results from a leak from an H2 transmission -- transmission line or from a storage tank.

MR. BRITT: So if I'm understanding the question, just -- let me try to make sure I'm understanding as well -- you're asking something that maybe is not related.

So we were talking about hydrogen leakage. That was an issue. And now we're talking about NOx. But I think NOx is under the understanding that hydrogen is going to be burned or used in a way that could produce NOx?

Is that --

MR. PEDERSEN: Well, I'm just going back to the very beginning of Darryl's presentation. He said there are three emission -- four emission sources. Number 4 was storage and transmission. Hard-to-electrify sources that are burning hydrogen.

MR. JOHNSON: And I have the answer for you. I apologize for being a little bit after-lunch slow.

So in the storage and transmission, as part of storage and transmission system, we have compression. The gas can't move without compression, and compression is normally associated with, you know, some sort of internal combustion engine and/or turbine, and there would be potential for NOx from that equipment.

MR. PEDERSEN: So if we had an electric compressor, you wouldn't have the problem?

MR. JOHNSON: Right. And as a mitigation, I'm sure that will be part of what we suggest.

MR. BRITT: All right. I'm going to go to Katrina, and then we're going to have a couple online that we'll reach out to.

MS. FRITZ: Okay. So diving deeper still

with Norm here, going back to those sectors that were identified, so are you saying that you specifically identified these as sectors that will be combustion -- combusting hydrogen?

MR. JOHNSON: Hard-to-electrify places or industries storage and transmission and any other -- whether there's a potential for any type of NOx from combustion and/or -- you know, we're going to examine where the potential sources of NOx are within these industries.

I would say here and now my initial thought is combustion because, you know, that's normally how NOx is created.

But in our research, if there are other sources of NOx that are within these source categories, we will evaluate those as well.

MS. FRITZ: Okay. So if heavy-duty trucks are mandated to be zero emission by the time the pipeline is built -- this is my input -- then it wouldn't be relevant because they won't be allowed to be combusting hydrogen in the state of California; is that correct?

MR. JOHNSON: The first part of your question -- could you restate the first part?

MS. FRITZ: Well, that's the question. Or

are you looking at, like, fuel cell trucks that would be using the hydrogen to see if there are still some NOx emissions from a noncombustion?

MR. JOHNSON: Both. I think, you know, we're looking at the possibility of combustion from the hard -- the larger trucks and the fuel cell possibility.

We're looking at the universe of these sources and their potential NOx emissions.

MS. FRITZ: Okay. So both noncombustion and combustion end use?

MR. JOHNSON: That's correct.

MS. FRITZ: Okay. Thank you.

MR. BRITT: All right. We're going to go now to Aaron. You've had your hand raised. If you could unmute your mic.

MR. KATZENSTEIN: Yeah. Thanks, Darryl.

So a couple points here. I guess when you do this analysis, you know, the geographic location of the NOx emissions is just as important, you know, as the quantity of the NOx emissions.

So your pipeline, transmission, compression, all that -- you know, I think we would be very interested in what are the NOx emissions that you would expect here in the basin from all

this; right? Because you've got your pipeline likely coming from out of the basin here.

In the overview, it says that you have other emissions. So I hope that you're looking at, you know, the fine particulate matter and also diesel, as part of this exercise, also as part of those emissions?

And then going to the sectors, when you look at things like the industrial sector, that's going to be a pretty hard analysis because I'm not sure it's really known yet, you know, how hydrogen impacts the NOx emissions on those sectors.

It will be interesting to see what you come out with on that analysis.

I know Jack's done some of that at UCLA, but I'm not sure that's completed yet.

MR. JOHNSON: So Aaron, I don't know the result of the assessment, but we are going to evaluate what the known information research and studies; and if there's no information to evaluate a certain sector, then we will kind of illuminate that as well. You know, we can't make or create an emission if the calculus is not there to do so.

MR. KATZENSTEIN: And then I think the other thing that you should also consider is the

importance of how this can also, it looks like you've got some of this in there, reduce the NOx emissions.

So, you know, having a hydrogen pipeline open up -- opens up opportunities to have, you know, backup generators run on fuel cells and things like that.

So there's a lot of good, you know, further reductions there that can be achieved from this process.

MR. JOHNSON: Absolutely, Aaron. Thank you very much for bringing that to bear with that. That will be examined as well. We want to look at both the potential emission increases and reductions.

MR. BRITT: All right. Is this -- thank you, Aaron.

We're going to now move to Marna.

Marna, you have your hand raised.

MS. ANNING: Marna Paintsil Anning.

Hi. This is Marna with the Utility Reform Network.

I had a question. In the proceeding, there was a definition of "hydrogen" that required that the hydrogen be produced with close to zero

emissions. I'm paraphrasing.

In your opinion, is that possible? I'm hearing you talk about combustion and so on and so forth, compression, and so on and so forth.

Would we really be looking at green hydrogen, according to the definition of the decision, if we're not using entirely renewable sources in storage and transport?

MR. JOHNSON: Excellent question, Marna.

So the production of hydrogen and the description of green hydrogen is how that hydrogen is created. I don't believe the production of hydrogen, whether it be green, purple, or the myriad of different other colors, speaks to the transportation of hydrogen. So I think we're discussing two different things.

So although the production of hydrogen may not have a combustion component, the transmission of it may, and that is totally dependent on whether, you know, that combustion is combusting hydrogen.

There is -- you know, as a mitigation, like previously alluded to, there is also the concept of having electric compression so that the combustion aspect and subsequent NOx would not be

an issue. But those will both be evaluated.

MR. BRITT: Jack?

MR. BROUWER: Yes. Jack Brouwer from UC Irvine.

I want to strongly second Aaron's suggestion that this not just consider NOx, but all of the criteria pollutants that are associated with the production, delivery, and conversion of the fuels that hydrogen would replace, and hydrogen.

So you have to have especially, I think, diesel particulate. You could have also carbon monoxide, hydrocarbons, hydrogen oxide. All of these things should be considered, please.

Secondly, we do have capabilities at UC Irvine to understand the subsequent impacts of these emissions changes to actual air quality and health impacts.

So this also, I think, should be at least somewhat considered because if you emit these in Palm Springs, that's very different from emitting them in Newport Beach. Okay.

So -- and then it doesn't just depend on where, but what happens afterwards, what atmospheric chemistry and transport takes place so it delivers the pollutants to a certain location

and has certain health implications as a result.

And, of course, the converse, if you reduce the emissions in a particular place, it matters; okay?

So I just want you to think about geo-spatial atmospheric chemistry and transport in addition to the emissions themselves.

MR. JOHNSON: I appreciate that. Thank you so much, Jack.

MR. BRITT: Ernie, did you have your hand up or -- okay. All right. Just making sure.

Anyone else have any thoughts on this subject matter of NOx?

(No response.)

MR. BRITT: All right, Darryl. You did a good job. You answered all their questions.

MR. JOHNSON: Thank you all very much.

MR. BRITT: Okay. Katrina. I'm sorry.

MS. FRITZ: Just to summarize my comments and I think some of Norm's comments, I would recommend making it really clear as to when you're referring to the NOx produced by the use -- production and use of hydrogen versus the offsets to the production -- you know, that are being created, the reduction that Aaron referred to.

It's not quite clear in the document.

MR. JOHNSON: Thank you very much for that as well, Katrina.

MR. BRITT: Again, this is exactly why we're here, is to make those types of clarifications, inputs, so that our methodologies are sound and that they make sense and they're technically accurate.

Okay. So we're going to now move into the next section, which is the environmental stakeholder feedback tracking.

Let me just grab this clicker here.

I'm going to introduce Armen Keochekian, who is the director of Insignia. He's going to make the preparation.

I think Jill alluded earlier to this process being something that is going to be documented, and Insignia has experience working on these types of projects, environmental studies, to not only just collect and capture the input, but also to make sure that it's included, incorporated into the process.

So I'm going to turn it over to Armen, and you can make your presentation. I'll move your slides for you if you --

MR. KEOCHEKIAN: Thanks, Chester. Good afternoon, everyone. I'm Armen Keochekian with Insignia Environmental.

I think I probably have -- oh, sorry about that.

I think I probably have the least interesting topic for today, but it is an important one. So we want to take a few minutes just to talk about what we're doing with all this feedback that we're getting from all these meetings.

As you know, the meetings have been recorded. They're transcribed. The comments have been logged in. What we're doing is focusing on the feasibility studies and the Phase 1 milestones within those feasibility studies. So we're taking those comments and kind of shepherding them through the system.

The first milestone -- I know Jill talked about this a little bit, but the first milestone is the scope of works or the study descriptions. You guys have those now. You received those, I believe, last week.

The next milestone is the methodology, and you'll all have an opportunity to comment on that in a technical approach.

And then after that will be the preliminary data and the findings.

And then the last opportunity -- the last kind of milestone is the draft report.

So there's four milestones for each study, and there's 16 studies. So that's 64 different opportunities to comment on this Phase 1 process.

The comment periods will each -- have one comment period for each milestone, typically about one month for each deliverable. It's somewhat variable and depends on when the deliverable goes out and the complexity of what you're reviewing. Some of those could actually be combined with other studies. And as the studies become complete, those review periods may change a little bit over time.

We've established a couple of different feedback mechanisms, but one of them is these meetings and you can provide your comments at the quarterly meetings, these internal meetings, and those are official on the record and we're considering those comments for further discussion.

We also set up a designated email address where if you prefer to do something in a letter form, you can send it in. And we'll distribute both those addresses.

And then the last one is an online form, which is being developed. It won't be ready for this first milestone on the scope of works, but on future ones, it will be available to submit your comments.

So we've developed what we're calling the FTS, or the feedback tracking system; basically, a database where we can get this information in and then see it through this entire Phase 1 process.

We're sitting in the second box from the left. The process for us kind of started with SoCalGas circulating the scope of works, and they established that review process, the review period, which is closing at the end of this month.

And during that time, you guys have the opportunity to review the documents and provide your feedback.

Next, we'll take that feedback and from this milestone, we'll be taking the feedback from these meetings and getting it into the database. We'll enter that into the database.

In the future, if you submit it through an e-mail, it will be somewhat populated, and we won't have to do as much work manually. And if you did it through a form, it would automatically go into

this database.

So then what we're going to do is we're going to take those comments, and we're going to take the first pass at reviewing them. We're going to tag them with different identifiers. If the comments are on something like air quality, we'll identify for air quality. If it's land use, we will identify it for land use. And we'll tag it with other important information that will help us down the line.

From there we will assign and will work with the subject matter, with SoCalGas, and we'll assign those comments for them to review. And then they will have access into the database to provide a response.

And at the end of this process, you know, while this is going on, we will be checking the database and making sure that the comments are being addressed in a timely manner and moving it through. And then the responses that we get will be in a summary of all the comments and they will be provided in the CPU quarterly report.

We realize we need to be diligent on this process and stay on top of the comments and make sure that they can be considered for the studies.

I think that's all I wanted to say. If there's any questions, I'm happy to answer them.

MR. BRITT: Right. It looks like Norm has a question.

MR. PEDERSEN: Armen, thank you.

This is all very detailed as far as what you will do, but I'm more concerned about us.

First of all, it would be very helpful if Emily or someone would circulate the slides for this meeting and the Tuesday meeting to us not next week, but today.

Could you send them out to the people who are on the screen, you know, on the virtual meeting and also are here in person? And don't wait -- we're going to be at the July 31st really soon.

Second of all, it would be really helpful -- I see everybody here is taking notes. Jack and Katrina are on their computers. Miles and I are scribbling away.

It would be really handy if you could hand out the slides so we don't have to copy what you have on the slides and then make notes. If you could put the slides onto one of those pieces of paper where we have a little place over on the right-hand margin to make notes.

I'm thinking about, well, how effective are we going to be in making comments?

Thirdly, nobody has mentioned to whom we should send comments.

Emily, where should we send comments? To you?

MR. BRITT: Yes. The answer is Emily or to Insignia; right?

MR. PEDERSEN: I don't have anything for Insignia, but I certainly have Emily's.

MR. BRITT: Yeah.

MR. PEDERSEN: I don't think you've circulated --

MR. BRITT: I'll give Jill time to clarify.

MS. TRACY: So Norm, that's why we're having this meeting and this discussion.

So Armen hasn't had the chance to go through the contact information, but if it's the substance of the Phase 1 study, it goes to the e-mail addresses that Armen is going to circulate through Insignia. They are going to be doing the whole tracking.

MR. PEDERSEN: So Armen? We need his e-mail address, then.

MS. TRACY: It's not Armen individually. We have set up specific e-mail for this feedback tracking system. So those will be circulated as part of the e-mail communication that will go out. And we can put the slide decks that will go out in the chat today.

We can also print out -- if folks want to have printouts -- I typically will either put notes separately, but if you would like printouts of the decks so you can put your notes on there, that's not an issue at all.

MR. PEDERSEN: I don't know what you mean "put them in the chat." I mean, I'm sitting here in the room. I would like to have an e-mail with an e-mail address where we send --

MR. BRITT: So let's be very clear. We're going to send today the slide deck and the contact information to Insignia so that you can send that out.

MR. PEDERSEN: Okay. Thank you.

MR. BRITT: I think that answers your question. In the meantime, if you have anything else you want to say, you can e-mail Emily always, anytime.

MR. PEDERSEN: Yes. Exactly.

MR. KEOCHEKIAN: I would just add that at the next milestone, which is the technical approach is when you get that package, it will have the e-mail address and the address and the ways to submit.

MR. BRITT: Okay. I also see Arthur. You have your hand raised, so I'm going to go to you next. If you could unmute your mic.

MR. FISHER: Arthur Fisher, Public Advocates Office. Thanks, Armen, for laying out this process. I really appreciate that.

Two questions: Firstly, is this tracking system going to be public, at least for viewing, if not -- obviously not to fill in, but for viewing, Number 1? If not, can it be so we're aware of where -- how comments are being classified?

And my second question, a lot of my comments -- my one main drive here is a global comments which applies to many of these studies in that you need to expand the range of alternatives, and they need to address the actual objectives that are in the demand study.

That has implications for the breadth of the studies and the time you're going to need for those studies.

Can you give me some idea about how that is going to be implemented, especially how you're going to be classifying global comments?

MR. BRITT: Arthur, before you leave, could I clarify your first point about if it's going to be made public --

Are you suggesting to --

MR. FISHER: To the PAG.

MR. BRITT: -- public or just to the overall PAG?

MS. TRACY: Yeah. So Tyson, in response -- this is Jill Tracy with SoCalGas.

In response to your first question --

MR. FISHER: I'm not Tyson.

MS. TRACY: Arthur. Sorry about that.

MR. FISHER: Fair enough.

MS. TRACY: Arthur, in response to your first question -- I did make you laugh, so I thought that was funny -- we will be publishing to the PAG and CBO groups the entire tracking system, so the categorization, what the feedback was, and how it was addressed and where it was addressed.

So that will be circulated, and you will see both the PAG and CBO feedback in the tracking system.

And then I will defer to Armen on how we will be tracking more global comments that could apply to more than one study.

MR. BRITT: And then Jill, could you also weigh in on how -- what Insignia is doing in terms of tracking? Is it going to be incorporated or not into the quarterly reporting that you're also doing to the CPUC?

MS. TRACY: Yeah. I believe it's going to be an exhibit to the quarterly report. That's how it's going to be circulated.

MR. BRITT: All right.

MR. KEOCHEKIAN: Yeah, in terms of categorizing the comments that are global comments, and we're anticipating there could be a lot of comments, we have thought about that, and we've put together this e-mail, and I don't have it in front of me now, but I can probably share it later, an e-mail of how we're going to address all these comments and identify the common themes.

So they will be tagged with common themes. So one letter could be connected to letters. So all the letters that are similar will have identifiers so that they can be categorized and sorted that way.

So it's a pretty massive scheme and that initial scheme is what got us to the type of database that we put together that's specific for this effort.

MR. FISHER: Okay. Thanks for that, Armen.

And Jill, just one more request. Can -- with respect to the contracting issue, I was -- I will be asking for the contracts, by the way. So I -- at least Cal Advocates will be asking for them separately if they're not provided voluntarily.

MS. TRACY: Okay, Arthur. Thank you for letting me know.

MR. FISHER: Okay. We can talk about that aside. Okay.

MS. TRACY: I'm happy to do so.

MR. FISHER: Thanks.

MR. BRITT: Okay. Thank you, Arthur.

Tyson?

MR. SIEGELE: Hello. Tyson Siegele, Utility Consumer Action Network.

I am interested in a couple things here. One is what I have been doing previously with the feedback is to send it to SoCalGas and then also send it to the Angeles Link service list so that

the service list can have that information as well.

I definitely -- in terms of myself, just speaking for myself, I would be interested in seeing feedback that the other PAG members have.

And so if the Planning Advisory Group members want to share in that same way or in a different way, please definitely include me on any of the service lists, the e-mails that go out, if that is something you're willing to do.

The next piece is when we provide our feedback to SoCalGas -- and I'm sorry if I missed this -- is there a time within the process of the feedback that we will receive information on "We got the feedback. We disagree with the feedback. We're not going to incorporate it" or "We got the feedback. We like a part of it, we're going to incorporate it or we're going to incorporate all of it"?

That sort of information for us would be helpful so that we know when we are providing the feedback that it has either been incorporated or not so that we don't have to continue to say the same things.

We'll know, yes, that is addressed either one way or another. Not necessarily addressed in a

way that we're happy with, but addressed one way or another would definitely be helpful for the process for us.

And then it seemed like there was one other thing.

MR. BRITT: Tyson, can we just address that first?

MR. SIEGELE: Sure. Absolutely.

MR. BRITT: While you're thinking of your second point?

Go ahead, Jill.

MS. TRACY: Hi, Tyson. I think that's a great idea about e-mailing all so you can kind of know what others are saying. And I'm going to make a decision off the cuff and say that maybe we can make an e-mail distribution list so you don't have to put in everybody's e-mail, which would be a nightmare.

MR. BRITT: So I was going to make the same announcement as the other meeting.

So we have this request and so we are willing to do that, but we also want to be respectful of those participating.

So if you do not want your name distributed, you can let us know, and we'll remove

it, but our intention is that we will distribute a list, subsequent to anyone, you know, telling us they don't want their name to be part of the list.

MS. TRACY: And that's correct. This will go out to the group, Chester, but this is a little bit of a distinction and so my point is for us to create an e-mail distribution list.

MR. BRITT: Yes. We can do that as well.

MS. TRACY: You would have to opt in, though. To your point about privacy, if folks would rather not or stay anonymous or not be included -- and I get that. I get way too many e-mails every day as well, so I understand if folks don't.

But I do think it's a very good idea. So if folks do want to opt in, I think Tyson's idea is a very good one.

MR. BRITT: Yep.

MS. TRACY: Does that address your first comment, Tyson?

MR. SIEGELE: It does, thank you.

MS. TRACY: Okay. Great. And then Number 2, this is a question on when does SoCalGas anticipate responding back to all of the comments so that folks know to what extent it's going to be

addressed or not.

Right now we have an anticipated time frame of in the next quarterly report that we would have that whole tracking system.

The one -- and I think we can meet that goal. In asking when we commit to a time frame, it is very difficult because we don't know the extent to which -- how many comments we're going to get.

We are anticipating it will take about two weeks for Insignia to compile all of the comments after the 31st, and then it -- then it starts -- the subject-matter experts then start their review.

And so this is the first time we're going through the process, Tyson, so I'd like a little bit of flexibility for us. And I'm very happy to report on how that process goes.

We have not worked with Insignia on this process, either. We're just starting it, and so what I'd like to do is -- you know, we're going to see how it goes.

We can definitely hit the quarterly report. If we can do it faster than that, we will. I want to be mindful of the fact that vacations are coming up and we've got 16 reports, so we're going to have a lot of coordination both internally with

your folks -- I mean, if some question or comments we might not understand, and we're going to have to go back to folks and ask them questions.

So this is going to be an iterative process, so if you could just be a little bit patient, and we're going to figure this out this first time on the scopes, and I think we'll be better when we get to the technical approach milestone, and we'll be even better when we get to the preliminary findings and data. And hopefully we'll be really, really good by the time we get to the draft reports.

MR. BRITT: Yep. Just as maybe a thought or a question about that, is there -- is part of your documentation process, the software you're intending to use, is there any part of that that indicates, like, due dates or timelines of when things are being worked on or -- because, to Jill's point, if we have a long list of things to do, you might have to prioritize the low-hanging fruit things that you can get to very quickly and other things that are going to take more time in the process.

Is there a way to delineate what those are?

MR. KEOCHEKIAN: Yeah. That will be a part of the database. We'll have signed -- we'll assign deadlines. We'll have the comment period associated with the comment, when the comment was submitted, so we'll be able to track it.

MR. BRITT: So that should be able to help to address what Tyson was saying, he'll be able to see where his comments are in that process.

MR. KEOCHEKIAN: Right. And just to put it into a little bit of perspective, in the first two meetings, we had a little over 100 comments. So at the end of this week, we could have, you know, about 400 comments to deal with.

MR. BRITT: Yeah. That's why you're here.

MR. KEOCHEKIAN: Yep.

MR. BRITT: Thank God. That's why you're here.

Okay. We're going to go now to people in the room.

MR. SIEGELE: I did have another question.

MR. BRITT: Oh, I'm sorry, Tyson. Go ahead.

MR. SIEGELE: So the next question sort of relates to what Norman was saying. I know that there is some desire for having in-person meetings,

but I do want to mention that when -- yesterday when -- or not yesterday. Tuesday, the last meeting, when we were talking and there was some issue within the room there where you guys are about hearing things, we were hearing things very clearly on the Zoom call, and so that -- it might be easier to have more people on Zoom instead of -- and I saw that the court reporter moved to Zoom, which is definitely beneficial.

The other piece that Norman was mentioning is that the chat's not available to everybody who is in person unless they're also logged in online.

And so, again, more tools are available when you are -- when you're on the Zoom call as opposed to in person.

So just throwing that out there in case that is helpful to anyone.

And then the last piece that I wanted to mention was another administrative piece.

I was curious, is there -- is there a -- and this is something that sort of popped up previously too, like, you know, SoCalGas is also under a lot of deadlines in order to get all these things done. I completely understand that. And this seems like a pretty important process to have

that sort of rushed feel to.

And so if there is -- my understanding is that the deadline to hit a certain end date for completing Phase 1 is somewhat self-imposed by SoCalGas. Jill, maybe that's not entirely true. If it's not, please let me know.

But if it is, then there is no reason to say, you know, we have to stick with this specific end date. It can be a two-year instead of an 18-month or two-and-a-half year.

You know, whatever the reasonable timeline is to make sure we're addressing all of the points as they need to be addressed.

I know that, for instance, when we were going through and providing comments today, Jack provided several different comments that were very good comments, and they also seem like it's going to take a lot more time to study the expanded scope of what Jack was mentioning.

And so with expanding the scope also of some of these studies, I'm sure that the contractors for SoCalGas, just like SoCalGas, is going to be taking a look at that and saying, "We can only get so much done in a certain amount of time."

So anyway, I want to throw that out as a possibility, and here, you know -- do we need to expand the timeline, shift the -- shift the schedule here?

MR. BRITT: So Jill, do you want to say anything about the schedule? And while you're thinking about that, let me just address the first part of your comment, Tyson.

We have done surveys at our first two rounds of meetings specifically asking input of whether people wanted to be in person or online or a hybrid. We have gotten strong feedback for having virtual meetings, but we've also gotten strong feedback about having hybrid meetings and in-person meetings.

So when you really look at the data, there are people that prefer having in-person meetings as well.

It seems to us that the most productive way to do this is the way we're doing it. And I will say this is not the easiest way to do it. We have put a lot of effort into making these available in person, and I've gotten to know some of you who have come in person, and so has SoCal staff, and it's been great.

I mean, hopefully you guys have gotten to know each other through lunches and sitting around talking and that's part of what we're trying to do here. This is a body that's going to work together.

And if Tyson, you know, were to have his way, maybe two years or longer; right?

It's super important that we try to make it as flexible as we can and productive and also beneficial to the group.

And so I mentioned earlier at the beginning of today's meeting that we have people here today that have not been in person before. Hopefully you find this perhaps a worthwhile experience being here today with us. And I think we'll continue that probably going forward.

But I don't know, Jill, if you wanted to say anything specifically about the overall schedule and the flexibility or not flexibility of elongating the schedule or keeping it the way it is.

MS. TRACY: Sebastian's not going to sit next to me.

So, Tyson, one thing I want to just remind people too is that we went virtual very, very

quickly at the gas company as to probably all the world. We did so because we had to; right? We were required by county and state and federal health mandates to basically work from home and not come into the office, unless, of course, you were first responders or -- many of our field folks did work during that time period.

There are great benefits to being virtual, and then there are also really good benefits to being in person as well. And I think we're seeing that, and I think having the virtual and hybrid option together is very, very beneficial.

Tyson, I would like to mention that you can't participate in the tour of the hydrogen innovation experience online, and so there are benefits, and there are definitely disadvantages as well to both.

So I think the hybrid approach is really something that we all benefit from.

With respect to the timing, you may recall that we were given a very specific cost cap as part of our Phase 1 studies relating to the cost estimates that we originally prepared, and the time frame of the 12 to 18 months was part of that process in coming up with our cost estimates.

We were also given the option of seeking an additional 15 percent over those -- that $26 million original Phase 1 cost estimate, and you may also recall that there were a lot of additional studies that were added on top of our original cost estimate that we are also required to perform.

And the time frame I bring up is part of that cost estimate. And as you seek to either expand the scope of the Phase 1 studies or expand the timing, then the costs are different, and they're going to expand. They're not going to go lower.

And so part of our goal to complete these studies on a timely basis is to complete them within our budget that we've been authorized to track costs for in the Phase 1.

MR. BRITT: All right. Thank you, Jill.

Katrina, we're going to go to you next and get your --

Oh. You didn't have anything? Okay. I'm sorry.

Ernie? He needs the mic. Although he really doesn't need it, but for online people, he needs it.

MR. SHAW: It's on; right? Okay. Cool.

There it is.

What's up, everybody? Ernie Shaw, Local 43, Transmission and Storage.

So I do agree that -- you know, for me personally anyways, I like having that in-person interaction because I can see who I'm talking to, talk to who I'm talking to, and truly engage with our thoughts and our efforts and just trying to understand the common goal in working towards something.

Tyson, man, I wish -- I wish you'd come down here, man, to beautiful Southern California and truly engage with us, man, because I know you have some ideas, and I want to kind of rap with you, man, and really understand everything because you've got good stuff.

Or, hey, we can always go up to wherever you're at, San Diego, I think, or something, and, you know, the next time we meet in person. Just a thought.

But for me -- because, you know, being on Zoom, online virtual, I don't know, it just doesn't work for me because sometimes I'm not fully engaged. I'm not really all the way there. It just maybe -- I might kind of linger a little bit

in my thoughts. I mean, I don't really feel like I'm truly 100 percent interacting.

So -- and then, of course, you can't really, like, talk to people on the side during lunch or breaks or, you know -- and then, like I said, like capture that engagement with each other.

So anyways, that's kind of where I'm at with that. I mean, if we could keep doing, like, in person or hybrid or however we want to do it. But I definitely -- I definitely truly value the in-person portion. Thank you.

MR. BRITT: Thank you, Ernie.

Arthur, I think you had your hand raised. I saw a chat that you mentioned. I wasn't 100 percent clear on your chat, so maybe you can clarify that.

MR. FISHER: Yeah. Sure. So just to make life easier for Insignia, I'm thinking if you make the scheme of classification for all the different comments available to us, to PAG, we can actually kind of preclassify our comments.

I've done -- I've been on the other end of this, and if people start to mix and match their comments and interlace them and they really belong in different buckets, then that's hard -- that's

the hardest part of the job for Insignia.

So if you can give us what the scheme is, what the classification kind of scheme is, we can do that for you, and that will make things run a lot easier.

MR. BRITT: Thank you, Arthur.

Armen?

MR. KEOCHEKIAN: Yeah. That's a great idea. And thanks for that.

And we were kind of thinking somewhat along the same lines with the online form, it would kind of force you to use one of those categories. And so in the next milestone, we'll provide an online form. It would kind of force you to choose definitive categories.

MR. FISHER: So just to respond, it won't be available for the comments on July 31st?

MR. KEOCHEKIAN: Not the -- not the online form for this --

MR. FISHER: No. The scheme.

MR. KEOCHEKIAN: The scheme? Yeah, we can provide that.

MR. FISHER: That's what I was asking. You could send out a document for the scheme, and we could categorize our comments for you, and you

could distribute the forms as you need to.

MR. KEOCHEKIAN: Yeah. I think that's a great idea.

MR. FISHER: It would make it easier all around.

MR. BRITT: Yep. All right.

Marna, I think you just raised your hand. You're next, if you can unmute your mic.

MS. ANNING: Marna Paintsil Anning.

Hi, this is Marna with the Utility Reform Network. Forgive me if I missed this, but in discussion of the stakeholder feedback tracking system, I did not see specific timelines incorporated into -- you know, incorporating stakeholder feedback.

I would like to see some sort of specificity that aligns with the timing for each study. I think in general there have been -- there's been a lack of specificity with respect to how much time stakeholders have to review and respond and provide meaningful feedback.

And so apologies if I missed this, but is there a plan to incorporate specific timelines, months, days, weeks into the tracking system or the feedback incorporation system, so to speak?

MS. TRACY: Hi, Marna. This is Jill Tracy. We did a presentation on those specific milestone dates for distribution and feedback at our last quarterly meeting for the CBOs and PAGs. We can drop that timeline into the chat so that you can have it available to you so that you can see them.

MR. BRITT: All right.

Norman? You need to unmute your mic.

MR. PEDERSEN: Norman Pedersen, SCGC.

As I understand it, the question about whether we do hybrid or all virtual meetings is actually a pretty limited topic because as I see it, we had the meeting on Tuesday, we had the -- excuse me, the workshop on Tuesday, the workshop today. There will be an opportunity for e-mailed comments on July 31st. And then the next PAG event will actually be the next quarterly meeting.

MR. BRITT: Yes.

MR. PEDERSEN: And then after -- we will have workshops after that --

MR. BRITT: Yes. Uh-huh.

MR. PEDERSEN: -- along this line.

MR. BRITT: Again. Yep.

So our next quarterly meeting is scheduled

in September. After that, we will have these type of workshops again in between our next quarterly meeting after that, which would be December.

And then again this process goes through the middle of next year, through summer. I know Jill and her team is working to develop a schedule because even securing this facility and AltaSea, the facilities that we've been securing to get these meeting in place, has been a little arduous because of conflicts and schedules and timelines.

So we're going to develop a master calendar going forward for the rest of the balance of this Phase 1 process. Well, we're doing that for ourselves, but also for you so that you can plan your vacations, your schedules around those things as well, to the extent that you can do that. So that will become available very shortly, and then you'll have a master calendar.

But we foresee very much maintaining our quarterly schedule along with intermittent workshop series as the technical process, you know, goes through its milestone schedule, and then we get to points where we can share information in the middle of it, and then towards the end when we are going to release our final results and things like that.

MR. PEDERSEN: Thank you.

MR. BRITT: You're welcome.

MR. PEDERSEN: The universe of these meetings is actually quite small.

MR. BRITT: Yeah, it is, but when it happens, it's very impactful; right? These are very long days, and you have to clear your schedule out. So yeah, we want to be respectful of that.

All right. I think we are now down to, if I'm not mistaken, the last of our presentations. Edith, I think -- well, I'll give everyone the option of breaking or go through one more and be done.

What do you guys want to do? I think everyone wants to get on with it, Edith, so you're up next. And I'm going to have Darryl pass you the clicker so that you can control your own slides.

While Edith is getting set up, Norm kind of set me up for some of the things we were going to talk about at the end.

But just again, this process that we're going through with you is iterative. Everything that we do is going to build on each other. All the things that we're talking about, whether it's, you know, the platform to garner feedback and all

of that is iterative as well; right? All your comments, all your input, all the things we're presenting, it's just building and building and building towards this Phase 1.

One of the things that's been brought up at least ten times today and Tuesday is the nature of these studies being dependent on each other. It's very understandable that this Phase 1 process is a little time constraint and convoluted in the sense that there's a lot of pieces moving at the same time.

We're doing our best -- SoCalGas is as well -- with the consultant team to really make sure that we try to think through all of your inputs, reconcile them against what's going on with the technical work, make sure the technical work is feeding into each other's technical work.

And all that is to say that this is still Phase 1. I mean, Phase 1 is really just looking at the feasibility of what we're talking about.

There's a lot of details that if approved in Phase 2 and 3 would be fleshed out further in those subsequent phases along with you guys as well.

So with that, I'll turn it over to Edith

and she can make her presentation on water.

MS. MORENO: Thank you, Chester.

Good afternoon, everyone, again. Hi. Welcome, everyone. My name is Edith Moreno. I'm part of the Angeles Link team focused on regulatory strategy and policy.

But before I get -- I have a -- or get into my presentation, I'll just give you some -- a quick, quick background just about who I am.

So I'm originally from southeast L.A., so specifically South Gate, California, which is just right down the street from the beautiful city of Downey, but I traveled east, and I got my undergraduate degree in geology and then came back and got a degree in environmental science in management, and water resources, actually, was my specialization as -- in my graduate program.

And so I started my career as a water consultant, and then I segued into the energy industry, where I started at San Diego Gas and Electric as a water resources specialist and then made my way through.

But unfortunately, I thought my water days were behind me, but they've come back full circle. But I've been working more recently on energy

policy issues at SoCalGas for the past five years.

So it's nice to kind of dust off, you know, the old books and dust off just some of the old kind of work that I used to do on a day-to-day basis as a consultant, and then working for San Diego Gas and Electric.

So with that -- hold on. Let me put the deck in front of me so I have my notes in front of me.

So, again, I think I want to -- I'll advance this slide here.

Again, back to my, you know, earlier comments. You know, water is something that is very much near and dear to my -- to my heart, and so as has been mentioned by other colleagues throughout our stakeholder engagement meetings, you know, we're intending to transport clean renewable hydrogen that is produced through electrolysis, where we are zapping or splitting water into hydrogen and oxygen.

So in Phase 1 of our water resources evaluation work, we will be looking into specifically, you know, how much water is available for clean renewable hydrogen production, and what are really our options in Southern California and

the greater L.A. basin to acquire this water.

So I want to stress that at SoCalGas, we are sustainable water sources, and we want to make sure that the water that is being used for clean and renewable hydrogen is not making our water challenges in the state worse or exacerbating them.

And so, again, the goal is to use responsibly sourced water.

And so if you see on the right of your slide here, there are sort of two key components of how we will be approaching our water evaluation study.

And so the first is to essentially evaluate water availability or what the universe of water is.

And the second is to evaluate what are the challenges and potential opportunities, which I'll get into more in detail in my next slide.

So what are the challenges and opportunities with the water -- with water availability that could impact third-party hydrogen production?

Okay. So I'm going to spend most of my time walking you all through this slide. So we'll start on our left.

And so as I mentioned earlier, first and foremost, we will be assessing, you know, the universe of water availability for hydrogen production. So is there recycled water that can readily be available?

So we're all from Southern California -- or most of us are very familiar with just seeing purple pipes; right? So that's where most of our recycled water is transported.

You know, is there recycled water that is available? Is there also maybe wastewater? So wastewater -- there is a difference between wastewater and recycled water.

So recycled water is wastewater that has been treated to standards, and you can actually drink it, but I wouldn't, you know -- it hasn't been cleared, and it's not suitable for potable water use, but it is -- it is pretty clean.

And so then the next step is once we identify potential water sources in Southern California or what's available, we're going to do a lot of validation.

And so specifically we'll be having conversations with various water management agencies, like the Metropolitan Water District,

which is located here in downtown L.A. next to Union Station.

And then if you can focus your attention to the middle column is -- the next step is to essentially, again, first identify where the water is and the next step is, well, how much is there actually available; right?

So we'll be providing estimates of the amount of water available and then how much it is going to -- or what is it going to take to acquire this water.

And so water acquisition is not only going to include the costs of the commodity itself -- so just the H2O, but it's also going to include potential conveyance costs.

So, you know, does it make sense that we might have to, you know, pipe or truck -- hopefully not truck, but, you know, essentially we have to evaluate potential conveyance costs with -- associated with acquiring the water.

And then since the majority of the alleged technology today requires very, very clean water -- it's actually beyond -- it's cleaner than what we -- or what is called ultra pure, so it's been pretty much stripped of all of the good things that

are found in water, like total dissolved solids.

And so I like to think of it as kind of lab water. So for folks, whoever did take a chemistry or science class, you'll often find this pure water in clear plastic vials to use for your experiments.

So as part of this work, we're going to be assessing what it's going to cost to clean up the water. So if we're using water from the wastewater treatment plant, for example, what are the costs to get it to the purity level that an electrolyzer would need.

And then the final step is we would prioritize. So we'd go through a water supply prioritization exercise where we are going to be identifying more of its challenges to obtain that water supply and then possible medication strategies.

And so to give an example of what a challenge is is that, you know, there could be a really great water source. Let's assume it's, you know, pretty dirty and we're trying to figure out what we can use or if it can be utilized.

So there might be a scenario or a challenge where it just could be a little too

expensive to clean it up and therefore really not cost effective or economically viable to use it for hydrogen production.

And then an opportunity is a way that I -- I kind of describe this as a win-win scenario for a hydrogen producer and another entity that would have quote/unquote "problem water."

So that is something that would also be evaluated.

So I'll go ahead and give you all an example of what an opportunity is. And so folks who live in the Inland Empire, there is a brine line system. So essentially it's, like, really salty. It is really dirty water that is often water that is a product from manufacturing, agricultural, and other industries.

And so there's a brine mine system, a canal system in the Inland Empire that is managed by the Santa Ana Watershed Project Authority.

And so that water ultimately gets discharged into the Pacific Ocean, but there are significant costs that are associated with cleaning it up before going into the ocean.

So in this case, a potential win/win scenario is that a producer can take that water

from that brine line instead, clean it up, use it for hydrogen production, and then therefore potentially save Santa Ana Watershed Project Authority some money in water treatment costs.

And then lastly, after all challenges and opportunities have been identified, we would then provide recommendations of what sources could be targeted for potential clean renewable hydrogen production.

So, again -- again, just to summarize as quick, identifying water; second is how much is there available; figuring out how much it's going to cost to acquire it; and then challenges and opportunities; and then essentially evaluate or prioritize or rank the water resources that are available for hydrogen production.

So that's it. Thank you.

MR. BRITT: Thank you. All right. Water is a big issue. Obviously we talked about the production side. Hydrogen can't be produced without water. It's essential to create hydrogen.

So does anyone have any thoughts or questions about the process that Edith just outlined or methodology for conducting the study of water resources?

(Brief pause in the proceedings.)

MR. BRITT: What's that? Okay. Marna, online, I think you've raised your hand. We'll start with you.

MS. ANNING: Marna Paintsil Anning. Hi. This is Marna with the Utility Reform Network.

I have a question specifically pertaining to how this study fits in the scheme of the project.

From my understanding, SoCalGas will not be producing hydrogen. And if SoCalGas is not producing hydrogen, what exactly is the methodology for how the water will be -- will be provided to whoever the production facility is?

Is -- are we to assume that SoCalGas will purchase the water and then sell it to the production facility or is there some type of a contractual arrangement once these water sources are identified to have that producer connect with whoever is providing the water source and SoCalGas would somehow benefit that way?

It's hard to understand in the scheme of this project that is exclusively focused on transporting clean renewable hydrogen how the water study or how this effort is going to feed into

that.

Is SoCalGas now branching out into water as another, you know, business stream? I'm trying to understand because prices are being identified. Sources are being identified.

And forgive me for my lack of technical expertise, but I've heard very clearly that SoCalGas will not be producing hydrogen. Or has that -- has that changed?

And I'm in no way suggesting that this study is -- bears no relevance. I just want to understand how it fits into the scheme of the project.

MS. MORENO: I'm happy to answer that question. And that is great because it is a little confusing as, you know, we've stated several times that SoCalGas is not planning to produce hydrogen. It's just transport.

And I'll just give you a little context, Marna.

So specifically the water resources evaluation study came about from the CPUC decision. And so if you were part of the regulatory proceeding, parties specifically had raised concerns that if we are going to produce hydrogen

from water, you know, folks were just essentially concerned with, like, "Well, is there enough?"

And we want to make sure that we're not making -- or we're not depleting our precious water resources in our state, since we already know it's something that we -- we are challenged with year after year.

And so this is essentially just an evaluation that stems from the directive from the Commission.

But no, we will not be purchasing water to sell to a producer. So it's clean cut. Again, it's just us transporting the hydrogen that is produced. So this is just an evaluation.

And last clarifying point I want to make is that how much water that is going to be used for this project is dependent on the demand study.

So I know Yuri Freedman spent a lot of time essentially talking about demand, so we won't know -- we -- again, demand is going to feed into how much water we're eventually going to need.

So I hope that clarified that for you, Marna.

MS. ANNING: Yeah. So just to clarify my question a bit further, I was part of the

proceeding, and actually was very interested in the sources of water that will be used to produce hydrogen.

But my question specifically is: How does this study strategically apply, considering that SoCalGas will not be producing hydrogen?

So is this going to be -- so we identified the available water sources. And is SoCalGas planning to exclusively transport hydrogen from producers who use these specific water sources?

Is there some type of standard that will be applied to the type of hydrogen that is presumably purchased and then transported by SoCalGas?

I'm trying to understand -- and I hope this is a little bit clearer -- the strategic purpose of, you know -- aside from contributing to our understanding of how, you know, large quantities of hydrogen will be produced to make this project effective, what is the strateg- -- has there been -- have there been any strategic plans for what is going to become of the information obtained by studying the various water sources?

MS. MORENO: I'll do my best. Thank you for clarifying.

So the results of our water evaluation would eventually feed into the production study that we're also working on.

So this is -- again, it's a feed into one of evaluate; and then, two, you know, it's going to inform where or refine the areas where we could be potentially produce -- be producing hydrogen.

And so I don't think I can address -- or without really speculating more than that. But it really is just an evaluation that is going to help inform some of our other studies, which include the production study.

Does that help, Marna? We're happy to note your comment and get back to you.

MS. ANNING: Yeah. I think in answering my question, you've said that this water study will feed into a production study, which will inform how SoCalGas produces hydrogen, but the prevailing position is that SoCalGas is not going to be producing hydrogen. So I am -- I am still a bit confused.

However, I understand that this may require some additional thought, and so I will rephrase this as a comment that is meant to provide input into the study to help us -- those of us who

are interveners understand whether SoCalGas intends to develop standards for the purchase or the production of hydrogen if SoCalGas is, in fact, going to be producing hydrogen -- or clean renewable hydrogen as a result of this project.

So that's -- I think that's how I feel comfortable leaving it.

MS. MORENO: Okay. Thank you, Marna.

I'll just, again, clarify we're not producing. We're not getting in -- we will not enter any agreements, but I hear your comment, and I think that's something that would potentially be evaluated in future phases of our project.

But I see Norman very --

MR. BRITT: Yeah. Norm has his hand up. I think he might be able to address that.

MR. PEDERSEN: Let's use an analogy with which we are all familiar, building the natural gas pipeline. You build a natural gas pipeline -- transmission line from a production field two points of demand.

As I understand it, the SoCalGas effort here is to try to identify the equivalent of the production area for a natural gas pipeline. The analogy would be the production area for a natural

gas pipeline.

So you're asking yourself: Where are the water resources going to be available as well as the energy resources.

So it seems to be a perfectly natural study for SoCalGas to be undertaking, even though like a natural gas pipeline, SoCalGas is planning to build a transmission line and is not going to be producing the hydrogen itself.

MS. MORENO: Exactly, Norm. A is the production. Production relates to water. And so they all feed into each other. We're the line between A and B, which are the end users, so --

MR. BRITT: And Jill, would it be fair to say that this CPUC, in looking at your application for developing a transmission line, wants to know some of these ancillary supporting industry informational things that would feed into whether or not building a transmission line is even worth the effort; right?

Because there's no point in studying transmission lines if there's no water available to produce hydrogen; right? It's kind of like putting the apple before the cart?

MS. MORENO: Yes. Exactly. Thank you.

MR. BRITT: Okay. Katrina.

MS. FRITZ: As a follow-up to that, going back to the comment on life-cycle analysis, would it then be included in any life-cycle analysis studies, as part of the project? The water resource?

MS. MORENO: I mean, that's something that we can consider.

MR. BRITT: Yeah. Good input, Katrina.

All right, Tyson. You're up.

MR. SIEGELE: Hello. Tyson Siegele, Utility Consumers Action Network.

I -- the question that Marna asked raises a couple of interesting -- interesting considerations, and I think this also stems back to some of the NOx emissions considerations.

And one of the things that it seems quite reasonable, quite possible to do is it brought us to figure out: Okay. We're going to have standards for the producers of hydrogen. This is the water standard. And that would be a great use of this study.

Similarly, with the use of the hydrogen end users' use of the hydrogen, there could be a set of standards for the use of that hydrogen.

So, for instance, if combustion is something that is shown to be in the -- in the NOx analysis, something that is going to have a detrimental impact on the community, then, again, only delivering hydrogen to noncombustion users would be something to consider.

Just throwing those two things out there.

The other thing that I just had a quick clarifying question on, at one point, it seemed as though -- I remember SoCalGas saying: Yes, we're going to take a look at storage and transmission.

Maybe storage was never in it.

But recently I think I heard storage is not going to be considered as part of the Angeles Link. It's just going to be pipelines, either a local hub or long-distance transmission pipeline, and clearly all the other -- all of the other analyses.

But with storage, is that -- am I correct now at this point, storage is not something that is being considered as part of the project that SoCalGas would build?

MS. MORENO: Tyson, that is not a water question for me.

MR. SIEGELE: It isn't. It's related to

the -- you know, how water works, and then it reminded me of something else.

So I apologize. Not -- it's more for the room, a question for the room.

MS. MORENO: I'm sweating over here.

But I did take your note about, again, the full life cycle kind of comment and then potential, you know, standards of water that should be used for clean renewable hydrogen production.

But I will defer the storage comment -- maybe we just note it, since our panel up here is not -- well, yeah. I guess I'll just answer no. No storage. No major storage.

There might be some above-ground storage that we would use, you know, to up -- you know, to power some of our operations, but for the most part, it's not storage like what we traditionally operate today.

MR. SIEGELE: So the storage for hydrogen related to either the production or the end user, all of that storage is going to be either contracted by the end user, contracted by the producer?

MS. MORENO: Yes.

MR. SIEGELE: Got it.

MR. BRITT: Yeah. Back to water hopefully.

Arthur, I believe you have your hand raised? You're on mute. Sorry.

MR. FISHER: Yeah. I do hope this is a water question.

It strikes me -- this comes down to fundamentally where we intend to put the electrolyzers or where we intend the electrolyzers are going to be.

So is this study going to look at the deliverability of water to in base and locations is kind of where I'm coming from? I guess that's my question.

Are we going to be looking at deliverability to, say, the locations of the heaviest anticipated users?

MS. MORENO: Yes is the simple answer.

MR. FISHER: That's good.

MS. MORENO: So we're evaluating all options of where the water is, where we're going to transport it.

MR. FISHER: Okay. So you're looking at an invas- -- an in-base in option, basically?

MS. MORENO: Correct.

MR. FISHER: Okay. Thank you.

MR. BRITT: All right. Ernie? Somebody give that man a microphone. All right.

MR. SHAW: Hello, everybody. Again, Ernie Shaw, Local 43, Transmission and Storage.

So yeah. A couple things. I think I have a two-part question, one for Edith, the water expert, and then one from the lingering kind of comment from right now that was just shared and asked.

So that's something kind of new that I heard as far as end user and the contractors to handle the storage.

I just want to make it very clear that -- you know, hence, the name, Transmission and Storage, my members in storage, they do this day in, day out, handle it every day for years and years and years.

I don't see the merit of a contractor handling the storage if we have my own members to do the storage itself.

So is there any kind of elaboration on that that I can possibly share to members if I -- you know, if possible? I'll start with that.

MR. FLORES: Sorry. I've just got one

question. This is Anthony Flores of Utility Workers of 43.

My question is: Why are they okay with contractors with storage when it comes to SoCalGas and doing what we do on a daily basis? I think everybody's against it.

MS. TRACY: Sorry, Anthony. Can you clarify your question? I just want to make sure we understand it.

MR. FLORES: So it sounds like people on the Zoom call are fine if contractors are going to do the storage or we're going to do the storage.

But as Ernie says, we do storage day in and day out. But why is it okay if a third-party contractor, who's probably going to be new at this doing storage, there's an issue with it?

MS. TRACY: That's a fair observation. That makes perfect sense.

Norm, do you want the mic?

MR. BRITT: Yeah. Norm might have -- maybe we should get two microphones.

MR. PEDERSEN: Well, the way I envision this is if you go out to the hydrogen home exhibit out in the parking lot, you know, you see the home, you see the electrolyzer, you see the panels that

are generating the electricity from sunlight. Then over on the far left-hand side, you see a tank.

And what SoCalGas is talking about, as I see it, is the 20 feet of pipe that connect the electrolyzer to the storage tank, hydrogen is delivered at 435 pounds, as I recall the presentation yesterday, into the storage tank, pounds per square inch.

Looking down the road, if you think about a power plant or a hard-to-electrify industry, it's going to need the hydrogen to be delivered at a very high load factor to its facility. It will have to be at a high load factor or they are not going to be able to bear the burden or the cost of the pipeline.

The storage tank will have to be at the facility, and it will be a storage tank -- it will be directly connected to the point of consumption, to the burn.

It will not be like SoCalGas's Aliso or any of the storage fields on the SoCalGas gas system because those are very different. They are connected. They were at the tail end of the transmission lines where gas is fed into generally the local transmission system.

We will not have that scenario with a hydrogen pipeline. At least, I don't foresee it.

So I guess the question: Do the SoCalGas share my vision of how it -- oh. Look who's here.

MR. BRITT: Yuri just magically appears right when we need him.

MR. FREEDMAN: Yeah. I couldn't stay back once I heard the topic is being discussed. So, again, forgive me for jumping in.

MR. BRITT: Can you just state your name for the court reporter.

MR. FREEDMAN: I'm Yuri Freedman for SoCalGas.

I'll make a couple comments on storage, and one of them is at a very high level. I think most of you know what I am going to say, so I'll be brief.

Storage and pipelines are, to Ernie's point, deeply complementary. They always work together. They're part of the same system that connects that production source, be it natural gas, hydrogen, or any other commodity to demand.

So the simplest way to store something is to store it in the pipeline, by the way. That's called pipeline, of course.

And then once you're out of that capacity, you go to other options. You can store it -- gas is being stored in completed field, in salt domes, and sometimes above ground in a compressed or liquified form.

Now, hydrogen will be stored likely not quite in the same way as natural gas, and quite likely the storage of large volumes of hydrogen is going to take place in salt dome caverns. That is how a lot of natural gas is being stored today in the Gulf Coast area.

The issue is that we do not have a whole lot of salt dome formations in California. We do have, however, salt dome formations in the West.

It's also important to realize that as we're building this hydrogen system, it is going to be wintertime. And if you think about how much storage you need, the answer to this question is: That depends upon how much demand we have and how volatile that demand is.

Quite simply, if we have very little demand, if it's not very volatile, if it's flat, you don't need any storage at all. That's never the case, but fundamentally, that's one extreme.

The other extreme is that if you have

large demand that swings wildly, you have a lot of storage.

So my point is that the storage facilities will be developed over time because we are likely not going to need large amounts of storage because hydrogen market will come up and gain scale over time.

So I would not take anything off the table right now in terms of the type of storage we are going to need.

With regards to -- and that's -- I'll go back to what was said, Edith, I think what you mentioned, various parties can contract for storage, and that is the case for natural gas.

Producers sometimes contract for storage because they need to put some gas when there's no pipeline capacity. And users contract for storage because they need to manage their volatility, they need to have some backup. And pipelines sometimes contract for storage because they need to supplement their operations.

So I would not take any of these off the table.

What I would say is that we at SoCalGas as of now are not envisioning the salt dome storage

facility for the simple reason, but there are none that I know of here in California. If they were to be found at some point in the future, we would have to take a look at that.

So that's just a couple of comments I wanted to make to explain how storage of hydrogen relates to natural gas and how it is going to move over time.

MR. BRITT: So Yuri, can I just ask, which of the technical studies would that -- what you just described be discussed in?

MR. FREEDMAN: I would say that the alternatives analysis and the routing analysis is going to capture some of that.

But, again, I want to emphasize that that also is going to be related to the fact of how the system will evolve in time.

MR. BRITT: Right.

MR. FREEDMAN: Because if you remember the Commission's decision, they specifically asked us to look at the localized hub, which is acknowledging that this hydrogen ecosystem will evolve and develop over years and perhaps decades.

So it's also a question of not only where and how it will exist, but when it will be needed.

MR. BRITT: Which is also related to production and demand; right?

MR. FREEDMAN: Exactly.

MR. BRITT: I'm starting to get this now; right?

MR. FREEDMAN: Totally, yeah.

MR. BRITT: 12 hours of meetings, and I think I got it.

MR. SHAW: I'm very limited on Yuri's expertise. That's why I brought my expert right here, Mr. Anthony.

But okay. Well, thank you. Thank you. You know, I mean, I know we're getting there, but to your point, Yuri, another follow-up with that, and then I'll get to you, I promise. So be ready.

So you said, like, as far as like there's limited, you know, supply or none, you know, of salt domes in California, that you're aware of.

So, you know, to reference, you know, Field of Dreams, why don't we just build it? Is that possible? And that way, as I understand it, it's a cheaper way of storing hydrogen.

The cheapest way is just to build an underground, you know, storage, for hydrogen and that would create jobs for the, you know,

disadvantaged communities, bring those jobs to them and, of course, you know, create jobs for all other union members and other different locals. You know, to kind of encourage that as well.

So is that a striking possibility perhaps? And for every one of us on the Zoom call as well.

MR. FREEDMAN: But that's a fair question, Ernie.

I will say that overall, the storage -- there may be a need for storage facilities here in California close to the demand centers. It may be above-ground storage. And these facilities should and will be constructed and if we determine that there's a need if Commission agrees, then these facilities will be built here next to the use centers by California workers.

And they'll be banded to commute in California. There's no question about that. And I think that sometimes just like natural gas, gas can be stored in different forms. There are depleted fields that will be domed. Above-ground facilities, there may be. And by the way, there's above-ground storage of hydrogen right here at the project that you may have seen. It's a hydrogen storage tank when, in compressed form, holds

kilograms of hydrogen.

So these facilities will be built here. Salt dome caverns are being built in very large geological formations, to give you a sense. They may be -- those caverns in salt domes can be as big as the Empire State Building. Very large caverns which are leached by water formation which are formed over millions of years during geological sedimentation.

So it is hard to replicate something like that if you don't have a physical layer of salt. So that's the reality of that.

But the likely will be need for the above-ground storage, which, again, is going to not compete, but complement the salt dome storage.

Does that make sense?

MR. SHAW: I kind of got it. So if Anthony understands it, I understand it. I like it. All right. Thank you, Yuri.

And then Edith, you're not getting away from me. Time to sweat.

MS. MORENO: And I was like, this is great. Or folks are talking about other things that are not water.

MR. SHAW: But some of the content that is

produced from some of our storage facilities, can that be used or recycled for, you know, hydrogen production, or is this not enough?

MS. MORENO: I mean, I wouldn't even know how much is actually even produced from condensation, Ernie, or just, I guess, give you a rough estimate is how much it takes to produce hydrogen.

So one kilogram of hydrogen, which is roughly equivalent of a gallon, right, takes about nine liters of water, or about 2.3, 2.4.

So I'm not sure how much gallons of water would come from condensation to justify collecting it and then converting it.

MR. FLORES: This is Anthony Flores. I guess what he's talking about is that at PDR, we have brine water that we discharge to the county sanitation. So it's quite a bit.

But it's just like you said, the brine water that they discharge down at the Santa Ana River or what you said is pretty much the same concept.

MS. MORENO: That's really great input, Anthony. I don't think we're capturing at this point, for example, brine water for our operations,

but we'll take that into account. Excellent input. Thank you.

MR. BRITT: Okay. Jack.

MS. MORENO: I'm scared, Jack. Be nice.

MR. BROUWER: Actually, I just wanted to support that last suggestion. That's a wonderful one. A lot of people right now are planning to use wastewater streams for hydrogen production, and some wastewater streams are really amenable to that, especially those that come from wastewater treatment plans. So you're seeing a lot of that happen.

The main thing I wanted to talk about was storage because there are some forms of storage, underground storage, that you and your members could actually build, okay, here in Southern California that don't use salt domes or depleted oil and gas fields.

You could just drill into hard rock and create underground storage facilities that are a lot cheaper than all above-ground storage.

So that's another technology that I know is emerging and that people are thinking about deploying all around.

I also want to go back to Aliso and

suggest that around the world, at least -- maybe SoCalGas is not considering this, but around the world, at least, people are investigating the potential use of depleted oil and gas fields for hydrogen storage.

And the massive asset that that is, that we've invested so much in, I encourage consideration of looking at that, looking at it for hydrogen, please.

MR. FREEDMAN: No. Thank you for your comments, Jack, and I think they are very well taken. And, in fact, you know very well about the project Shasta, where the federal government actually supports exploration of possibilities of storing hydrogen under the ground, and we are going to pay very close attention to that because that always has tremendous economic promise, also promise for the work for communities, no doubt.

MR. BRITT: Thank you. All right. Great input, gentleman.

I see a few hands online now. I will jump back to Marna. I think you're first up. If you could just unmute your mic, we should be able to hear you.

MS. ANNING: Okay. This is Marna Paintsil

Anning with the Utility Reform Network. Can you hear me?

MR. BRITT: Yes, we can.

MS. ANNING: Okay. So I want to go back to water, and I've enjoyed this foray into discussions regarding storage because it's been very informative for me.

Norm, thank you for educating me regarding the purpose of this study being part of SoCalGas's normal business activities with respect to building a transmission line for your existing source of energy, which is methane. That was very informative.

However, it is my understanding that for this particular molecule, for hydrogen gas, SoCalGas gas has been considering locations, including Delta, Mohave, White Water and Blythe.

As far as I'm understanding, your technical water supply analysis documents are looking at sources of production that are in the desert.

And so my question -- and thank you, Tyson, for highlighting the points within my question that I was providing as input -- is with this particular study for this particular project,

how does SoCalGas plan to operationalize the information ratepayers are paying for this study?

And so I'm trying to understand; one, how this study applies, considering the efforts that I think Rincon consultants have already made into analyzing the potential water sources that are in locations that are, like, in the desert. I think Utah was one of the considerations.

How is this not duplicative of that? How is this going to be operationalized?

And then thank you, Arthur, for highlighting the fact that this study is considering in base and locations, because that's new information.

We have been -- Arthur has been recommending over and over again considering hubs as an alternative, and we've been having this conversation about pipelines. If it's a pipeline, your initial analysis suggests some locations where there aren't water.

And so going back to Tyson's point about will this study be used to develop a standard that wherever the hydrogen is produced, they have to obtain water from, you know, as you said, recaptured sources? Or is this study primarily

only going to inform the hubs option?

I think that -- that was more along the lines of my comments last question, and I really do appreciate the education, Norm, because, as I said, I'm developing my technical expertise. We're all learning. And so it's very useful to have a perspective on exactly what this water study is supposed to answer.

And I think, if I may for a -- Arthur knows more about this than I do -- the Commission's interest was that if there is a hydrogen hub, ensuring that the sources of hydrogen -- or the sources of the water used to produce the hydrogen aren't going to exacerbate the current water shortage situations in the L.A. basin.

So we were not considering transporting hydrogen to Utah or transporting hydrogen to the Mohave Desert or anything like that.

So I just wanted to clarify. I hope it's clear what my question, slash, comment was about. Yeah.

And I will stay unmuted just in case you have any questions for me about this comment.

MS. MORENO: So the question -- I know you just -- you said a lot there, and I was taking

notes.

Yes, I think what you identified is just some preliminary work that is posted on our website, on, you know, the spec work on just kind of the potential areas where hydrogen would be produced.

And so, right, most of these places is where we have renewable energy and that's oftentimes in places that are dry and hot and are, you know, desert, and so there is limited water.

And so part of the water resources evaluation is -- I talked a little bit about, would include potential conveyance. And so does it make sense to potentially help bring water -- and, again, it's not all -- you know, there's no potable water in the desert, but there are -- there could be wastewater treatment, affluent, recycled water, brine water.

So there could be other types of water that could be available in some of these more arid areas.

And so, yeah, if you look at the description of work, also, it does kind of -- the geography or the scope of our evaluation is broader than just these potential renewable hub locations,

and so it does include kind of the greater Southern California region and even parts of the Central Valley, since we, you know, are serviced here toward -- cover that portion.

Does that address some of the --

MS. ANNING: Yeah. So for clarification SoCalGas is contemplating that if the production site is out of state or in some arid desert region such as those regions that have been initially scoped out by your Rincon consultants, that SoCalGas would obtain water from the basin or recycled water and truck that water out to the desert?

Is that something that is -- is that what we're seeing as the scope of this study, is that SoCalGas, in order to assist in the production of this hydrogen in the desert, potentially would be trucking water from the basin area to these arid locations in order to produce hydrogen?

I just want to make sure I'm clear about that.

MS. MORENO: I just want to clarify. SoCalGas is not purchasing water or conveying water to a production site, so we're not -- SoCalGas is not -- will not be trucking water or getting it to

the producer.

So ultimately it would be the producer, to assess what their options are for acquiring that water.

MS. ANNING: Okay. And so that means that this study will -- this is essentially meant to inform a potential producer where to obtain that water in the basin?

MS. MORENO: Correct.

MS. ANNING: If that was the scenario?

MS. TRACY: Correct. And that would be then discussed further in the production study.

And Edith, this is also to clarify that this is to inform the Commission and the parties to the regulatory proceeding about the availability of different types of water resources as part of third-party production.

So Marna, I just want to make sure that that was clear.

MS. ANNING: Yes. Thank you.

MS. TRACY: Whether or not producers or potential producers choose to read it is another thing, so --

MR. BRITT: All right. Jack, and then we'll go to Tyson.

MR. BROUWER: Okay. Well, I want to go to that question of whether or not water should be moved to the production site or the production site should be moved to the water.

So this is a -- I hope that your analysis will consider that because just like we heard from Arthur earlier, there's a possibility that you want to, by wires, move the electricity to the production site where water is available, or you might want to build a water pipeline to the -- where electricity is available.

Okay. So please consider both of those options for getting water.

MS. MORENO: Thanks, Jack.

MR. BRITT: All right. Tyson, you are up.

MR. SIEGELE: Hello. Tyson Siegele, Utility Consumer Action Network.

Anthony, I just wanted to clarify. It sounds like I wasn't clear when I was -- when I was asking my question before.

I don't have a -- an opinion either way in terms of contractors versus SoCalGas supplying storage. My interest in asking the question is only to find out: Do I need to be providing feedback on storage or do I not?

If it's not SoCalGas who's doing it, then it doesn't make any sense for me to be providing feedback to SoCalGas on storage issues.

And so that's the only reason I was asking the question, is just to make sure that I was including the right things within my feedback.

MR. BRITT: Thanks for clarifying that.

Jack, is that just left over from your last comment?

Yeah. I just wanted to make sure.

Okay. I do not see any more chats. I do not see any more hands. I do not see any more name tags raised, so I am going to assume that we have reached the end of our discussion on this topic, unless anyone else would like to say anything else; okay?

Okay. Well, I want to just, again, thank everyone. It has been a long two days with you guys, but a very productive two days, and I will resay that I have enjoyed getting to know you guys. Hopefully you guys have gotten to -- enjoyed getting to know SoCalGas, you know, staff as well as each other.

I think these meetings have been very, very productive. As you heard Armen state, we've

gotten -- we're thinking we're going to end up with over 400 comments through these four days by all the members.

We have one more meeting tomorrow for the CBOSG, which will conclude this series of workshops. And I think we accomplished what we set out to accomplish, which is to get through the work studies and give you short presentations and really encourage the member feedback and discussion.

I'm encouraged to have you guys talk to each other. That was one of the goals as we got started in this process, was to not just have us talk at you and you talk at us, but to really have the discussion be centered around the members themselves.

So Norm, I think I'll give you credit for raising your hand to answer a question, but that's how it should be. This group is designed to be diverse, balanced, have varying inputs and ways of looking at this issue. We have academic institutions, labor, we have private sector, we have ratepayers. We have all kinds of groups that are represented here, and we need to hear from you.

I will say, if I have to be honest, I'm a little disappointed that we didn't hear from

everyone. I would love, as a facilitator, to be able to say I got everyone to speak. I know that can be challenging when you're online.

And I just want to make the point that -- we've said it, but this is not your only opportunity. If you're like me, you're going to wake up in the middle of the night, and you're going to think, "Oh, I should have said something, and I have a thought."

You know, if you have a thought, e-mail it to Insignia or to Emily at Insignia, if it's related directly to the work studies. Anything else goes to Emily. We are welcoming your input. We're taking it. We're documenting it. We're incorporating it into the process.

And the studies themselves will be better for it, and you -- hopefully you'll see that, as some of the technical results start to unfold.

I want to thank all of our speakers. SoCalGas experts, project managers have made themselves available.

I know, if you're like me, you guys have busy schedules and lots of e-mails coming to you, and you've spent the time sitting at this table to hear what the members are saying. I think that's

very impactful, not only to the process, but to them as well. And I just want to thank you for that.

I want to thank our court reporter, Stephanie, again for spending six hours listening to us, and literally documenting everything.

I think we have one more person. Arthur -- last time it was Tyson who got to say the final word. This time it is you. So you get that formal designation, you get the last word out. Today it is your turn.

So if you'll unmute your microphone, we'll take your comment.

MR. FISHER: Yes. This is not a comment for the record. Actually, I just need some contact details from SoCalGas to send that request to them. So I need to know who I contact and who the reg manager is as far as that's concerned.

So Jill, is it you, or is it Emily? Who do I address my DRs to?

MR. BRITT: Yep. Just grab the -- Jill's going to grab a mic and answer your question.

MR. FISHER: Okay.

MS. TRACY: Hi, Arthur.

MR. FISHER: Hi.

MS. TRACY: We're going to be circulating the Insignia e-mail address for folks.

MR. FISHER: No. This is a data request This is at SoCalGas.

MS. TRACY: This isn't an open regulatory request.

MR. FISHER: It doesn't matter. I'm Cal Advocates, so --

MS. TRACY: So --

MR. FISHER: Go on. Sorry.

MS. TRACY: Okay. Then send the request to Emily.

MR. FISHER: Okay. Thank you.

MR. BRITT: Emily Grant. We'll type it into the chat. Stevie, you have Emily Grant's e-mail.

And so Arthur, you should be able to get that in real time right now.

Does that make sense?

Okay. All right. Again, we have a post survey that's available. I'll let Alma just make that announcement real quick.

MS. MARQUEZ: Yes. To Chester's point, this is not a comment to anything. This is just for us to improve these, facilitating these

meetings. It would be very helpful.

We heard verbally from some folks yesterday, and if you have anything to help us improve your experience as you're sitting here through these workshops and upcoming coordinated meetings and any other follow-ups that we have after that, it would be helpful for us to let us know so that we can make these meetings more comfortable for you as you're sitting here through this process with us.

There is a QR code in this back and you can just scan that and give us your feedback. That would be very helpful. Thank you.

MR. BRITT: All right. One more thing I wanted to make a big point of. We have gotten a fair amount of pushbacks on e-mails that we send out because we're sending eblasts to the PAG group.

On your end, you have to make sure that there's no spam filter that's blocking our e-mails. I'm not a technical expert, but I have been told that there's a way for you to kind of clear our e-mails coming to you so that in the future, they don't get ignored and you don't miss some of the invitations and notifications that we're sending out.

We are continuing to try to send it in varieties of ways. We make phone calls to you as well. We are trying our best to get ahold of you.

If your contact information changes, your phone numbers, anything changes, please let us know so that we can keep in contact with you.

You should expect to hear from us on a regular/semi-regular basis. You know, we'll be sending follow-ups in terms of summaries and, you know, these thematic responses and things that we do.

We'll continue to communicate with you in between meetings, but as I mentioned a few minutes ago, our next scheduled quarterly meeting is in September.

We don't have an official date yet, but as I mentioned, Jill and the group is working hard to confirm that date and the rest of the schedule going forward through the middle of next year that we'll conclude, hopefully, Phase 1.

So that should -- Ernie, you just had to be the last word today. Okay.

So Ernie's going to have the last word.

MR. SHAW: I took your -- I took your note there, Chester, when you say -- I've got a thought.

I've got to say something; right?

MR. BRITT: Yeah. There you go.

MR. SHAW: It just kind of came to me, a little epiphany. I'm thinking about everybody, everything today, right, going back and forth about environmental and just everything else, right, storage and all that.

And like you said, Tyson, you're good either way, right, with whoever does it. And, of course, I'm going to encourage that. I'm representing the storage, so I'm going to keep -- once again, broken record. You're going to keep hearing me say it; right?

But the one thing that I want to kind of highlight, you know, my brother Sal, who's not here, Dicostanzo, is -- if there's a way to get this thing built aside from everything we've been kind of tussling around, let's build it and let's just get it done, and let's just move forward.

And that's just a general comment, right, my own belief. There's plenty of work to go around, for all my other union brothers and sisters to take advantage of, so that way we can continue to feed our families and, you know, go home safe and do everything else.

Because as it is, you know, in California, people are leaving left and right, you know, no work, and amongst everything else. This is something that's going to secure everybody's, you know, employment and feeding their families for years to come.

So let's, you know, keep California great, you know, working, living, and doing, and let's just get it done, because before we know it, we're going to get boxed in if we haven't figured it out yet, and we'll be late to the party with trying to get this thing built and moving.

So I just want to leave it at that. Thank you.

MR. BRITT: Thank you, Ernie. All right. So Ernie officially got the last word. Let it be known.

Okay. Again, I want to thank everyone.

That concludes our meeting. Please drive safe. You will hear from us shortly.

Our next meeting, quarterly meeting, will be in September. And that concludes our meeting. Thank you so much.

(Whereupon, the proceeding was adjourned at 1:58 p.m.)

CERTIFICATE

OF

CERTIFIED SHORTHAND REPORTER

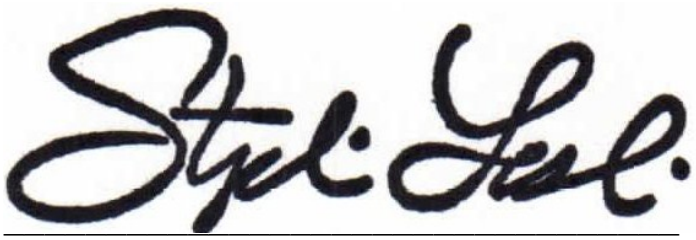
* * * *

The undersigned Certified Shorthand Reporter of the State of California does hereby certify:

That the foregoing Proceeding was taken before me at the time and place therein set forth.

That the Proceedings were recorded stenographically by me and were thereafter transcribed, said transcript being a true and correct copy of the proceedings thereof.

In witness whereof, I have subscribed my name, this date: AUGUST 7, 2023.



STEPHANIE LESLIE, CSR No. 12893

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REGAL
COURT REPORTING

In the Matter Of:

SoCalGas

PLANNING ADVISORY GROUP

August 29, 2023

Case No:

In Re: SoCalGas

Angeles Link: Planning Advisory Group August Workshop

August 29, 2023

Transcribed by:

Katherine Thomas, CSR No. 14378

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In Re: SoCalGas

August 29, 2023

Angeles Link: Planning Advisory Group August Workshop

CHESTER BRITT: I want to welcome our Planning Advisory Group members who are joining our August webinar. We will get started in just a moment, and we're just going to give everyone a chance to get settled in and join the conversation, and we should start shortly.

Thank you.

All right. Good afternoon. I want to welcome everyone to the Angeles Link Planning Advisory Group August webinar. Today's meeting is focused on demand and environmental justice analysis.

I want to introduce myself. My name is Chester Britt. I'm the executive vice president with Arellano Associates, and I will be serving as the facilitator. Hopefully, I've met most of you in previous meetings, but I want to welcome those who are maybe new to our process today. We'll go through a roll call in just a minute.

I also want to introduce Alma Marquez, who is with Lee Andrews Group. She's the vice president of government relations, and she is also helping to facilitate the community-based organization stakeholder group.

So with that, let's do a couple quick housekeeping slides. This meeting is being recorded, both video and audio. We would ask, when it's your turn to speak, if you could turn your video camera on so we can see you, that would be great. If not, it's -- that's fine, but we want to make sure we can hear you and see you.

We do have a court reporter who will be transcribing the meeting. Please announce yourself before you speak so that the court reporter can document who is speaking. Because we are doing a webinar, all Zoom microphones will be muted by us to eliminate any background noise. You will need to unmute yourself on your end when you are called on to speak.

We would, like, as I mentioned, encourage you to turn your cameras on so we can engage with you, and we would ask that you also feel free to use the Zoom chat to provide input and ask questions throughout the meeting.

I just want to remind everyone that the chat feature, we are capturing all of that and recording it, and it will be part of the formal process of us documenting the meetings, and all of that information will be cataloged and documented just like the verbal comments.

If you would like to speak, please use the raise-the-hand button at the bottom of the Zoom screen; that will allow us to see that you have your hand raised. We have

a number of places within the agenda for us to recognize you and allow you to ask questions and make comments.

With that, I'm going to pass it off to Emily Grant, who is the senior public affairs manager for Angeles Link and SoCalGas.

EMILY GRANT: Thank you. Hi, everybody. Thank you so much for joining us today. I wanted to give you a brief overview of our agenda for this afternoon. We're going to do quick self-introductions.

We might have a couple new people we want to introduce to the group. Then we'll move into a brief overview of our environmental justice analysis. We've made some updates to that scope of work that we wanted to keep you abreast of.

Then we'll move into a Zoom poll; it's just two quick questions. We want to gauge your familiarity with the premeeting materials that we sent out on the demand study analysis. So our fantastic speaker today, Yuri Freedman, will be presenting that information to you, so that's going to give him a good guide of how quickly he should go over that material.

If everybody's familiar with the information, he'll go through it a little bit faster. So we can get to the feedback section. If we have some folks who didn't get a chance -- because we know it was a lot of material to get

through all of it, then he'll slow down and go through that presentation and take a little bit more time to make sure that we have adequately covered the topic, and then we'll get into the feedback portion.

So, again, just two quick questions on that, and then we'll move into our next steps, moving forward in the feedback and stakeholder process for Angeles Link. And that's it. Thanks, Chester.

CHESTER BRITT: All right. We're going to do a quick self-introduction, roll call. I have a list of people that have RSVP'd. I'm going to go ahead and just call out the organization. If you could unmute yourself once you hear your name, and just, again, introduce yourself and your organization, that would be great.

I have Maddie Muson with Agricultural Energy Consumers Associate. Maddie, are you there? All right.

We'll go to JP Gunn with Air Products. JP, are you there? All right.

Tyson with Arches. All right.

Sarah Wiltfond with BizFed. All right.

Katrina Fritz, California Hydrogen Business Council. No? All right.

Dean Talley with California Manufacturers and Technology Association. All right.

Arthur Fisher with CPUC.

ARTHUR FISHER: Hi there. This is Arthur Fisher with California -- with the Cal Advocates.

CHESTER BRITT: Thank you. Christopher Arroyo.

CHRISTOPHER ARROYO: Good afternoon. I'm Christopher Arroyo. I work at the CPUC.

CHESTER BRITT: All right. Matthew Taul.

MATTHEW TAUL: Hi, senior engineer in safety branch, public advocates.

CHESTER BRITT: Tyson Siegele.

TYSON SIEGELE: Hello. My name is Tyson Siegele. I am representing the Utility Consumers' Action Network today.

CHESTER BRITT: All right. Shara Burwell.

Sara Gersen.

SARA GERSEN: Good afternoon, Sara Gersen representing Sierra Club.

CHESTER BRITT: Welcome. Brian Goldstein.

BRIAN GOLDSTEIN: Hey, Chester. Brian Goldstein, executive director of Energy Independence Now.

CHESTER BRITT: Thanks for joining.

Joon Hun Seong.

JOON SEONG: Hi. My name is Joon Seong with Environmental Defense Fund, EDF.

CHESTER BRITT: All right. Russell Lowery.

RUSSELL LOWERY: Russell Lowery with the

Environmental Justice League.

CHESTER BRITT: Welcome.

Nick Connell.

NICK CONNELL: Nick Connell, interim executive director with Green Hydrogen Coalition.

CHESTER BRITT: Thanks for joining.

Karla Sanchez.

KARLA SANCHEZ: Hello, everyone. This is Karla Sanchez with the Harbor Trucking Association.

CHESTER BRITT: Welcome.

It looks like Jan Smutny-Jones.

JAN SMUTNY-JONES: Yeah, Jan Smutny-Jones, Independent Energy Producers representing the power generation sector.

CHESTER BRITT: Welcome.

Sal DiCostanzo.

SAL DISCOSTANZO: Hi. Sal DiCostanzo with ILW Local 13.

CHESTER BRITT: Welcome.

Nathaniel Williams. All right.

Jesse Vismonte. All right.

Aaron Guthrey.

AARON GUTHREY: Hello. This is Aaron Guthrey from LADWP, Hydrogen SP. Thank you.

CHESTER BRITT: Welcome.

Pete Budden.

PETE BUDDEN: Hi. This is Pete Budden with Natural Resources Defense Council.

CHESTER BRITT: Welcome.

Rashad Rucker-Trapp. All right.

Mariam with Air Quality Specialists. Or, actually, she's with South Coast AQMD. Miriam, are you there? No.

Aaron Katzenstein, I think it is. Aaron?

Sam Cao.

SAM CAO: Hey, this is Sam Cao SCAQMD.

CHESTER BRITT: Welcome.

Charlie Wilson.

Norman Pedersen.

Aaron Stockwell.

NORMAN PEDERSEN: -- Pedersen for Southern California General Coalition is here.

CHESTER BRITT: All right, thank you. I almost passed you. Thank you, Norman. Good to hear your voice.

Aaron Stockwell.

AARON STOCKWELL: Yeah, good afternoon. Aaron Stockwell representing your California State Pipe Trades Council.

CHESTER BRITT: Great.

Arun Raju.

ARUN RAJU: Hi, everyone. Arun Raju with UC

Riverside.

CHESTER BRITT: And Ernest Shaw.

All right, if I did not call your name, if you could just raise your hand so we can see that you've raised your hand, we would love for you to introduce yourself.

All right, Theo, I see your hand raised. We'll go to you first.

THEO CARETTO: Good afternoon. Theo Caretto representing Communities for a Better Environment.

CHESTER BRITT: Welcome, Theo.

Anyone else?

KATRINA FRITZ: Hi, Katrina Fritz, California Hydrogen Business Council.

CHESTER BRITT: Hi Katrina. I think I must have announced your name before you joined because you were on my list.

Sarah Wiltfong.

SARAH WILTFONG: Yeah, Sarah Wiltfong with the Los Angeles County Business Federation. Thank you.

CHESTER BRITT: Thank you.

And then Marybel Batjer.

MARYBEL BATJER: Yes, good afternoon. I'm just out of bed from six days of COVID, so I'm not going on camera; don't mean to be disrespectful, but I'm with California Strategies, most recently past president of California Public

Utilities Commission, and I'm advising SoCalGas on Angeles Link. Thank you.

CHESTER BRITT: Thank you. Hopefully you get better.

Anyone else?

Okay. Well, if anyone else joins later, we can, again, introduce you in the process of having our conversation today, but thank you for those self-introductions. Let's get into the heart of our agenda.

As you heard Emily mention, we have a full agenda for our two hours together, and the first up is Edith Moreno, who is going to be speaking about environmental and environmental social justice analysis. She is the regulatory strategy and policy manager for SoCalGas and Angeles Link.

So, Edith, I'm going to turn it over to you.

EDITH MORENO: Thank you, Chester.

Good afternoon, everyone. I won't have any slides to walk through today. So if folks don't mind turning on their cameras so we can engage, that would be great. I'd love to see everyone's faces.

So, as Chester mentioned, I'm Edith Moreno. I'm part of the Angeles Link team supporting regulatory strategy and policy. So, first of all, I do want to thank you for devoting for very valuable time and energy to engage with us today.

So for folks who were with us in July, here is a quick reminder, but those discussions that we had in July were focused on the various scopes of works for our Phase 1 feasibility studies, but, specifically, I want to talk to you about the environment and environmental social justice study for Phase 1.

So discussions that we had in July with both PAG and CBO members reiterated how important and how complex this topic is, and so we felt that we wanted to have an additional session with you-all to review some of the modifications we are planning to make to the scope of the environmental and environmental social justice component of that study, which I'll just simply refer to EJ analysis today.

I really can't stress enough that this is an extremely important topic for SoCalGas, and I want you-all to know that we do recognize the disproportionate burden of environmental hazards that has been placed on communities of color and low-income communities, and we want to make sure that EJ issues are adequately addressed and considered throughout the project.

You know, we do want to make a very long-lasting impact in the communities we serve and expect that Angeles Link will bring clearer air and provide workforce development opportunities in our communities.

So with that said, we have modified our approach to

our EJ analysis to some of that feedback that we heard from you-all back in July.

So if you didn't have time to completely look through the materials we distributed last week, I'm going to spend a moment explaining the modifications we're proposing, and then we'll pivot into some of the discussion, but for the most part, this is meant to just be a time for us to engage directly with you and not -- again, like I mentioned earlier, not go through slides of material.

But if folks want me to bring up those slides later in the discussion, I'm happy to bring them up, and we have them on hand ready for you-all.

So the EJ analysis is not going to have two components, the first of which is a desktop EJ analysis that will be carried out using some of the state and federal tools that have already been developed, including CalEnviroScreen. And the second component is a stakeholder engagement plan, which we are -- and in this plan, this is where we're planning to outline some of the engagement activities that we plan to conduct in Phase 2.

Again, we're currently in Phase 1 of the project, and in Phase 2 is when we're going to move into more detailed engineering, routing analysis, and then ultimately Phase 3 is when we submit the application to request approval to construct Angeles Link. And that phase is still several

years down the road.

So to clarify, the EJ analysis that I just kind of briefly mentioned was part of the original scope. So if you-all recall, you might have -- you might remember kind of some of CalEnviroScreen and some of the USEPA tools that we would be using, but what is different is we are adding a community-focused stakeholder engagement plan that we will write in Phase 1 with everyone's input, and Phase 2 is where we would gather community concerns and address and mitigate impacts to the communities of concern. And so this plan will include outreach to local indigenous communities.

So just to recap, the approach is to develop this plan with your input during this phase, and in Phase 2 is what we're calling more of the boots-on-the-ground outreach and engagement. So that could be a listening tour, focus groups, or any other method you-all think would be effective to gauge what matters most to our community members.

So we want to hear from you. We want to know what to include or exclude in this plan, and in future meetings, we will likely have a kind of roll-up-the-sleeves working session to kind of work through some of the components that we're planning to include in the plan.

But, again, this is just the high-level change in scope or approach to our EJ analysis and really want to just kind of gauge your thoughts and feedback on whether this is

the right direction to take and what we should include in this plan.

So with that, that's it for me. Just kind of a short and sweet overview of the proposed modifications. So I'll turn things back over to Chester.

CHESTER BRITT: Thank you, Edith.

So yesterday, we had a very robust conversation with our community-based organization stakeholder group about the environmental justice issue. Lots of input from them. And I'm curious, before we go on to the demand study, if anyone from the PAG has any further input.

I mean, one of the things you heard Edith mention is that we're in Phase 1, and, you know, if we get approval to go into Phase 2, a lot of these ideas for stakeholder engagement will be appropriately implemented during Phase 2.

But going into Phase -- the end of Phase 1 and beginning of Phase 2, we would like to begin to craft what our stakeholder engagement plan will look like. So we're welcoming any input. If you guys have any ideas or things that you think we should be further exploring when it comes to community outreach and things that we can plan ahead for, we would love to hear that.

We would love for you to compare this project with any other projects or experiences you've had, maybe lessons learned or things that you've done and seen before that you

would like to see in this process. Those are the kinds of things that would help us now.

You've heard that we've already started to pivot from what we are heard in those initial meetings in July, and now you heard Edith mention some of those things are being incorporated, but we want to spend a few minutes now just making sure we're hearing anything else as we continue this process forward.

And, again, just like all of the work studies, this is not a finished product. We're in the process of going through a series of meetings with you which will lead themselves to final reports in all these. And as you provide input, we will be obviously documenting that and putting that into the final decision-making process.

So I think, Russell Lowery, you raised your hand first, so we'll go to you. If you could unmute yourself, we should be able to hear your comment or question.

RUSSELL LOWERY: Thank you. I appreciate particularly the part two of your analysis, and I -- so there's praise available there, but I would like to focus my comments on part one.

The first comment is there's nothing in Phase 1 that would be different from any other piece of infrastructure that was being built anywhere in California or anywhere else. Not that you're aiming for a cookie-cutter approach, but

that's just typical, ordinary, nothing special.

I think what it misses important that I would like to see reflected is that this is a hydrogen product. And when we think about environment justice, we think of the communities that have been disproportionately impacted by a carbon-based economy should be at the front of the line when you talk about a transition to a clean economy.

What that might look like and what we'd like to see incorporated in here, and it was mentioned at the previous in-person meeting, was that there needs to be analysis of the end -- potential end uses of hydrogen, and I know that's in a separate study, but that needs to be incorporated into the EJ analysis.

The reason for that is some of the end uses, heavy industrial port, the heavy duty truck transportation in and around those ports, are potential end uses for hydrogen and disproportionately impact EJ communities.

So depending on what your potential end uses are could dramatically impact our communities, and so -- and it also could affect the scoping and the build-out of the project. So if you're going to generate hydrogen or hydrogen end products at the end or in and around ports, that might be something that's going to impact EJ communities sooner rather than later.

So those analyses -- we think that analysis needs to

be centered and forefront, not saved until Phase 2, and if you -- and if we map it onto the PUC's EJ goals, we talk about increased investment in clean energy resources, especially to improve local air quality and public health.

In this case, if you're going to put infrastructure through EJ communities and they're not receiving an environmental benefit depending on some of those end users, you're introducing a safety risk that the PUC has already identified, and you could be dramatically, negatively impacting a public safety or public health issue which would be the opposite of the second portion for what PUC has identified for their EJ action plan.

CHESTER BRITT: Great input. Could you just announce who you're with for the court reporter?

RUSSELL LOWERY: Russell Lowerly with the Environmental Justice League.

CHESTER BRITT: Perfect.

So, Edith, I don't know if you wanted to say anything in regards to Russell -- Russell provided a lot of --

EDITH MORENO: Yeah, this is all really great feedback, and this is exactly what we wanted to hear, Russell. I do want you to know that the CPUC's ESJ action plan is something that we are looking at and making sure that it's aligned with it and so noted your comment and took

extensive notes to see how we can modify our approach. Thank you, Russell.

CHESTER BRITT: All right. Tyson Siegele, you're up next if you can unmute yourself.

TYSON SIEGELE: Hello. I'm Tyson Siegele. I'm representing today the Utility Consumer Action Network. The start of my comment here is just to reference the final decision in the Angeles Link memorandum account.

The decision stated that Phase 1 SoCalGas -- I'm sorry, in quote, "SoCalGas shall not record any public outreach costs. In addition, we find that activities related to engaging with public officials or legislatures are not beneficial to rate payers and are therefore prohibited from being recorded in the memo account in any phase of the project."

So the specific language there, "shall not record any public outreach costs," that is a -- that's exactly what SoCalGas is proposing here unless, of course, it's claiming that Phase 2 is not going to be tracked in the memorandum account.

On Slide 2, the bullet point here, boots-on-the-ground outreach to communities. So it appears that what you're proposing in this change is a direct contradiction, a direct violation of the final decision within the Angeles Link memorandum account.

It also is concerning that SoCalGas would be doing the outreach on hydrogen, on SoCalGas-provided hydrogen because SoCalGas has a conflict of interest here.

For instance, in the slides on -- let's see, Slide 5 here, there is a -- there's a bullet point that says, "Education on hydrogen-related topics and benefits of clean, renewable hydrogen." That -- sure, you know, that is important to have people understand the benefits of hydrogen.

The inverse is also true. It's important for people to understand that there are harms, there are dangers, there are negatives to using hydrogen in various cases, and that needs to be expressed to the community as well.

So the No. 1, the change to the environmental justice plan, the study here, is a violation of the final decision. No. 2, SoCalGas itself should not be doing promotional work that is paid for by rate payers.

So those are the two comments that I have for this particular stakeholder engagement.

CHESTER BRITT: So, Edith, do you want to speak to that issue of the final decision, or is there someone --

EDITH MORENO: No, I can just briefly. Thank you, Tyson, for your comment. I'm very well aware of the ins and outs of the final decision and what SoCalGas is allowed to record and not record. I see your concern, and maybe it's just a difference in interpretation, but we will continue to

comply with the final decision. So thank you for your comment.

CHESTER BRITT: All right. Theo, I see your hand raised. If you could unmute yourself, you're next up to make a comment.

THEO CARETTO: Yeah, hi, Theo with Communities for a Better Environment. Yeah, I do echo some of the concerns that Tyson raised around impropriety if SoCalGas is performing the outreach themselves.

I know that some of the material presented here in the past has not been entirely on the up-and-up or has just kind of presented a much more rosy picture of hydrogen rollout than we're aware is the, in fact, what hydrogen will look like when it's rolled out.

So we're concerned that if those materials aren't reviewed ahead of time, they may not present a fully accurate picture. Also concerned about the materials not being accessible to community members, if they're not presented in language -- with language-appropriate materials if the discussion isn't just, you know, reviewed ahead of time by folks who are familiar with working with the communities where those materials are going to be presented.

Also curious to hear the scope of where this outreach is going to be conducted, whether it's focusing on the LA area as these Angeles Link public engagement meetings

were at the start or whether there's a plan to do outreach sort of along the length of the proposed pipeline in communities that demand for hydrogen will impact as well as sort of on the production end as well as the end uses end and whether outreach will be conducted sort of in all of the areas that are discussed in the end uses -- or the demand study.

I know the demand study had kind of a wide scope, and it doesn't really seem to make sense that you would only conduct outreach in a -- sort of like a contained area if you're accounting for a much broader area for demand in justifying the project.

I think it's also important to present information around alternatives available when you're meeting with EJ. I know that there were -- that that's something that's sort of being analyzed in another part of the studies being done, but, again, it's not appropriate to present communities with incomplete information.

CHESTER BRITT: Was that the end of your comments, Theo? Can you hear me? All right. I think Theo was done making his comment.

So I just want to reiterate something, just to be very clear. So we're in Phase 1 of potentially a three-part phase process. Phase 1 is really focused on the feasibility of the potential of Angeles Link. So, as of now, there isn't

a defined project, and we have no approval to go into Phase 2. So that is the process that we're in.

Edith, I think maybe it's very clear that that's the case, and what we're hearing from our community-based organization is obviously there are interests -- high-level interests in us engaging the communities, right? They're eager for us to do that. Part of the issue of not doing that now is that we don't have a project defined that we can engage them on, and we have been very clear that that engagement is probably going to be taking place in Phase 2.

That notwithstanding the comments that we just heard from Theo and from Tyson obviously are things that SoCalGas is very aware of, very concerned about, paying attention to, and documenting, and we have the CPUC as part of this process here today. And as part of all of the meetings that we're having, they're watching what's going, and we're having -- SoCalGas is having direct conversations with them about that.

So all of that is to say that we welcome your input; that's why we're here. We were looking to make sure that we're hearing what is important in relationship to community engagement once we get to the appropriate time and place where that would take place. And that's really what the focus was.

So, again, today's meeting is not the last chance for you to weigh in on this topic. You can submit, you know,

e-mails when you think about it later, you have ideas. We're documenting what you're verbally telling us, but we're also continuing to welcome additional input, and we're giving you a month for all of these sectional work study programs as we present them to you to give us your thoughts so you're able to review the materials, give us your deep input, and we're documenting and recording that.

So I don't see anyone else's hand raised, and for the sake of time -- oh, Arthur, you raised your hand at the last second, so we'll let you make a comment, but then I would like to move forward on the agenda because we do have the demand presentation, which we believe is going to capture a lot of interest in today's meeting, and we want to make sure that we get to that part of the meeting and make sure that people can have a chance to weigh in.

So, Arthur, unmute yourself and you have a chance to make your comment.

ARTHUR FISHER: Hello there. It's Arthur Fisher with the Public Advocates Office. This is just more of a comment/observation for your desktop studies if you're using something like the EnviroScreen. Just to say that if you use -- there needs to be a combination of screens and assessments, not just EnviroScreen. EnviroScreen can miss certain economic disadvantaged communities that may not be environmentally disadvantaged because of the weight that it

puts on things like air quality, then there are certain communities that were -- that are economically disadvantaged that fall outside of it.

A good example we find up here in San Francisco are some of the -- some of the Asian immigrant communities in the center of San Francisco. By EnviroScreen standards, they are not disadvantaged; they don't fall into the top ten percentile, the top percentiles, but by any other standard, you would consider them so.

So just an observation to you, you're going to need kind of a multiple approach towards it and not just rely on that one source. That may be especially important if you're getting out to the extent of your pipelines, if you start to get out to more rural areas. If you've got a pipeline, say, that's going to cross the Mojave or somewhere like that, then, you know, your air quality is going to be fine. And the way that EnviroScreen weighs will not necessarily capture some of the communities out there. That's my comment.

CHESTER BRITT: Thank you for that, Arthur. Really good input. We appreciate that. All right. Let's bring up up the presentation again, and let's get into the next section.

We're going to do a quick Zoom survey. As you've heard Emily allude to when she went over the agenda, there's only two questions: How familiar are you with the

supplemental demand material provided last week? And the second question is: What are you -- actually, that just covered my screen; I can't see the second question. What demand topics are you most interested in discussing?

The reason we're asking this question is because we recognize that we sent out a very deep dive slide deck into the demand study, and we want to just understand how many of you were able to review that and are very, very familiar with what was in there or how many of you just skimmed through it or maybe some of you didn't have a chance to look at it. So that will help our presenter, Yuri, when he's making his presentation.

So if you could just quickly answer those two questions; both questions should be appearing on the same pop-up screen. Once you answer the first one, you just have to slide down to answer the second one.

We'll give you guys all just a minute to do that, and then we'll show the results and then we'll get on with our presentation.

All right. It looks like everyone kind of has made their choices. A couple more people entering their thoughts. It looks like we're up to 22 people answering, which, I believe, is around the number of people that are on the call.

So let's, Nancy, go to the results. Go ahead.

All right. So how familiar are you with the

supplemental demand materials provided last week? You see that only one person did their homework and read through all the materials. You know, again, it was a lot of information so we understand that. Forty-one percent said that they're somewhat familiar. Over half are either unfamiliar or very unfamiliar.

What demand topics are you most interested in discussing? Seems like scope and process is still high on the list, even though we did spend quite a bit of time talking about that in July. I know that focus was really on project description, and now we're going to be talking today more about the actual methodology and process. So that will be good because you can see there's a high level of interest there.

Mobility, power, and industrial; it seems like power is the most important for this group to discuss; although mobility and industrial did get a third of you replying that those were important as well.

So that just helps us, again, to just make this a better meeting for our presenter. With that, we're going to quickly now switch over to Yuri, who is going to make the presentation on the demand study analysis.

Yuri Freedman is the senior director of Business Development for SoCalGas, and he's going to make the presentation and then we'll get into the discussion with the

PAG members.

So go ahead, Yuri.

YURI FREEDMAN: Thank you, Chester, and good afternoon, everybody. Chester, thank you so much for the poll results; I think that will help me recalibrate the depth and the scope and the focus on specific aspects of the study or specific aspects of demand.

Let's go to the next slide, please.

This slide is a very high-level recap of where we are in the process and what we plan to do today. As you all remember, we shared study descriptions, and today, the intent is to review the technical approach and to dig deeper into the methodology, into the scope questions, quite simply, where the numbers came from, what we did with the numbers, and what the -- and then, ultimately, go into the initial outputs; that's the light blue box on the right above the arrow.

We would like to share with you some of our preliminary findings because, obviously, this is the ultimate purpose of the exercise, is to quantify initially and then in the final version, the range of demand.

I think we all understand and agree that making forecasts that far out is going to necessitate a range; we're not going to be dealing with a single number. And we want to try and develop this range based on the number of variables

that we know are going to be uncertain and yet be applied a range of methodologies to create the boundaries of outcomes.

And, ultimately, the objective of the effort, of course, is to prepare the reports and draft from and then, in the final form, which will be submitted to the comission for the final decision.

Let's go to the next slide, please. So the next slide, please.

The next several slides are going to review the background, so to speak, where we came from, where we are now, and where we're going. As, again, all of you remember, I'm sure, that last December, the commission issued a decision approving SoCalGas's request to establish the Angeles Link memorandum account. Sixteen studies have been requested by the commission, and the demand analysis that we're going to discuss today is one of those studies.

This is something that is -- we see is very important because, again, remember we're talking about the introduction of a commodity which is not in and of itself new; hydrogen is not new, it's been used abundantly for decades, but we are talking about opening new markets, new end uses for these commodities at a large scale.

So it's really important for us to develop a bottom-up, robust, creditable view on what this demand could look like in a context of decarbonization objectives of the

state; and that's what we're doing, that's what we're going to see today.

The time frame is effectively from 2025, which is almost with us here, for the next 20 years out, which is until 2045. And what we're going to do today is to talk about the methodology itself then talk about the assumptions, because I think all of us who have been involved with models know the input and assumptions are critical in understanding and framing and engaging to outputs. So we want to be very clear and transparent about how and why we made assumptions, what assumptions we made, and, ultimately, as I said, share with you the outputs.

Let's go to the next slide, please.

Thank you.

What we're going to do on this slide is talk about what is in scope but also, very importantly, what is not in scope. The in scope are the three priority sectors, which, in our view, are comprising the majority of demand for clean hydrogen. I know you heard this from us before, that these three sectors are mobility, power generation, and industrial sectors.

What we did not include in this analysis are several factors which are real which are tangible which actually are in the process of being quantified but which we did not include at this stage, just to be conservative, and these

factors are, first and foremost, system reliability.

It is a very important topic as, you-all know in power generation, and, in fact, we at SoCalGas have recently completed and released the reliability white paper that is now on our site.

The very short summary and the reason it matters is that if we were to analyze the power grid and could the constraint or, if you will, could the condition of maintaining what we call loss of load expectation, which is to say, not allowing frequent blackouts or brownouts, against the fact that increasingly the larger and larger share of the resource in the grid will be renewable and intermittent; this initial result in our white paper suggests that there will be a need for incriminental amounts of clean molecules to -- for it to simply have a dispatchable generation to back up these renewables.

That is something which we're going to dig into deeper in the Phase 2. We did not include those conclusions into our analysis, and that's an important caveat. Obviously, if we are -- as we are going to look at the needs for hydrogen for the liability purposes, the volumes will go up.

Another factor to keep in mind is that there is analysis, including analysis by our resources board scoping plan, which suggests that we may need a large amount, about 9

gigawatts of hydrogen turbine capacity, and, of course, that capacity, even when built, is going to demand more quantities of hydrogen.

We did not include those capacity additions into our demand for gas. We focused on existing generation and conversion on the vary scenarios of this generation to hydrogen. Again, it stems to reason that as you add those nine gigawatts to the mix, the demand for hydrogen is going to go up.

So I'm sure you see a pattern here, and the pattern that we purposefully have here is the pattern of a degree of conservatives. We do not want to add the variables to the analysis before we are going to be confident in the numbers behind them, before we do the robust power grid model.

The last variable I will address is the carbon pricing. Again, it's obviously a topic of intense conversations, and some examples of that are LCFS and cap-and-trade mechanisms.

The regulatory proceedings under way currently may have input from that, which in turn will have impacts on demand.

So the variables I just listed will be further assessed in future studies; for now, they are not within the scope of Phase 1 or Phase 1 demand analysis, I should say.

Let's go to the next slide, please.

Thank you.

If you note -- notice the chat boxes, again, this is the status check, if you will, for all of us to get oriented with what was done, what has not yet been done, what's in process.

The first stage in every exercise and model is definition of the model. It's, effectively, what are we trying to model, what is the scope, and what's the approach? What we did fairly on is we closely examined the preexisting work, because we're not doing our work in a vacuum.

There has been substantial work at the state, at the federal level in the academic community that tried to answer, maybe, not exactly the same question but questions which are very relevant, what we're trying to analyze here, and we'll go into some of the studies. At least we'll list them a little bit later.

But we have been reviewing, of course, all this analysis to make sure that we can build incremental value with our analysis here.

Then the build out for the model is the nuts and bolts of it: Where does the data come from, how do you work the math, what is the internal logic in the model? And we'll talk about this in the next slide. It goes from total addressable market, overlaying the various assumptions of the conversion or the transition to zero omission, fuel quality

operations, and, within that, make assumptions for share of hydrogen technologies.

And what you see at the bottom is really important, because, again, another indication of this not being done in a vacuum is that we wanted to be sure that not only we are examining what was done before us, but we want to solicit the opinions of market opinions of academic experts of the agencies on the methodologies which we are using on the initial output which we're developing.

So the sector interviews and peer reviews are real important to us because, again, we're talking about an application of a commodity in real sectors where sometimes it has not been used at scale. It's a rapidly moving, rapidly evolving picture. It's new sectors.

Therefore, it's real important for us to understand what practioners spend in their time and their money on advancing those sectors, think about our approach, think about our outputs, and what we are intending to do, as a result of this process, including conversations like we're having today, is to find the model to go back and iterate and understand where some of the changes we're going to make so we can arrive to truly credible results, which we'll then bring to the commission as part of our Angeles Link Phase 1 studies.

Let's go to the next slide, please.

Thank you.

I would suggest that the most important section of this slide is middle, is the blue chevrons and the language underneath them. It really does lay out the logic of the model.

And, again, it starts from model and total addressable mark, which is to say, in transportation, needless to say, is the fuel which is being used in our service territory by transportation vehicles. Power generations, power plants, and industrial factor is the industrial use.

This is something that we start with, then we overlay or that's the regulatory slative goals of the state, which is, of course, decarbonization. And that is something which is reflected in multiple regulations.

The next step is the assign market shared for hydrogen, vis-a-vis alternatives of decarbonization. And that is something which, again, is very specific, for example, to the sector, of course, in transportation sector. We're talking about the completion of two types of electric vehicles: Battery electric vehicles and a fuel cell electric vehicles.

And I know that most of you, probably all of you have heard the discussion about the duty cycle as the parameter that really matters for defining the market chair.

And, as we'll talk later, we included, obviously, some of those permanents into our -- developing our cases.

And the last step on that is to go from the current fuel use, which we are fortunate to know because we have been using the database of our resources board, which actually has a wealth of information, not just on vehicles themselves, which is a really deep wealth of information, but also their fuel usage.

And so once we make assumptions about conversion of these vehicles to zero omissions and then within zero omissions to fuel cells, then we can calculate, and we did calculate, the initial results of what would be the fuel requirement for these volume of vehicles across segments across various types of vehicles.

I brought up transportation because it may be the most granular example of how we've done that, but the very similar approach was used in power generation and across the industrial sectors.

Again, I mentioned the validation, but the affect was something which we touched upon the previous slides, so I will not belabor that point on the right.

Let's go to the next slide.

So these are the reports, which are all, obviously, in public domain, and we encourage all of you, if you haven't reviewed them, we encourage you to review them.

We really are benefiting from a wealth of recent work, which was done as hydrogen began to enter the conversation, then we started to move from the concept to reality. There's work in the federal government, and the report on the left is actually very robust. It was released earlier this year.

And they're not just looking at technologies; they are actively analyzing what are the pathways, as the title suggests, to commercial liftoff, because everyone seems to agree that the key to a reduction of costs, key to wider adoption scale. So this report is very, very, very deep. It's very sector-specific. Again, those of you who haven't read this, I would encourage you to.

The energy commission has looked at hydrogen in great detail, and we are fortunate to have this report which inform our analysis here. Obviously, we have the reports from academic community, the UC Davis and others who have looked at hydrogen.

So, again, that, by no means, is an exclusive list of analytical material, but that is some of the good representation of what we leaned on as we thought about our work as we planned this effort.

Let's go to the next slide.

This is the slide to really lay out the, if you will, the logical composition of the model. What you see on

the left is three scenarios. We purposely call them conservative, moderate, and ambitious, as opposed to low, medium, and high, because ambitious, to me, is in line with ambitions of California. To reach the decarbonization, to reach omission reduction, elimination by mid-century is a very ambitious goal. I think we all know that.

Accordingly, we wanted to give credit to the state but also to sync up our cases with what the state may need to do as it moves down the path of decarbonization.

The conservative case, again, on top of not including some of the factors which we talked about, we just wanted to assume that their regulation in place will stay in place, they'll be no new legislation, they'll be effectively adoption of sectors and subsectors, but we took fairly conservative approach on -- with regards to that.

And the moderate case, as one could, of course, guessed, is in the middle. The distinguishing feature of the ambitious case is that we wanted to reflect some of the sectors where the adoption of hydrogen is still being explored, but the potential and the importance of its adoption is too large to, if you will, ignore at this point.

And then specifically referring to refineries where, as I'm sure all of you know, this is the largest by far sector of hydrogen used today, of course, by and large the hydrogen that is being used is green hydrogen produced

through steam methane reformation.

If the refineries in our service territory were to consider green hydrogen, and that is something which is the subject of consideration for them, of course, in light of the LCFS training work and decarbonization goals, that would be a very noticeable uplift in demand.

So I wanted to acknowledge that, but we do not think that this is a mature enough conversation at this point to be included in all the scenarios, so that was our effective way to treat this as a sensitivity.

That's one example. There's several other sectors where we include them in an ambitious case but not the conservative or moderate case.

On the right-hand side, what you see are the four levers, which between them, in our view, define the adoption rate of hydrogen in a sector or in a subsector.

Of course, first and foremost in policy and legislation, this is something which draws the low carbon technologies. We see and we all know the levers which are going to continue to do so, and we'll talk about this more as we go into sector by sector conversation.

Clearly, the more policy support will be received by a sector, the higher adoption rates will be going, although first is also function of the market share of hydrogen to be the alternatives of decarbonization.

The next one there, the technology feasibility, that title, so to speak, maybe speaks for itself because, ultimately, the technology has to work, and it's something which, again, is in the process of development; many of those technologies are established by now, some others are not yet proven commercial. So this is something which is a rapidly evolving element of it, and we assessed it as well.

Commercial availability is effectively something where we factor in the cost. It's something which is, I think, we all understand, with all the incentives, ultimately, it has to work economically. And so commercial availability relates to availability of equipment and of hydrogen, of course, itself; it evolves into something which, again, while we have ambitious goals that, again, as you all know, set by the federal government, reaching one kilogram hydrogen -- one dollar per one kilogram, one decade.

But the equipment upgrade themselves, especially on the demand side of cost, and we have to acknowledge that and assess the preparedness of a business of an end user to make the change.

That is a topic that is very, very high on the agenda of the federal government. As you may have seen, they've come out, I believe, maybe a couple of months ago and they set aside a billion dollars for, specifically, demand site incentives, demand site support, which we believe is

very important because while there's been tremendous support for clean hydrogen on the production side, you also need to think about the markets, some of these markets exist today.

Again, LCSF is an example that always comes up, but LCFS, of course, is focused just on transportation market. If we expect adoption of decarbonization technologies across the spectrum of end users, they should support across those users and the federal government is clearly acknowledging that and providing them support.

And the last category of this is business readiness. What we want to captured here is the internal goals of corporations of customers, which are also incredibly important in driving adoption, and, oftentimes, driving scale, because there's no secret that oftentimes larger corporations are the ones that have ambitious environmental goals; they also have strong balance sheets to back those goals up and convert those aspirations into the physical reality.

So what we call business readiness is really preparedness for business to integrate the low carbon technologies including their corporations, and that is something which is also going to be a very important element of hydrogen adoption rates.

Let's go to the next slide, please.

Maybe -- I know that I've said a lot about a lot in

a very short period of time. What I would like to do now is maybe make a pause for questions and comments before I go into the description of the preliminary outputs.

CHESTER BRITT: Thank you, Yuri. So we have quite a few people who have chatted while you were making your presentation. So we'll just start at the beginning.

Theo Caretto typed in, "The scoping plan doesn't state a need for hydrogen combustion generation." He thinks that's misleading.

So would you have any thoughts about that, Yuri?

YURI FREEDMAN: I think that the, again, first, I would perhaps refer us to the work that we have done as SoCalGas, analyzing the needs for liability. Second of all, I will say that the structure of the fuel mix 20 years out is, for now, I think it's fair to say, not completely understood.

I will add to this the need for dispatchable generation, because that seems to be not in doubt. There are many things which are in doubt. I don't think that need for dispatachable generation for just-in-time delivery is one of them. I think that there's a broad acknowledgement of the need for the dispatchability as the share of intermittency on the grid grows.

Again, that's something which will be established in the following phase, because, as I'm sure you understand, you

need to do a really robust market analysis, and, in fact, you need also to capture some intermittence of renewables.

So it's not your annual analysis, it's actually doing the almost hour-by-hour breakdown and figuring out what does intermittence of renewables mean.

We have some work in academics community which points to the multiday periods where solar and wind is going to be lower than the average, which then, again, calls for basically dispatchable power to fill the void. And, ultimately, recall that this is something which we purposely did not include in our scope.

So my intent in bringing this up was to point to the potential incremental needs for clean fuels while not putting a number in this just yet.

CHESTER BRITT: All right. Russell Lowery made a comment, not really a question. He said, "The demand and end uses are potential benefits of hydrogen that need to be included in the EJ analysis. Industrial pollution disproportionately impact minority communities. If hydrogen is going to displace fossil fuels in end use cases, that will impact our response to the project."

So I just want to thank Russell for your comment, not really a question. Sara actually did ask a question, Sara Gersen. She asked, "Was Yuri suggesting that the market share you assumed for hydrogen was based on the EMFAC fuel

use data? The market share assumptions for various vehicle segments in the circulated materials was very surprising, and it would be great to get more clarification on where those came from."

YURI FREEDMAN: Thank you, Chester.

So let me go in order of receipt. First of all, I would like to go back to Russell and say that I second Chester's comments, and I think I am personally quite passionate about the fact that, again, let's take the transportation, let's take heavy duty.

Taking the diesel trucks off the road and the road that passes through these disadvantaged communities, again, Freeway 710 and many others, and displacing it with zero omissions, but also zero air quality impacts, fuel cell vehicles, is the large and massive act of environment justice, in my firm view.

And I think that that's something which we as a state will be proud of when we accomplish that. So there's no question in my mind that we should fully capture that impact, and we will.

It is not strictly speaking within the scope of the demand study, but, again, there's data, frankly a few examples I can think of, where implications of hydrogen can have such a large immediate impact on quality of life of many people. So point taken.

Sara, to your question -- I think I remember the second one; Chester, you can help me with the first. So what we did with the CARB database, we used the fuel use data once we arrived to the adoption rates.

Remember the logic, you first look at the total addressable market -- and we'll dig into this in some detail -- you look at how many vehicles there are by not just the vehicle type but the way they've been applied, the dray tracks, the sleeper cabs, so on and so forth.

Once you do that segmentation, again, there's a wealth of data in the CARB database. And, again, it's public, of course, so encourage you to explore that. Then you look at the clean fleets regulation, and what we've done bottom up is assessing what portion of these trucks -- and I'm using trucks as an example.

Same is true for other vehicles. What portion of the trucks is going to be covered by the ACF, the advanced clean fleet regulation? Not all of them, of course, but a large share.

And that gives you a sense of how many trucks will need to be converted to zero omissions. We're not yet making a technology choice, we're talking about zero omissions.

The next step from that is based on the totality of the core factors which we described -- which I described, which is the technological readiness, the business readiness,

the commercial availably and policy, is to ascribe market share to fuel cell electric vehicles versus battery electric vehicles.

In that process, we heavily relied on the work which was done by other parties, and we definitely can, perhaps, do it offline and compare notes on where these parties are, UC Davis and others, in their reviews in the share of fuel cell electric transportation versus battery electric transportation.

I think you will see in those materials -- you have seen, I assume that the share ranges from relative numbers for some transportation sectors to pretty high in some others, which, based on conversations we have had, seems to reflect fairly broad consensous in the industry.

So that's maybe incomplete, but hopefully answer [sic] that touches the main points of whatever the thought.

Chester, I may have missed some of the answer, and I apologize for that, please.

CHESTER BRITT: I think you pretty much covered it, but if Sara doesn't feel the same, then you're welcome to let me know and we'll go back to the part of the question you need to get clarified.

Tyson Siegele, you've raised your hand, and I also see that you chatted, but I'll go ahead and let you just verbally ask your question. So if you could unmute your

microphone.

TYSON SIEGELE: Thank you. This is Tyson Siegele. I am representing the Utility Consumers Action Network today. There were a variety of questions that I had for you, Yuri, that are sort of high-level questions on the overall study that cover all three sections. And so I'll go ahead and just ask those to begin with before you present the others.

So the first one is that, throughout the studies, it looked like there was a -- maybe an expanded geographical area compared to the LA Basin itself, in terms of taking a look at the hydrogen demand.

Can you specify what geographic area SoCalGas is taking a look at here for the hydrogen demand study?

YURI FREEDMAN: Yeah. It's effectual SoCalGas service territory. Thanks. It's a fair question.

TYSON SIEGELE: Great.

The next question is the -- and forgive me if it's in here and I didn't see it. I didn't see any place where it is reviewed what hydrogen is going to be supplied, of the overall demand, what hydrogen is going to be supplied by SoCalGas versus other hydrogen suppliers. For instance, on-site hydrogen, nonregulated companies, other utilities, municipal utilities.

Is that covered yet in the existing demand study here?

YURI FREEDMAN: It is not, Tyson. It's an excellent question, and this is going to be covered within the supply study. It's a separate -- again, the list of studies is long, and there's sixteen of them, supply is one of them. It's a separate work stream.

It's a very important work stream because it is going do address exactly the questions you're asking. The demand study is trying to take a view of -- as we move to decarbonization, what does it mean in terms of need for hydrogen across our service territory.

Then, once you address that supply separate, they obviously will meet, so to speak, in the middle and the economics and cost analysis will be part of that as well. But the short answer is that that is not within the scope of the demand analysis.

TYSON SIEGELE: The next question is: With the model itself, when will SoCalGas be releasing the model that actually does the calculations and provides the outputs so that if, for instance, PAG members want to take that model and put in their own assumptions and inputs, we would be able to see what the output of that model is.

We also would be able to take a look at the model and be able to determine, you know, exactly the calculations that the model goes through.

YURI FREEDMAN: So what our intent was, Tyson, is to

give all the PAG members, as well as OCBO members, full visibility into the process and the calculations, exactly like how you described, and there's slides in the presentation that go through the, if you will, nothing mathematical, but just arithmetic of that, what to multiply by what, to arrive to a number.

Obviously, you know, anyone can go to the database and get the number of vehicles. Then, you can assume -- make your own assumptions with regards to the conversion to zero omissions, as an impact of ACF, but many legislative and regulatory acts, you can then overlay onto that your assumptions of hydrogen fuel cell and ultimately take the fuel use and get the hydrogen demand.

I wanted to be clear that that logic is what we present, and we believe it's entirely transparent. There's nothing there that is proprietary and, so to speak, behind the curtain.

TYSON SIEGELE: Okay. So what I'm hearing is SoCalGas doesn't plan to release the model; is that correct?

YURI FREEDMAN: That is correct for the time being. I think right now, representing materials which give complete and full visibility into the process and the ability to replicate it, we're using only the public available data, which is what we have done.

TYSON SIEGELE: That actually leads to my next

question. There were several slides within the presentation that refer to interviews as a source of data for the inputs and assumptions that were used.

Are those interviews going to be released before the comment period is over?

YURI FREEDMAN: That's an excellent question, and let me come back to you, if you don't mind, because I don't want to answer until I get full certainty on this procedural point. But it's a fair question, we'll take it back, and we'll come back to you.

TYSON SIEGELE: And I think that's -- that concludes my overall questions. I'll wait until the next section for additional questions. Thank you.

CHESTER BRITT: I appreciate that. And I think, Tyson, you raise a good segue for me to just reiterate, this is not our last bite of this apple, right?

All of our 16 work studies are going to be going through a process over the next coming months where we're going to be coming back to each of them. You know, we started off with project description; we're going to be talking today a little bit about technical appropriate. We're going to be talking about preliminary results; we're going to talk about the final results.

This is going to be an ongoing iterative process, and for each of these as well, you're going to have, like, a

month period where we're going to release documents to you, you'll have the ability to look into those in great detail.

These meetings are meant to provide a big picture overview of what's going on, allow people to ask clarifying questions, but, again, you have, in this particular case, until September 25th to weigh in on where we are with the demand study, and we would welcome that.

As far as further questions, if you leave this meeting today and you think of something later that you forgot to ask or clarify, you can actually, you know, reach out to us and Yuri and others will be able to provide the information you're looking for.

So I'm going to, I think, Theo, you have your hand raised and we're going to take that, and then I would like for Yuri to finish his presentation, which won't preclude you guys from asking further questions, but I want to make sure we get through the entire presentation so that you see the full presentation in its entirety so that you can have -- ask questions -- and some of your questions might be answered in that second part of the presentation.

So, Theo, go ahead and unmute yourself and ask your question.

THEO CARETTO: Yeah. I just really quickly wanted to jump back to the CARB scoping plan. I mean, I'm well aware that the CARB scoping plan discusses the need for new

energy resources on the grid and that there's a discussion of a possible need for combustion to use as a dispatchable resource to make sure that we're supplying base load power and meeting peek demand, especially over periods where other renewables, like wind and solar, may not be producing, you know, at full capacity.

I just think that the discussion of the scoping plan, I think the way that you've phrased it requires or shows a need for nine gigawatts of hydrogen turbine capacity, sort of speaks to the same concerns that I have with impropriety if SoCalGas is producing materials for EJ outreach.

I think that the way you presented that is really misleading and doesn't accurately represent what the scoping plan puts forward. I mean, I think it's absolutely possible that the scoping plan could result in a scenario where that is the end result, but for SoCal to say that, Oh, the scoping plan says that we need nine gigawatts of hydrogen turbine, is not accurate. It's misleading.

And, I mean, along with this discussion here about not sharing the inputs and sort of being able to understand why you're coming up with certain numbers about, like, hydrogen fuel cell vehicles being part of the EV market is really concerning when you also say that you're going to be producing these materials and doing outreach in EJ

communities.

It's just, not only does it speak to a lack of trust, but, also, it's just like if we can't inquire into where this is coming from, if we don't see your modeling, then, like, what are we supposed to do?

Yeah. I don't know. I think that it's just kind of frustrating, and I'll leave that there. Just a comment.

CHESTER BRITT: All right. Thank you, Theo, for your comment. Yuri, I don't know if you have any further comment on that. I also want to recognize that Sara Gersen did make another comment. I don't believe it's a question.

But we are, again, capturing all of your chats, so all of that will go into the process and the summary of what you guys provided, in terms of input.

So, Yuri, I'll turn it back to you to either follow up on what Theo mentioned or just continue on the presentation and then we can continue our discussion.

YURI FREEDMAN: Yeah. Maybe two quick points before I move on. Theo, I take your points, and perhaps my phrasing was incorrect. It definitely was not intended to be misleading, and I regret if you found it such.

I will say that we seem to be spending an enormous amount of time on this conversation on a factor which we exclusively defined as not included in the scope of this analysis. And that's, I guess, as it relates to the need for

the new generation.

And going back to the modeling, the slides that we provide, the case studies for those sectors, if any of you are unable to arrive to a number of demand for these sectors, which we spelled out there very clearly based on the inputs that we provide in those slides, I encourage you to reach out to us, including to me personally.

I will help you to go through the process to make sure that you understand -- not just understand the logic, which is clearly laid out, but you can get to those numbers. And I'm hoping that that addresses the question about being unable or able to get the same numbers. I'll definitely prepare to work with whoever needs support to get to those numbers.

So with that, I believe we should be moving on to the summary of the preliminary outputs. Let's go to the next slide.

So this is the, again, to emphasis something, which is the model outputs, which I wanted to share with you. Recall that we looked at three key sectors, and, accordingly, the legend clearly spells them out as mobility sector, the dark blue; power generation, the light blue; and the industry sector is the highest element of demand.

You can see that between conservative case and the ambitious case, there's a quite wide range, and it ranges

from just under two million tons per year by 2045. By the way, all the numbers on the right, you see 1.9, 3.3, and 6.0, these are all 2045 numbers. So the range is always substantial.

Again, it's something which, as you can see, the proportion of transportation, power varies across the cases; power is the sector which, again, according to the slides, which we provided an appendix, we've looked at 175 used cases of transportation, went from bottom up and calculated the numbers of consumption for each of those, again, in a very transparent and replicable way.

And, as you can see, the range of adoption actually varies but does not vary as dramatic across the three cases. You can look at the trajectory of it, but, ultimately, when it gets to 2045, it's something which mobility will have just under million tons per year in a conservative case and that number grows to over one but below two million tons per year in ambitious case. So that's mobility. And we'll talk about the mobility breakdowns on the next slide.

Power generation, and the key driver of that, as I'm sure you saw in the supporting slides, is the assumption of -- well, there are two assumptions. One is the conversion of power generation from natural gas with hydrogen, but the far bigger assumption, of course, is the assumption of capacity factor of the plans in 2045 and that goes back to saying that

we will need to do significantly more work to speak about the capacity factor 20 years from now with confidence.

It's probably fair to say that initial range that we wanted to start with is -- from where it is today, which is, if you look at the capacity factor, all the territory today, it's about thirty percent.

So we wanted to make that range covering those possible outcomes, which is ten, twenty, and thirty percent capacity factor, and that range, that broad range of power generation demand is capturing exactly that, as you can see those numbers go fairly substantially.

Again, that's not our statement about how the world is going to look like 20 years from now. We'll need to do way more work to get comfortable with this view. It's simply the range of what we believe are realistic possible outcomes.

And the last sector of the three is industrial. A large portion of the increase in the ambitious case -- and, again, there'll be a slide that will show it in more detail -- is driven by the two factors, refining, which, if you recall, I mentioned we are streaming refining conversation to clean hydrogen in the ambitious case but only that one case.

We're also looking carefully at power generation facilities in the industrial sites and making assumptions about their conversions of hydrogen as well.

So let's go to the next slide, and we're going to dig a little bit deeper into the transportation and mobility sector. The legend may be a little bit hard to read, I apologize, but the big takeaway, as you can see, is that Class 8, sleeper cabs, which is this dark blue category at the bottom, is what accounts for a very large share of demand. Not surprisingly, the second largest right after it is a classification.

So these are the results of, again, calculations, which are laid out in the appendix slides, where effect of the size of the fleet, the fuel usage, the conversion of this fleet to the clean fleet, according to the ACF, and then the make and market share assumptions on the fuel cell vehicles versus battery vehicles is what drives that.

You can see that the range of adoption is wide across the sectors. You also have the date and the appendix which specifies the ranges of those adoption assumptions, and, again, we definitely are prepared to -- not just to walk through these numbers but also to help reconcile them with some of the publicly available data.

If you recall the reports I referred to, happy to spend time to take you through these reports for those assumptions. So that's mobility.

Let's go to the next slide.

This is a very straightforward slide compared to the

previous one, because obviously there's no multisectorial breakdown here. The intent here simply was to illustrate those numbers exclusively. So this .7 -- they happened to increase by one million a year, but it is not because we simply, arithmetically added one million, significantly more involved than that.

So you can see that those numbers are growing more than three times between the conservative and the ambitious case. And not to belabor the point, but I do refer you to the slide about what we did not include in this slide, that as quite important.

Let us go to the last slide, and then maybe we can address the comments, because that may be more systematic than trying to toggle back and forth.

So I will direct your attention to the right-hand side of the slide, and these are the two sectors that I talked about. As you can see, the vast majority of incremental demand in the ambitious case comes from refineries and from cogeneration. This is all, again, bottom-up work.

As you know, there's a large amount of industrial facilities in the SoCalGas service territory. There's also several refineries. So these numbers are effectually built bottom facility by facility up, and the same is true for all three cases, of course.

You can see that in the conservative and moderate case, you do have conversion of some of the cogens -- for cogeneration facilities -- excuse me. But refining only appears in the third one, because we wanted to demonstrate the magnitude of the (inaudible).

As you can see on the chart, it doesn't quite add million tons per year, but it's something relatively close to that, that gray bar, gray layer gets it from slide .8 to just under 1.6. So it's a very significant addition, which, again, is not in the other two cases.

And what's important for the industrial, as you look at the legend, you know, I would like you to appreciate the breath of the sectors we looked at. I also would like you to appreciate what is currently not on this list, because we divided the industry sectors by top priority and lower priority just based on our assessment of potential hydrogen demand.

There's definitely a lot more work to do because, as you can appreciate, the industry is much more diverse than those sectors that are listed here. So that was our attempt to quantify demand from the, if you will, largest sectors but not to the exclusion of any others.

Let me pause here, and I would welcome questions. I think I've seen a comment in the chat, but, Chester, please --

CHESTER BRITT: Yeah. Yuri, there is a question -- if we could go back to Slide 19. One of the chats was by Matthew Taul, and he wrote, "On Slide 19, the ambitious table peaks at 5 million visually, but the callout reads 6 million. Which value is accurate?"

YURI FREEDMAN: My mistake, and I apologize for that. We're going to come back to you with this. You know, I'm inclined to say that the chart usually is what is right, but I don't want to jump the gun. Let me come back to you with this. Again, I apologize for this mistake.

CHESTER BRITT: All right. Anyone else have any questions or comments?

Tyson, you have your hand raised. Please go ahead.

TYSON SIEGELE: Hi, Yuri. Thanks for --

CHESTER BRITT: Please just announce yourself. I'm sorry, Tyson.

TYSON SIEGELE: Of course. Tyson Siegele, the Utility Consumers Action Network.

Thank you, Yuri, for the presentation. I am taking a look at each of the various pieces here, and I'll start with mobility. There is a variety of percentages that are projected for California and percentages that are projected for the U.S. in the various documents, the papers that you reference.

When you are going through there, did you take any

of those and just say, Okay, within SoCalGas territory, within California, that SoCalGas territory represents X percentage of the overall California or X percentage of the overall U.S.?

How did you use those key pieces of information that were identified in the slides that were distributed to inform the study?

YURI FREEDMAN: Yeah. I would say maybe the high-level answer, Tyson, is that the studies that were done were obviously done -- it's varies by degree of granularity. As you said, some were done for the United States, some were done for California, no one did it exactly for SoCalGas territory, that's not surprising. So there's a range.

And we were informed by the assumptions and by the conclusions of this report, obviously, the ones which were the closest to us are probably the UC Davis numbers, because, naturally, California is the -- each of those transportation studies came, I think, as close to trying to tackle these questions as one can. Obviously, a lot more work to do.

So we looked at their assumptions and compared what we assumed the range of our assumptions with theirs, and I believe we're in the same ballpark.

In other cases, we looked at the -- again, the -- conviction seems to be that the heavy-duty sector is clearly arrived for adoption of fuel cell electric vehicles. I think

if there's one common denominate, which we saw in a lot of the studies, is that. And so that gave some comfort to us in -- you know, in moving forward with our cases.

So it's been really synthesizing everything we saw and heard in the report, including in the conversations with people who wrote them and that, ultimately, informed the ranges which we present in our, again, conservative, moderate, and ambitious case.

TYSON SIEGELE: When you are taking a look at the primary factors arriving at adoption rates, you had four different high-level factors.

Can you say which area cost is the most -- is affecting the most -- I'm assuming the cost is a very high consideration within the overall study, but it wasn't listed specially as a primary factor driving adoption rates, which was surprising to me.

YURI FREEDMAN: Yeah. Maybe we can go -- I mean, we have, in the appendix, I believe the case study for the sleeper cabs, maybe that will be the easier one to address if someone can help me. I believe we have the slide in the appendix.

CHESTER BRITT: We do. Do you happen to know what slide number it is?

YURI FREEDMAN: Well, that's where the forty-plus slide deck is going to be a challenge for us. So while I'm

talking, maybe you can just find the title of the slide. I think it's called Case Study Sleeper Cabs.

I would say that for trucks in particular, I think ACF is the major, major driver because it is not, as you can appreciate, as economic as much as it mandates the zero omissions by date certain. We draw additional, I would say, comfort in making the assumptions because the nature of this demand is anchored, in many instances, in ports, as I think we all know.

And the ports, on top of their own -- on top of their own clean air action plan, have, obviously, ability to affect the change within the fleets that enter the ports. So I would say that, again, not seeing the slide that we are looking for right now in front of me, I would say that the ACF was a major, major parameter in defining that.

I would also say that -- and I think I've just seen it used very recently, that there are data points which point to the large companies placing orders for fuel cell electric vehicles. I think the latest one I saw just very recently was JB Hunt, but there are many others.

So to me, I would say it's the technology readiness, it's the, what we call, commercial readiness or the business preparedness to take the steps, and the -- but, above all, I would say it's the advanced clean fleet. That really is a very strong driver.

TYSON SIEGELE: I'm sorry. Above all was what?

YURI FREEDMAN: Sorry. The strongest driver will be the advanced clean fleet, the ACF regulation. Because, at this point, as you obviously understand, as we all do, at this point, you're not comparing the alternatives with diesel.

You're basically looking at zero omission options, and you're deciding what those zero omission options can meet your duty cycle requirements [sic], and while there's clearly a battery presence in the market, I think in the long hall, the sleeper market is -- used to be what we observed to a degree of consensus, that the fuel cell, just because of the fundamentals of energy density, is to adopt to be a solution -- technology solution of choice.

I think -- I think you may be looking for Slide 19 --

TYSON SIEGELE: There's a -- in the slides that you provided -- SoCalGas provided to the PAG before the meeting, it's Slide 15, I think, which is titled "Mobility Methodology Example." Is that it, Yuri?

YURI FREEDMAN: Yeah. Thank you. I appreciate it.

So that, by the way, goes right back to what we talked about. Again, it's very dense and full of numbers, but that's how -- that's the work and you can appreciate that ACF, as you can see here, it so happens that when you look at

the ACF, which is to say how deep a fleet has to be to fall under ACF, it happens to be exactly the third. Almost exactly the third. Sixty-seven percent, as you can see.

So that's basically -- maybe a quick illustration of what seems to be falling under that. Again, it's a small font, I apologize. And number of vehicles, obviously, is something which you can see here.

So, again, this is something which we may or may not have time to do the mathematics of it today but happy to sit down with whoever is interested and walk you through the multiplication of, you know, go from to the left to the right.

CHESTER BRITT: Yeah. And I just want to jump in, if you do have the desire to go into a deep dive with Yuri, I mean, he's made himself available, which I think is entirely gracious for anyone that needs to do that.

For the benefit of this meeting, I really want to make sure we hear from as many people as we can. I see two more hands, so we're going to go to those two more hands.

But, please, if you're on the call and you haven't made a comment or if you have any questions or thoughts, just even generally about the demand study, I would really encourage you to put your hand up and or chat something, just because we would really like to hear from anyone from the PAG as much as possible and all these different programs that

we're going through.

So I'm going to move, Tyson, from you to someone else. Again, if we run out of questions, we'll come back to you again, if you have more.

But I see someone with their hand raised with just a phone number. I can't see their name, but it starts with 949 as the area code. So if that's you, if you could unmute yourself, we should be able to hear you.

NICHOLAS CONNELL: Hey. This is Nick Connell with the Green Hydrogen Coalition. Can you hear me okay?

CHESTER BRITT: We can. Thank you so much.

NICHOLAS CONNELL: Perfect. Thank you so much, and, Yuri, thank you very much for that presentation.

I first and foremost wanted, you know, to appreciate you highlighting the power generation side. This has been a large theme as of lately, especially in California.

You know, I have two questions. The first, you know, the three-year demand study, are you taking into account some of the findings that are coming out of the SB100 modeling scenarios? I know they identified, you know, potentially up to the five gigawatts of, you know, long-duration storage or firm clean power. I was curious if those assumptions were taken into account.

And then, secondly, I see that, you know, you have the blending assumption, that thirty percent, and then

potentially by 2030, being at a hundred percent, and I was curious how that impacted your demand study and if you're reflecting a hundred percent on the onset or if you're just scaling this up by 2045.

Yeah, and thank you again for your hard work on this.

YURI FREEDMAN: No, of course. I appreciate the question.

Let me come to your second question first, and then I can come back to the first one. So we did assume, as I think you-all know, that, if you will, a standard process -- or standard process.

The preferred solution for conversion of gas powered power plants to hydrogen that is now evidenced by two data points is to start from the 30/70 blend, which is thirty percent hydrogen, seventy percent natural gas, and then move over to the one hundred percent hydrogen by mid-century by -- or earlier, when we need to accomplish our generation carbon neutrality goals.

So that is, just to confirm, that is what we assumed. The two data points I was referring to, of course, are the Intermountain Power Plant, which you-all, I'm sure, are familiar with the work being done on that front, and the second one is Scattergood, in which the discussion was, again, very recent and that's something which we believe is

important.

We are in dialog with the manufacturers and we are confirming with them that they are comfortable, not just with the thirty percent assumption but also work on the equipment which allows them to move into higher percentages to that transition.

So that may be answering the second question. And I apologize; if you could repeat the first one, I would really appreciate that.

NICHOLAS CONNELL: Yeah. Yeah. You know, that's an excellent point, Yuri, and thank you so much for that clarification.

Just a follow-up to that real fast, you know, I think you listed the 32, you know, power plants that you have. Are your assumptions basing all 32 power plants off of the wind, or are you just looking at those areas with specific load pockets for reliability?

YURI FREEDMAN: Yeah. We looked at the power plants within our service territory. That may be the simplest way to answer the question. Again, it's something which ultimately will be the result of a much, much deeper study, because it's no question that the model is right. You really need to take a forward view of the grid of the state and, frankly, of the region would look like 20 years from now. We have not done that obviously. We just looked at the plants

in our service territory. I assume certain conversions and then overlaid certain capacity factors of that.

NICHOLAS CONNELL: Okay. Perfect. Yeah, and my last question was -- my first one, just circling back to that, you know, we're ramping up the SB100, the 2025 report, and there's a good workshop last week, you know, talking about the reliability component. EDF presented, they said, you know, potentially we need up to 25 to 40 gigawatts of firm dispatchable power. The initial, you know, transmission planning identified, you know, five gigawatts of long-duration, storage.

I was just curious if you took any of those other studies or any of the other analysis into account in your demand study.

Thank you.

YURI FREEDMAN: Thank you for the question. And, you know, my maybe imperfectly phrased caveat slide, I know, made it clear that we did not want to make any assumptions about incremental generation.

I think there's a lively and very intense debate about what generation we will need and how much we will need on that. I think that, obviously, it's looked in conjunction with very ambitious plans for offshore wind.

So there's multiple variables which move around, and we have done our part within our reliability study, getting

our hands around that. But there's no question that the work that needs to be done is really deep, and we have planned to do this work.

We are intimately familiar with reliability requirements today because our gas network provides, needless to say, fuel for the plants in the critical moments when the grid is under the extreme stress.

Again, the common sense suggests that this stress will not be lessening, it may be increasing, but, you know, beyond that, we need to do the robust bottom-up work, which we will do, to come up with those numbers.

And could there be that there is a need for incremental generation? Yes. But we, obviously, if we are going to build hypothesis, we're going to build them based on as solid as a foundation as we possibly can.

NICHOLAS CONNELL: Perfect. And thank you so much for that, Yuri, and, again, I just want to echo my appreciation for all the work you guys put into this.

Thanks.

CHESTER BRITT: Thank you so much for that.

The next person that has their hand raised is Sal DiCostanzo.

SAL DICOSTANZO: Hi. Thank you, Chester, and thank you, Yuri, for your comments.

My name is Sal DiCostanzo, and I'm with ILWU Local

13. I noticed that, on your last slide, you had a lot of reference to advanced clean fleet, and rightly so, but just wanted to underscore the fact that the ports are under a tremendous amount of pressure to decarbonize, not just the indirect sources but their on-facility sources as well. In particular, cargo handling equipment.

So I just wanted to share with you, and didn't want to take up too much of the remaining time, but we have a -- with only a few pieces of demonstration projects ongoing, we already have a deficit in the amount of hydrogen that we need.

So there is certainly going to be ramping demand in a matter of months. We're working with U.S. Hybrid and with Toyota Tsusho on demonstration projects involving top handler retro fits.

We are -- one project just went back to the factory for a tweak. We're expecting it to come back shortly, and we're expecting it to be able to work two shifts and just refuel overnight.

So if that demonstration project is successful, I would imagine that it's going to ramp up very quickly amongst all of the different terminal operators. You know, without naming them, there are other rubber tire gantry cranes that are supposed to be delivered from Paceco-Mitsui to one terminal operator, and if that is successful as we suspect it

will be, that will be spreading to other terminals as well.

So there is tremendous demand that is going to be pent-up here very shortly, and we're excited about this project and we hope that it will solve many of the issues that our local communities and that the supply chain, you know, needs to have addressed.

So if you have any questions on that, I'm happy to answer what I can hear, or if you want to reach out offline, Yuri, if you have additional questions, I'm happy to do that as well. But things are happening, they're happening right right now.

YURI FREEDMAN: Thank you very much. I really appreciate the kind words, and, again, we're all going to do this together. This is not, you know, a private or public sector, it's all people working together. And so it's a big challenge, but I'm looking forward to working together on that.

And I think what I take comfort in, few areas are as well-positioned to adopt hydrogen scale as Los Angeles Metropolitan are where we have this remarkable of factors, between the ports and the transportation of the ports and further out, the ocean growing traffic. There's so much to do there, and it's all very synergistic. So definitely more work ahead.

CHESTER BRITT: All right. Yuri, we have someone

who has chatted. Sara Gersen asked you a question. "Could you clarify whether the power sector demand analysis assumed all gas-fired power plants stayed online either operating on hydrogen or on methane with CCS or whether the model allowed retirements?"

YURI FREEDMAN: So the short answer -- and I realize we may be running down on time a bit. We did not assume retirements in our model, but that is actually, again, something where the calculation, as you can appreciate, is very straightforward, and you can easily derive the number, which would correspond to whatever percentage retirements you would want to assume. The same, of course, goes to those incremental capacities, which might get built.

So, again, it is, again, we're all in this business from various angles, and calculation of the capacity multiplied by the capacity factor is a variable multiplied by the blend is a fairly straightforward blend. So I'm hoping that that answered the question.

CHESTER BRITT: Yup. And we have two more people who have raised their hands. We'll try to squeeze them in before we run out of time.

Jan Smutny-Jones, I believe, is the next person who's raised their hand; if you could unmute yourself.

JAN SMUTNY-JONES: Yeah. I represent the sector in, actually, both ends here. I do represent a number of solar

and other renewable generators who are very much interested in producing hydrogen, and I also represent some of the fleet that exists in Southern California that, basically, are reliability machines now.

They are operating -- the capacity factors -- the amount of energy they're producing is about twenty percent below its historical high because they don't operate in the middle of the day, but they're essential in terms of ramping up in the evening hours and the winter ramp is going to be pretty significant, too, as we go into more electrification.

We also are very active in battery. So I want to be clear that we represent sort of a whole portfolio of different resources.

I'm trying to get my brain around exactly what the model is doing with the existing generation fleet and what the expectations are going forward. I think in the IRP there's an estimate, I want to say it's over 20,000-- or 20 gigawatts of gas remained in the system, and it may be higher than that. I don't have the number in my brain, but it remains there.

I think the expectation of my members are -- some of them will either blend hydrogen into their mixes of the thirty percent, and there are -- I do have at least one generator who is actually looking at going to a full hydrogen model somewhere down the road.

Having said all that, I'm just trying to figure out at what point in time does -- is that -- the potential for converting the existing fleet to hydrogen, is that going to pop up in the model at all? Or what are the expectations, at the end of the day, of how you're looking at the electricity fleet?

The fact of the matter is, is that while there is carbon capture opportunities for some of that fleet, there's limitations on that geologically and geographically as well.

So just help me with this, and maybe you'll have to better educate me offline or whatever, in terms of exactly how the model is working, but it's a little confusing from the standpoint of --

YURI FREEDMAN: Yeah. Well, to cover all of this within two hours would be confusing even for someone who has spent as many years in the business as you, but you've been doing it for a while, so. Definitely happy to spend time offline and walk you through the math.

The higher-level answer is that, you know, a substantial portion of what we have been looking at, of course, is the capacity owned by Los Angeles Department of Water and Power, and I know that they are on the call.

So, clearly, for them, you know, they made the decision in Scattergood. They may make those decisions on other plans, and obviously Intermountain, even though it's

not within our service territory, but that was the, if you will, the game changer in hydrogen power generation with the way everyone is stepping up.

So we are making assumptions on conversion of some of these plants to hydrogen based on our estimates of the capital operating cost it may take, and, again, we're happy to take it through assumptions. And our assumptions are also informed by the conversations with probably all the same parties that you-all -- your members that -- we are talking to some of them.

So we're trying to make sure that we fully understand the magnitude of what is happening but not become, you know, overly aggressive in assuming that everything switches to hydrogen because that's likely not going to be the case.

And, ultimately, it also is important for us -- and I may be jumping ahead a little bit, but it's important for us -- it will be important from the standpoint because we obviously want to make sure that we can serve as many customers as we can, and for that, we need to understand their plans, their operation parameters, and everything else which goes to that. So that's a high-level answer but happy to spend more time at your convenience.

JAN SMUTNY-JONES: I appreciate it. Thank you.

CHESTER BRITT: Thank you.

Arthur Fisher, you have your hand raised. Let's go to you next. If you could unmute yourself, we should be able to hear you.

ARTHUR FISHER: Hi there. Arthur Fisher, Cal Advocates. Hi, Yuri. How is it going?

Just a general question about your three different scenarios; you have the conservative, the moderate, and the ambitious scenarios.

Do they change geographically? Does the, kind of, center of gravity, depending on which scenario you go with, change? And if so, how and what is really the driver?

YURI FREEDMAN: Yeah. Arthur, thank you. Thank you for the question.

And the answer I will give is that they likely -- our scenarios likely understate the degree to which geography will matter. The reason I'm saying that, you know, our -- think about our power scenario.

In the absence of power market modeling, which really needs to be a power and gas market modeling because the two go together and transmission on top of that, right? In the absence of that, we just put in the higher capacity factors across all the territory.

Is it reasonable assumption?

I can tell that that's not how this plants are going for -- and you know this better than me. The plants and load

pockets will be operating very differently than plants that will be outside of the congestion area.

Should we capture this?

Absolutely. Because, again, we want our project to serve the plants that matter.

Did we capture it in this first phase?

No, we did not. We've done what we could within the confines of Phase 1, just to try to put parameters around.

So how much hydrogen could be used if we run everything at X percent capacity factor?

Now that we know some parameters, the order of magnitude plot, it gives us confidence to go to the Phase 2 and actually do the in-depth understanding where and when this would be and which, of course, by the way, pulls with itself another question of how much storage and where.

You will need to make sure that that deliverably that John was referring to, that that's critical, not just capacity, but deliverablity per unit of time is going to be there, if you're going to be able to inject needed amount into that period of time.

Does that make sense?

ARTHUR FISHER: Yes, for moderate and ambitious where the power industry becomes the more dominant sector, not necessarily for the conservative where it appears that the mobility is the dominant sector, which would suggest to

me that you can at least pin down where your conservative -- your conservative geography to more -- to an extent more than your moderate or ambitious scenarios.

Simply because it sounds to me from this conversation, is that the primary driver there is going to be the ports. It's going to be decarbonization of vehicle fleets.

Am I hearing that correctly?

YURI FREEDMAN: I think you're right, Arthur. I think that's a great point, by the way, because the beautiful thing about transportation sector is there's such a reach in data.

You know, frankly, go to the database, there is -- all you want to know about transportation is practically there, and if you superimpose this with what logistic companies know about where these trucks go, it's well understood the good movement industry is massive and the patterns are well understood. They're understood.

So I think your point is excellent, and we should look closely -- and we will look closely at trying to understand what the numbers in the mobility sector tell us about geography.

I've seen some of the data here and there that basically informed me about where this container is going to go, and, obviously, need to do serious modeling. And, by the

way, again, I'm stepping slightly outside the confines of this conversation, but I'm very encouraged by the work that US Davis ITS Transportation Studies is doing, because they're asking these very questions.

Somebody needs to map out the transportation infrastructure for the state. If you're really talking about this commodity and use that scale, we need to have a vision of how it's going to look like and that work is being done there.

So great question. I, unfortunately, don't have the answers for you, but I think you're asking the right questions that we're going to work to answer them in the next phases.

ARTHUR FISHER: So -- okay. Thanks for that.

YURI FREEDMAN: Thank you.

CHESTER BRITT: All right. So I want to do a time check. It's four minutes to four. And I think -- I really appreciate other people raising their hand and asking questions. I don't know, Tyson, if your hand is still raised because you have more questions, I'm assuming it is, but, I think, for today, we're going to run out of time to go into a deeper dive of your further questions.

I would encourage you to take Yuri up on his offer to call him directly and go through the things that you want to ask because I think he graciously offered that up as an

option for you. And I think, you know, if you have deeper questions and want to get into the modeling more significantly, I would recommend doing that.

Again, this is not the last opportunity for you to weigh in on this section. We are asking you to take your time through September 25; you can see that on the screen, that is the deadline for weighing in on the technical approach and the preliminary findings for the demand study.

I'm going to now turn it over to Jill, who is going to talk about next steps, and then we'll be able to wrap up our meeting. Jill.

JILL TRACY: Thank you, Chester. Sorry about that. I just was muted. Jill Tracy, senior director with SoCalGas and Angeles Link Regulatory and Policy.

I'm going to go over a couple of next steps. Before I do so, I just want to thank everyone for your robust and active engagement and these were really great topics by Edith and Yuri during our presentation, and we do really appreciate your feedback.

To the extent that the feedback wasn't directly addressed in the chat or during the conversation, as you know, we've retained Insignia Environmental to implement a feedback tracker that will be part of our quarterly reports going forward, and so we can look forward to seeing your feedback and how it's incorporated going forward.

As Chester mentioned, comments are due on the demand study on Tuesday, September 25th. So you'll have more opportunity to provide further feedback, and also Yuri has graciously made himself available for further inquiry on this very important study.

There's a reminder to send your comments to Insignia Environmental at alp1_study_pag_feedback@insigniaenv.com. I'm also happy to announce that the gas company is going to be setting up a SharePoint site for our PAG members, which will have all of the materials.

Right now we've been communicating by e-mail, but we're sending -- for your ease of reference because there is so much content coming out for the Phase 1 study, so we're going to be setting up a SharePoint site referenced as a living library here, where it will have all the content for our quarterly meetings, our workshops, our quarterly reports as well as our 16 Phase 1 study work descriptions.

And what's going to be coming out on Tuesday, September 5th, following the holiday weekend, we'll have our technical approaches to be sent out to all of you for your review and comment as well as the work study descriptions with red lines reflecting how we've incorporated some of the feedback that we've received as part of this process. And comment periods on this study, technical approaches will close on October 13th.

We are also looking forward to seeing everybody either in person or via zoom on September 28th at the Energy Resource Center in Downey meeting. Save the dates have gone out. Agendas are being finalized, and we'll be sending out further materials with a goal of two weeks before the 28th to get those materials out.

And then, also, please note that our final quarterly meeting is going to be held the week of December 11th. And so a save the date will be going out shortly for that information as well.

I'll pause there to see if anybody has any questions.

Okay. Hearing none, I'll turn it back over to Chester. Thank you

CHESTER BRITT: Yeah. So thank you, Jill. So I want to reiterate, I really feel like today's conversation was a good one. I feel like you guys were engaged in asking really significant questions that Yuri was able to answer, in a lot of cases, and gave valuable feedback. I just want to reiterate that's the point of these meetings, right?

I mean, we have said from the very beginning that we want to make this an inclusive process where we're giving you information as we go through the process, and we're collecting impact back from you as we go through the process.

So, again, these are not one and dones; these are

going to be iterative series of meetings. You heard Jill mention we have our quarterly meeting in September. We'll have more workshops in October. We'll have another quarterly meeting in December, and you'll be hearing from us on a regular basis.

We'll be putting stuff in the living library. You'll have access to all of that. We're giving you deadlines when we need comments on different sections so that you have the opportunity to do that.

And you are always welcome to reach out to us via e-mail or phone calls or any other method that you see fit to reach out to us in between meetings so that we can hear from you.

So, again, thank you so much for your attendance today, and that really concludes our meeting for today, and I appreciate all of your time and hope you guys have a great day.

(Meeting adjourned.)

CERTIFICATE

OF

CERTIFIED SHORTHAND REPORTER

* * * *

I, Katherine Thomas, Certified Shorthand Reporter, do hereby certify:

That the foregoing audio file was transcribed stenographically by me as set forth herein, said transcription being a true and correct copy of the proceedings thereof to the best of my ability.

In witness whereof, I have hereunto subscribed my name.

Katherine Thomas

DATED: September 15, 2023.

Katherine Thomas

CSR No. 14378

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REGAL
COURT REPORTING

In the Matter Of:

SO CAL GAS

PLANNING ADVISORY GROUP QUARTELY MEETING 3

September 28, 2023

Case No:

Angeles Link

Planning Advisory Group

Quarterly Meeting #3

September 28, 2023

9:00 a.m. - 12:00 p.m.

Transcribed by:

Katherine Thomas, CSR No. 14378

ATTENDEES

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Darrell Johnson
Theo Caretto
Maryam Brown
Charlie Wilson
Mike Galvin
Karla Sanchez
Vince Wiraatmadja

Angeles Link

Planning Advisory Group

Quarterly Meeting #3

September 28, 2023

9:00 a.m.

CHESTER BRITT: All right. Thank you for joining us online. We are just getting situated here in our room, and if you could just bear with us for a brief moment, we'll get started in just a moment.

Thank you so much.

All right. I think we're all situated.

I want to welcome everyone to the Angeles Link Planning Advisory Group. This is our third quarterly meeting. It's good to see everyone again, in person, and I know we have a lot of people online as well.

We're going to go ahead and get started. Let me just introduce myself. My name is Chester Britt; I'm the executive vice president with Arellano Associates, and I'm the facilitator of the PAG.

I also have with me today, Alma Marquez, who is the vice president of government relations with Lee Andrews Group. She is the CBUSG lead. We had our CBUSG meeting a couple days ago, and it went really well. And so we're

excited to meet with you today and cover some of that same ground that we covered with the CBUSG.

A couple housekeeping items. This meeting is being recorded, as is our usual practice. Both the video and the audio. We do have a court reporter who will be transcribing the meeting.

We would ask you, if you're speaking, to please announce yourself, your name and organization. That helps, really, with the court reporter documenting and transcribing the meeting and when we review it later, who is speaking.

The Zoom microphones are muted by the host, which is us. So we'll be eliminating any background noise. You will need to unmute your microphone when you are called on to speak; for both in-person and online participants, please speak directly into the microphone. It is hard to hear, sometimes in the room, if the people online are not speaking into their microphone and same for them.

So we have microphones scattered around the room, and when it's your turn to speak, you can just turn them on quickly and speak and then speak directly into the microphone.

We would encourage you to turn your cameras on so we can better engage with you. This is a hybrid meeting, so we do have people online, and it is nice to see your faces when you're speaking. So, please, we would encourage you to do

that.

You can also use the Zoom chat to provide input and ask questions throughout the meeting. So you're not required to speak. You can chat, and we will be documenting all that information, as you provide that.

If you would like to speak, you would need to raise your hand; that's a feature at the bottom of Zoom. Just click on that button; we'll see that you've raised your hand, and then, as our custom is, we'll go through the people that have raised their hand and ask you to unmute your microphone so you can speak.

The wireless microphones will be passed around to those, as I mentioned, they're already scattered around. So we won't actually need to pass them around.

Our agenda today is a full agenda. We had some time this morning with the continental breakfast, we appreciate that, and a little networking. We'll have a land acknowledgement and safety message, and then we'll also get into some SoCalGas opening remarks. We are fortunate to have Maryam Brown, the president of SoCalGas, here with us, and she'll be making some opening remarks.

We'll cover some decorum policy. We'll go into the project options and alternatives. We'll then transition to high-level economic and cost-effectiveness technical approach, and then we'll have a break, and we'll end our

section by talking about NOx and GHG. And following each of those technical presentations will be member discussions, and then we'll close out our meeting by talking about the schedule and the next steps coming up through our process.

So with that, I'm going to turn it over now to Alma, to do a land acknowledgement, and then we'll do our safety message and then our roll call.

ALMA MARQUEZ: Good morning, everyone.

Respectfully acknowledged the indigenous people on whose ancestral land we gather of the diverse and vibrant communities of Tongva, Tataviam, Serrano, Kiowa, Chumash people who, for generations, have cared for these lands and make their homes here today.

We honor and pay our deepest respect to their elders and descendants, past, present, and emerging. As they continue their enduring stewardship of these lands and waters for generations to come, we acknowledge our collective responsibility and commitment to elevating the stories, culture, and community of the original caretakers of this region and are grateful for the opportunity to live and work on these ancestral lands.

We celebrate the resilience, strength, and unwavering spirit of indigenous people and are dedicated to creating collective, accountable, and respective relationships with indigenous nations and local tribal

governments. Thank you.

CHESTER BRITT: All right. Emily, I think you're doing our safety message.

EMILY GRANT: Thank you, Chester.

Good morning, everybody. So for our brief safety message today, I try to keep these kind of seasonal or topical, and right now I find myself driving into the sun a lot during my commutes, and it's, no pun intended, driving me a little batty.

So some safety tips for that, use your sun visor, leave more following room, and drive a little bit slower, if you need to, keep your windshield clean and free of cracks. This one kind of got some -- a laugh on Tuesday, but don't store items on your dashboard.

And I shared that my grandpa used to do that; he would make turns, and, like, I would watch a bunch of papers and file folders fly from one side of the dashboard to the other. So if anyone is still doing that, maybe not a good idea.

Use the reflective lane markings to guide you, consider larger investments, if possible, like polarized sunglasses or window tinting, and, lastly, pull over, wait five minutes. Those five minutes when the sun is moving and might be somewhere else could go a long way in keeping you safe.

Thank you.

CHESTER BRITT: All right. Thank you.

We're going to now do roll call, so we'll just start with Emily, who just introduced herself, and we'll work our way around the table. Again, you have the microphones so we don't have to pass them all the way around. But if you could just introduce yourself briefly and your organization and then we'll go to online participants after that.

EMILY GRANT: Emily Grant, Public Affairs with Angeles Link.

ALMA MARQUEZ: Alma Marquez, Vice President of Lee Andrews Group.

JILL TRACY: Good morning. Jill Tracy, Senior Director, Angeles Link.

EDITH MORENO: Hi. Good morning, everyone. Edith Moreno, Regulatory Strategy and Policy Manager on Angeles Link.

AMY KITSON: Good morning. Amy Kitson, Director of Angeles Link Engineering and Technology.

KATRINA REGAN: Hi. Good morning. Katrina Regan, Engineering and Technology Development Manager for Angeles Link.

ERIC HOFMANN: Hi. Good morning. Eric Hofmann, SoCalGas and Robin's nephew.

ROBIN DOWNS: Eric's uncle. UWUA 43.

ERNEST SHAW: What's up, everybody? Good morning. Ernie Shaw, President of 483 Transmission and Storage. Good to see you.

NICK CONNELL: Nick Connell, Interim Executive Director with the Green Hydrogen Coalition.

KATRINA FRITZ: Katrina Fritz, Executive Director of the California Hydrogen Business Council.

MICHAEL COLVIN: Good morning, everyone. Michael Colvin with Environmental Defense Funding.

MARYBEL BATJER: Hi. Good morning. I'm Marybel Batjer, California Strategies, Formerly President of the CPVC. Thank you.

NEIL NAVIN: Good morning. Neil Navin, SoCalGas Chief Clean Fuels Officer.

MARYAM BROWN: Maryam Brown, President of SoCalGas.

DARRELL JOHNSON: Darrell Johnson, Environmental Services Manager.

YURI FREEDMAN: Yuri Freedman, Senior Director, Clean Energy Innovations, SoCalGas.

CHESTER BRITT: All right. Now we're going to go to folks online. I see Tyson Siegele. If you could unmute yourself and introduce.

TYSON SIEGELE: Hello. My name is Tyson Siegele, with, today, representing the Utility Consumers' Action

Network.

CHESTER BRITT: Good to hear your voice, Tyson.

Theo Caretto.

THEO CARETTO: Hey. Good morning, everyone. This is Theo Caretto with Communities For a Better Environment.

CHESTER BRITT: All right. Sarah -- it looks like Wiltfong

SARAH WILTFONG: That's correct. Sarah Wiltfong with the Los Angeles County Business Federation. Thank you.

CHESTER BRITT: Thank you. Joon Hun Seong.

JOON HUN SEONG: Hi. Oh, camera. Hi. Joon Hun Seong, S-e-o-n-g, with Environmental Defense Fund.

CHESTER BRITT: All right. Julie Roshala.

JULIE ROSHALA: Good morning. Julie Roshala with Insignia Environmental.

CHESTER BRITT: Katherine Thomas.

KATHERINE THOMAS: Good morning. I'm the court reporter for today.

CHESTER BRITT: Okay. I wasn't sure your name.

Sam Cao.

SAM CAO: Hello. This is Sam Cao from the South Coast Air Quality Management District.

CHESTER BRITT: All right. Pete Budden.

PETE BUDDEN: Good morning. This is Pete Budden with the Natural Resources Defense Council.

CHESTER BRITT: All right. Thank you. BJ Atovin.

Okay. Thanks for joining. It looks like Katherine -- we already did her. I think Christopher Arroyo.

CHRISTOPHER ARROYO: Good morning. I'm Christopher Arroyo. I'm the hydrogen analyst working at the CPC.

CHESTER BRITT: I think that's everyone that I have listed. If I missed anyone, please raise your hand, and I can see that you've raised your hand and then we can introduce you.

Okay. We have someone in the room who's just joined.

VINCE WIRAATMADJA: Sorry for being late. Vince Wiraatmadja with Air Products.

CHESTER BRITT: All right. Matt, it looks like you're next online.

MATTHEW TAUL: Hi there. Matthew Taul, Senior Engineer with Cal Advocates.

CHESTER BRITT: Welcome. And then Charlie Wilson.

CHARLIE WILSON: Charlie Wilson, Executive Director Southern California Water Coalition.

CHESTER BRITT: Great. And I think that pretty much covers everyone. So, again, it's good to see everyone again and be together. I'm going to just close that participation screen, and then we'll keep going on our presentation here.

Again, I mentioned earlier that we are fortunate

today to have Maryam Brown, the president of SoCalGas here, to do some welcoming remarks. And so I'm going to turn it over to her and look forward to her presentation.

MARYAM BROWN: Thanks very much. I'm checking to see if this works. Yeah. Thanks very much, Chester. I appreciate the opportunity to have a few minutes with the PAG.

I'm going to start with a very sincere thank you to all of you who have dedicated your time to be here today. Those of you who have come and journeyed in person as well as many of you who are online with us virtually. I think that it is a testament to a commitment to this conversation. And know that SoCalGas shares that commitment to this conversation.

I think you should also know that there is an interest, significant growing interest at a national level on Angeles Link, and I think that part of that interest is driven by how provocative this proposal is. It is provocative that a gas utility would be proposing to displace 25 percent of its traditional natural gas system.

And another area where there's a significant and growing conversation is about this engagement with this PAG, both its structure and -- its structure and even its existence, because it is increasingly being seen as a blueprint for constructive engagement.

And one thing that I talk to my team about, and I appreciate being able to put a fine point on it with all of you is, as important as Angeles Link is for what it has the potential to do, to lower greenhouse gas omissions and to lower NOx omissions and make a significant impact on jobs and increasing jobs, I think just as much is the hallmark that Angeles Link is on constructive engagement.

And when I talk about engagement, it is not just engagement with the intent to listen. Engagement when we're talking about Angeles Link and the work of this PAG is a synonym for engagement with the intent to collaborate.

And I know thus far a lot of our collaboration has been focused on process, and I think that that piece is really important, that we've had good conversations about these meetings and their frequency and the materials that support these meetings and the timing of those materials and the transparency of the feedback that we get with the engagement and the dialogue that we're having here.

And I know that some may marginalize process, but I want you know that I do not. I think that when you have meetings of large and diverse groups, having an agreement on rules of engagement is absolutely essential to the outcomes that you're looking to get from that process.

And I think the only way that you can get that -- people buying into the rules of engagement, is if they know

that their voice is going to be heard, and I think that those voices are being heard. And I see it in a number of substantive ways in the scopes of work and, you know, just some examples that I want to mention -- and I appreciate, Darrell Johnson, you being here because some of these improvements are in the studies that you and your team are overseeing.

But I appreciate the feedback from South Cost Air Quality Management District as well as Environmental Defense Fund on the NOx study that we're expanding to look at other pollutants, right. I appreciate very much that, as we look at the environment justice issues, which are so important to the analysis of Angeles Link, that we are looking at the health benefits and impacts of an initiative like this.

And, also, I would say to my labor friends that are here, the work that we're doing to improve the workforce analysis to get granular about the real workforce needs as an initiative like this moves forward is really important.

I've very excited about the conversation on the different feasibility analysis workstreams that are taking place today. Particularly, the alternative study. I think as we march forward on this, it is so important that we don't have blinders on and that even if hands are stacked on the purpose and need for an initiative like this, we must be looking for alternatives that can help meet that purpose and

need.

So I'm looking forward to that robust conversation. I think that this dialog has sharpened all of us. I thank you for your time and focus on it.

And with that, I will turn it back to Chester. Thanks very much for today.

CHESTER BRITT: Thank you very much, Maryam.

I'm going to just kick us off today by just talking a little bit about the decorum policy. It's a little bit of a review. You know, when we started the PAG earlier this year, we developed a set of guiding principles for both how the CBOSG and the PAG would function and operate, and, for the most part, I want to thank everyone for really following those guidelines.

I think we've been able to have some very productive meetings and very robust conversations in those meetings that have covered a lot of information and a lot of topics. As you heard, we had 16 work-study streams, and, you know, we had some long meetings in July that were, I think, four to six hours each and we had four of those in a row.

And, again, I really appreciate your guys' participation and willingness to sit in those meetings and have a very productive dialog. But as we start now to get into further detailed discussions, because we're now going to start getting into the technical approaches, we're going to

start looking at preliminary findings, you know, and then we're going to end up with draft reports.

And as we get into that, those details, and essentially get into the weeds of those studies, you know, the potential is that there could be disagreement or misunderstanding of some of the information or people don't necessarily see it the same way.

And I just want to remind us, as a group, that for these meetings to be productive, we really want you to communicate openly and directly but to be courteous and listen attentively and respectful of other points of view, because, you know, we intentionally put these groups together to have diverse opinions. You know, it was not designed to be a homogenous group.

It was designed to have diversity of opinion and thought from different sectors of the community and different sectors of the industries that represent the hydrogen issue that we're focused on on Angeles Link.

We also ask that you participate fully in the group exchange. You know, again, if you've been in these meetings and you haven't had a lot to say, we would encourage you to have a point of view, to say what it is that you think would represent your organization and their point of view on this message -- messaging that we're giving you. And we would ask that you limit any cross-talk or sideline discussions while

we're having our meetings.

And then, finally, refrain from any form of personal attacks and use of profanity. I, as the facilitator, I've been very -- it's been very nice to have you guys really follow the guidelines and be respectful. It makes my job easier, and I appreciate that.

And I know there's a lot of strong opinions, and that's what want to hear, but we do appreciate your guys' respect in going through the process together. So with that, I'm going to now transition to introducing Yuri Freedman. He's the senior director of business development.

Yuri is going to be making a presentation -- or, actually, a series of presentations on the Phase 1 project options and alternatives as well as the high-level economics and cost-effectiveness studies.

And so with that, I'll turn it over to Yuri.

YURI FREEDMAN: Thank you, Chester, and, again, good morning, everybody.

I will go over, as Chester mentioned, two studies. The first one is titled "The Project Options and Alternatives." And today, we're going to review technical approach for the study. The first slide on the screen right now lays out the key steps in the process; there are six steps.

We start from, maybe, the obvious one where we're

going to identify these alternatives. We did want to highlight that we are also going to have, among those, the localized hub, which is something which we were told to investigate, which we will investigate, by the commission.

It's something which is ultimately looking at production of hydrogen in a relative proximity to its demand, and we're going to look at that among other options. Having those alternatives, we're going to evaluate them against criteria. The criteria is on the next slide, so bear with me; I will go through them. There are four of them, and I'll go through them in a fair amount of detail.

Effectively, these four alternatives together will serve as a screen for options that are going to meet this criteria or not. And the alternatives that meet this criteria will be carried forward for a fairly robust analysis and for just better understanding of their feasibility and the potential fatal flaws in this process.

That leads us to step 5, where this study is going to connect with the cost-effectiveness study. Ultimately, the parameters of the assets which will constitute the solutions, their capital costs, their operating costs, their cost components will be fed, if you will, will [sic] serve as inputs in the cost-effectiveness study.

They will also serve as inputs into other studies, again, which are outside the scope of this particular set of

slides. It's the Environmental and Social Justice study.

And last step, of course, is where we're going to bring it all together and assess the fit of this alternative with the purpose and need of the project.

What's important, and you'll see this at the bottom of the slide, is that we are soliciting PAG and CDL feedback at four points through this process. First already happened; that was study description. Today, this is the second step in the process where we're discussing and soliciting feedback on technical approach. That will be followed by us presenting the data and preliminary outputs. And the last one will be the draft report.

Now, recall step 2, which I -- which includes the four, if you will, criteria that together form the filter for preliminary screening. These four criteria, from left to right, are the policy criteria, compatibility with the state policy, which is to say whether or not the alternative, as proposed, aligns with California's clean energy and environmental policy and goals.

The next filter is technology feasibility, and the important element of it is not just whether or not it's technical and feasible to execute an alternative, but does it have enough scale to meet end-use demand. Because as you recall from the previous conversations, demand for hydrogen, for clean hydrogen appears to be substantial and we want to

be sure that solutions that we bring to the table have the scalability and necessary to enable that demand, to ultimately contribute to meeting state's goal.

The third filter is, of course, very important; it's the customer; it's the end-user requirements. Does the alternative that's presented support the end use, be transportation, be power generation, or the broad range of industrial uses. That obviously needs to be established in order for the alternative to be viable.

And the last but really important -- and I know that a lot of us have spent the last several months focusing on this topic, and I'm thinking about, of course, Environmental Defense Fund and others -- their liability and resiliency has become the topic of major importance.

There are papers being published; there's modeling being done. I think we as a state are now fully alerted to the need to analyze and establish and reach that reliability and resiliency, especially in the context of the state.

So that's something which we're going to look at very carefully; does it or does it not support or reliability and resillancy. These are the four permanents.

Now let us talk about the alternatives. They fall into the three tiers. The first tier, the most intuitively, paraphs immediately obvious, is the alterative for routes and configurations, where a pipeline to Los Angeles is going to

be needed to establish its optimal route, which is function of supply, which is function of feasibility of constructing a pipeline, and several other factors.

We also need to establish what are the storage requirements for the pipeline, which ultimately is -- which ultimately is the function of nature of demand as it grows over time by the end-use customers and that demand will be different in its nature between power generation, of course, and industrial and transportation.

So that's something which storage and other permanentes need to accommodate and related to that, of course, is the compression. Compressor stations, their location, and their size are ultimately a function of the service that the pipeline needs to deliver to the customers, which, of course, is always a function of what service they need.

So that's something which is going to result in several alternatives of routes and configurations. I know I mentioned before localized hub. I won't belabor the point, other than just to say that it is important for us to design the system that is going to address demand that will grow over time; as we all know, demand for clean hydrogen is going to go from currently relative low levels to significantly high levels over time, and we need to find that optimum, if you will, where we may need to build the whole system as we

will need it in 2050 in one step.

But we will short change ourselves, and we'll compromise the effectiveness and cost, if we're going to build system so small, that once we finish building this, you'll, figuratively speaking, have to start the second one. So localized hub is the alternative which we're going to explore. Having -- I see the question, Michael.

MICHAEL COLVIN: Hi. Sorry for the interruption, Yuri, but just before you move off of this --

CHESTER BRITT: Can you just introduce your name and organization.

MICHAEL COLVIN: Of course. I apologize.

Michael Colvin with Environmental Defense Fund. On your first column here, when you're talking about the localized hydrogen hub and then the alternative routes, does that include the in-state versus out of state production of the hydrogen?

You know, there's localized hubs here in the basin, but the initial proposal had several different longer pathways that wouldn't be a localized hub. So I'm curious how much variance there is in that alternative route; what are you thinking about for that?

YURI FREEDMAN: Yeah. I would say, Michael -- that's a great question, and it goes to the heart of what a localized hub is, which I think is going to be, to some

degree, the result of analysis, if possible. Quite simply, how much hydrogen can we produce really, really, really close to Los Angeles.

There's probably some production potential; it is probably not a lot, but there's some, and it's probably more expensive, because, among other reasons, land is more expensive. So, effectively, that shortens the need for a pipe, but it does limit what you can do.

As you go further out, make next step, let's say, 20, 50 miles, the spectrum of options increases, cost somewhat drops, size somewhat increases, need for pipeline does increase.

So this is push-and-pull, is what we're going to analyze. I think it's reasonable to say that localized hub in its nature is going to be an intrastate; as, by the way, the Angeles Link itself, we envision this as an intrastate pipeline. Will it connect eventually upon a full build-out with other states?

I think it's reasonable to expect that that's what the federal government wants to see. They want to see hydrogen hubs and their elements eventually connecting to nationwide system, but that's longer term version, and, in that context, no secret.

Just like renewables from many other states want to get to California, I think it's reasonable to expect so will

hydrogen. For now, I will say that we're looking at this on a strictly intrastate basis.

I'm hoping that answers the question but happy to go into more detail.

MICHAEL COLVIN: Michael Colvin again with EDF. I don't want to knock you off your presentation, so why don't we get through the rest of the slides, and then I'll come back when we have the full --

YURI FREEDMAN: I appreciate it. Thank you, Michael.

So after we talked about, a little bit here, the alternatives of pipelines, the next category, of course, is the macro alternatives to hydrogen, per se, which is the question: Do we need hydrogen, or can we solve a problem or a need by range of options, beginning from direct electrification, which, of course, has been implemented at scale for a number of years now, accomplished tremendous success in reducing the costs of renewable generation.

Of course, energy efficiency is a very powerful lever, and it is included into many of the planning documents of the state. The alternative to hydrogen may be the use of fuels that emit CO2 but would evacuation of this CO2, that's carbon management or carbon capture and sequestration or equalization, and, of course, another one is renewable natural gas, biomethane, where we are using this avoiding

leakage of biomethane to the atmosphere, and by that, of course, having not just net but negative greenhouse gas effect.

So we're going to look at these alternatives in terms of their feasibility, their ability to address the need for the project, again, recall the need; we're talking about this transportation with a focus on heavy duty power generation and industrial use. So we're going to screen these alternatives against these use cases, as we call them.

And the third category is if hydrogen is a preferred solution, if this molecule is best able to do the job, then the question is how do we deliver it from the production sources to the demand, and there's a range of options.

Of course, today, hydrogen, by and large, is delivered to hydrogen refueling stations by trucks. Trucking is an option, whether it's compressed and liquefied. The train is another consideration, rail. There's a lot of conversations about marine transportation options and permutations of thereof.

So these are alternatives which we're going to examine. These are the tiers of alternatives; again, beginning from the pipeline options, going to the macro-level alternatives, and then how to deliver them.

Let's go to the next slide. Again, the first one breaks it down a little bit in more detail. I know we

touched upon this a lot. I think, again, what's important here is that this is going to be fairly involved work, relative to the pipeline routes, because we want to be sure that what we are planning is going to be, as we call it, constructible.

So, ultimately, this is for the stage where maps, where the understanding of the challenge associated with putting a pipeline through various terrain are going to come into play; that's fairly detailed work with regards to these alternatives, as you could expect. It's also some modeling of the, what we call hydraulics, which is to say flows, and that's where the location and the capacity, the power of compressor stations comes into play.

Next slide, please.

I know we talked about the range of options here. What I would say is that this is going to include -- maybe we should talk about electrification.

We're going to go significantly more granular than just talking about electrification transportation, because I think, as I'm sure many of you know, the answers to the questions about the feet of electrification are going to vary a lot by the sector, by the type of vehicle, and by the duty cycle, as we call it, and by the type of travel that they execute, whether it's return to base or whether it's travel along the long arteries. All of this is going to matter a

lot.

We're going to draw a fair amount of data. Fortunately, the data is widely available; the state agencies have been complying a lot of data on goods movement. And so that's gives us ample opportunity to understand how goods movement occurs today.

And, obviously, the future may be different from the past, but the patterns that we observe today are going to give us foundation to go in the future, with changes of technology of this transportation, but routes itself may or may not.

Let's go to the next slide, please.

This is the hydrogen delivery. What's important thinking about that one, this is going to evolve over time. So we're not looking at this as a static solution. We appreciate today, when volumes of clean hydrogen are modest, trucking may be an optimal approach to distributing it. And we think there may be an option for -- a need for trucking, even in the future, because there may or may not be a location -- there may be some locations that are not accessible by pipeline.

I think what is also known is that the lowest cost, ultimately, transportation mechanism for air molecule of gas is a pipeline; that's why natural gas pipelines are put in place several decades ago. We expect something similar to

play out now. Going back to the objective for federal government; ultimately, if hydrogen hubs -- which are going to be awarded, hopefully, quite soon -- are going to successfully develop, these hubs will want to connect. Hydrogen will want to go from the location of low value to the location of high value, as does any other molecule.

And that's what ultimately develop on top of infrastructure which connects those hubs, and that's where the pipelines are going to be, in our view, necessary because that's the way to connect those locations -- multiple locations of supply and demand, most effectively.

But, again, we're talking about the, frankly, new commodity market, and, clearly, it will take time for it to emerge. So that's just, really, one way of saying, perhaps, that there's a mix of solution of delivery and that mix will likely stay with us in the future, although the share of various solutions in the mix will change.

Let's go to the next slide, please.

And bringing this all together, ultimately, as you remember, the very end of the process that I had laid out on the first slide, we're going to compare our alternatives to the purpose and need of the project.

And, of course, the most important need of the project is to support the state in its decarbonization goals, importantly including mobility sector, which, as you-all

know, accounts for a very large share of omissions. Also, for a very large share of air quality impact.

It needs to optimize service to all potential end users. That's an important element because, like any other molecule, it can reach -- hydrogen molecule can reach multiple end users, and it needs to be optimum accessible for all of them. I mentioned air quality; I think that that's maybe the single most important element that we should keep in mind, along with the greenhouse gas.

If you think about the local impact of the project, because that project has a potential to tangibly improve quality of life of people -- many people at scale; that is a very, very important opportunity.

I touched upon the resiancy. I think that this word is going to stay with us, frankly, at the national level, at the state level for decades. I don't think it's the word of the year. I think we're going to live in this world for many years, and, frankly, as a share of intermittency in power generation grows, we're going to need more resiliency, rather than less. It's really important.

Of course, energy storage is why we -- is one of the solutions of that, and there are various forms of it. But, again, hydrogen serves as a very effective and scalable energy storage solution. What project needs to do is to provide open access; that is really important, and that goes

back to how to make sure that consumers and customers have the most benefit from the project.

And they get the most benefit by the structure which allows all of them access to a pipeline on a nondiscriminatory basis, which ultimately guarantees that producers will compete and compete fairly. And, as we all know, competition brings benefits to consumers. So open access infrastructure is really important for that.

Safety and efficiency is, of course, what needs to be an uncompromised attribute to this project. And last but not least, this project is going to help produce natural gas use served by the Aliso Canyon Facility today.

Let me stop here before we go into the cost-effectiveness study and pause, turn it back to Chester.

CHESTER BRITT: Thank you, Yuri. Before we get into any comments or questions, I think we had a couple people join us. So I want to give them the opportunity to introduce themselves.

Mike, I think you were one of them. If we could pass the microphone, someone. And then if anyone online has joined us as well, please raise your hand, and we'll give you an opportunity to introduce yourself as well.

MIKE GALVIN: Hello. Mike Galvin. I'm with the Port of Los Angeles and responsible for the energy business at the port, including hydrogen.

CHESTER BRITT: Thanks for joining us.

And let me see if there's anyone online. I don't think we have anyone else who has raised their hand.

Okay. So we're going to -- actually, there is. Looks like Karla, if you could unmute yourself.

There you go.

KARLA SANCHEZ: Sorry about that. I was having a hard time. This is Karla Sanchez with the Harbor Trucking Association. Good morning.

CHESTER BRITT: Yeah, good morning. Thank you for joining us.

KARLA SANCHEZ: Thank you.

CHESTER BRITT: Anyone else?

So just, again, we're going to take an opportunity now to have a conversation about Yuri's presentation. We would just ask that you stay on topic, obviously, and focus any of your comments and questions about the presentation.

In Yuri's presentation, he outlines the approach for evaluating alteratives, including hydrogen pipeline alternatives and nonhydrogen alternatives, also including hydrogen delivery alternatives.

What do you think about the defined screening and evaluation criteria that he presented? And I'm going to go back to that slide. I think it was this slide that had the four screening criteria.

I was just looking for people's input on the screening criteria because this is part of the technical approach.

Does anyone have any thoughts on these?

Yes, please.

MICHAEL COLVIN: Michael Colvin, again, with the Environmental Defense Fund. I was trying not to be first.

CHESTER BRITT: That's okay. We always need someone to be first.

MICHAEL COLVIN: Yeah. The -- from a technical perspective, I understand, Yuri, why you've picked these; I think they're good broad categories, and I think there's a lot that can go underneath each of them.

I would encourage, at the end of technical feasibility, that there's going to need to be two additional screens. The first one would need to be overall cost effectiveness or affordability. I think that's probably implied in some of these, but I think we need to make it very explicit.

And, second, and I think this is implied within compatibility of state policy, but I think we need to be explicit, is overall omissions impact of the project. And what is the best bang for the buck for each option and each alternative that's out there.

It might not be a technical issue, but I think it

should be a screening issue that we go through. So I recognize we could do it here or -- and bake it into this or we could do -- go through this process and then evaluate the things that are technically feasible against those two screens. I think there's pros and cons either way, but I just want to make certain we don't lose sight of them.

YURI FREEDMAN: Great comment, Michael. Thank you. And I think we'll do that. I think the nuance that I want to bring up back again are the six steps. And if an alternative does not meet the four criteria, if it cannot physically perform it, then we're not going to try to put numbers together just for the sake of putting numbers together.

But I think for all alternatives that are physically able to do what the project aims to do, I think it's absolutely critical. And, frankly, the next slide, of course, will talk about cost-effectiveness. But I completely agree; it needs to be explicit.

Two parameters that matter are how much -- frankly, one parameter that matters is how much it costs per unit of commodity, and then the question which is stapled to that, is what is the cost of abatement, of course.

Thank you.

MICHAEL COLVIN: And, Chester, if you go back, actually, to that slide, I think the comment that I was acknowledging is going to be carried in in step 5 of that, of

that list. I think we should just say both "cost-effectiveness" but also affordability. Those are not necessarily interchangeable. And when we say "environmental," you know, we should just say "omissions" very explicitly, because there's a lot of things that fall under CEQA; omissions, I think, needs to be its own. That's what I was really trying to react to.

CHESTER BRITT: All right. Thank you for your input. Anyone else have any thoughts or comments?

All right. I'm going to go to some of the people online that have raised their hand. I think I see, Tyson, you've raised your hand, if you can unmute yourself.

TYSON SIEGELE: Hello. Thank you, Chester. My name is Tyson Siegele. I am, today, representing the Utility Consumers' Action Network.

I think that the point that Michael made on cost-effectiveness is really important. One of the concerns that I had when taking a look at what we're talking about right now is cost-effectiveness and how is that defined and how are we taking a look at, for instance, the demand for hydrogen to begin with. Because if you don't have the demand right, then you're going to be taking a look at alternatives that aren't looking at the right demand either.

And so I think that that cost-effectiveness criteria is something that was missing from the demand study that is

really important. And I want to acknowledge and thank Yuri for the additional meeting that he was willing to take with myself as well as a representative from Cal Advocates and talk a little bit more about the demand study.

One of the issues that came up is that the cost of fuel, either electricity for battery electric vehicles, hydrogen for fuel cell electric vehicles, or traditional fossil fuel vehicles. The fuel cost was not included when taking a look at that demand, and when we're taking a look at, you know, each one of these pieces of the overall 16 studies, cost is going to be a really big issue that we need to address. So that is No. 1.

No. 2 is, we really need to have all of the data when we're taking a look at these particular issues. One of the things that I followed up with with Yuri and his team about after the meeting was, you know, I provided a list of additional data that -- it would be great for PAG members to have in order to provide the best feedback to SoCalGas, provide the most pertinent remarks to improving the study, improving the demand study as well as improving things like this, the alternative study.

And so the list of needed data, really, to analyze not just the demand but also the alternatives, we need to have the computer modeling that shows what SoCalGas is calculating, because without that, we're sort of in the dark.

In addition to that, we need to have the basis for the assumptions. We need to have the basis for the inputs and assumptions. If we don't have a basis for that, then we're not going to be able to, again, meet SoCalGas in a way that is going to be most helpful to looking at the demand for hydrogen, looking at the alternatives for the Angeles Link.

We need to have interviews. The interviews that are being conducted, you know, many different slides list interviews as the basis for some of these inputs and assumptions, and without those interviews, we have no idea what, again, SoCalGas is basing its studies off of.

So those are some of the pieces that we really need in order to be able to respond most effectively. And so I'm hoping that those things are in the works, that they're on the way.

Prior to taking a look at alternatives, prior to taking a look at, you know, other things that we're going to be discussing today, like omissions, we really need to have a reliability demand study. And if we don't do that, we're putting the cart in front of the horse. We're not doing things in the right order. We need to have the demand in some sort of reliable way.

I submitted comments and copied the service list for the Angeles Link on them on the 25th, the day that you-all asked for comments on the demand study, and one of the things

that I put in there is, I don't see -- I don't see how SoCalGas reached the demand that it reached.

In just my back-of-the-envelope estimates, I can't figure out how that demand was reached. It looks like the demand that SoCalGas is estimating is at least ten times more than what future hydrogen demand will be, and, I mean, that's at least.

And so, again, if we are taking a look at a demand study that's ten times too high, and then we're trying to figure out what alternatives would be feasible to meeting that hydrogen demand, we're going to be looking at the wrong alternatives.

And so those are some, you know, very high-level requests, high-level comments. Hopefully, we'll be able to get some of that information.

Thank you so much.

CHESTER BRITT: Thanks, Tyson.

So, Yuri, he covered a lot of ground. He talked about cost, which I know you're about to make a presentation on the cost component, so I don't know if we want to jump right into your other presentation. But what about the idea of demand as it relates to the alternatives?

YURI FREEDMAN: There's definitely a lot of ground to cover, and even though the demand discussion is technically outside the scope of this conversation, I'll make

a couple of comments here.

First, Tyson, we are developing the response to your latest set of questions, which I'm hoping is going to go a very long way to warrant helping you understand how the numbers result in what we present, and, no, we did not add an extra zero to it, but we are going to get this to you; our goal is to get this to you within 48 hours and happy to have a full-on conversation to walk you through these materials, if you'd like. So that's something that's in the works.

I completely agree that transparency and understanding how numbers are adding up to what we believe they're adding up to is key, and we're fully committed to making sure that anyone can take a pen and a piece of paper and replicate what we've done. Let's just be very clear about that. Maybe that's one thing I'll say.

Another thing I know you brought up cost. The important element for, I think, all of us to keep in mind, is that, as we compare cost, as we look at costs in many instances, the drivers of switching to clean fuels or clean electrons are legislative and regulatory.

Advanced clean fleet regulation is going to result in switching of trucks to zero omissions, and the real question becomes, are those zero omission vehicles going to be battery electric vehicles or fuel cell electric vehicles, and there's room for each of them.

But that, ultimately, is what regulations were intended to do; that's what they will do. If we're going on power generation to phase out combustion of fossil fuels, we will need large amounts of dispatchable clean fuels, that's what the studies that I wish you have seen and we referred to keep suggesting, and we're talking about tens of gigawatts of clean displaceable generation.

So we're going to, Michael, to your point, to analyze the cost it's going to create, but let's be clear, this is something which is going to be happening to a very large degree because of the direction of the state of California aiming to reach greenhouse gas neutrality.

I think that that's a real important point for us to keep in mind. I am ready to transition to the slide that talks about cost-effectiveness analysis in more detail, unless there's additional questions we need to take.

CHESTER BRITT: And we can always follow up if the cost presentation provokes any more thoughts on the alternatives.

So let's go head and jump into that because it seems like the cost component is significant as it relates to the alternatives.

YURI FREEDMAN: Indeed. And there's a recap on this slide, of the long list of alternatives, maybe the one I want you to focus on is the upper left metric, which we are going

to talk about. Some of you know it very well; some of you know it a little bit less.

The notion of levelized cost of hydrogen, what does it mean? Well, what it means is that, let's say, you need to have a molecule you're going to use, how much is it going to cost you. Well, what is it a function of. It's a function of what you need to build, how much money you need to spend, how many years am I going to be able to use this asset, and what are the operating costs of running this, and, of course, in the front, how much is going to cost you to permit and develop these assets.

Ultimately, like any other investment each of us is looking at, when you put it all together, that gives you the answer of what's your cost of commodity, because, obviously, if you just look at marginal cost, as the economists call it, just what it takes to produce the extra element of that, that's not super helpful because that actually does not give you the full notion of how much it costs to build the assets to build the production and transportation facility to do that. So that's levelized cost.

Again, it's relatively easy to describe at a high level. There's a fair amount of fairly cumbersome math that, I think, as many of you know, goes into that because you need to account for all the tax attributes, you need to account of all the incentives at the state and the federal level; plenty

of math goes into that. But that, ultimately, is the one metric which allows you to compare, if you will, the apples to apples.

Let's go to the next slide. I think the next slide goes into a little bit more detail on that. Yes, thank you.

And, again, some of the cost components which we listed here are -- there is, what we call upstream, which is to say, even before you get to hydrogen, you need to build renewables and you need to build electrolyzers.

These are fairly capital intensive assets. Renewables, of course, are very well-known to California because we build tens of gigawatts of those. There will be need for renewables because you need to have renewable power to produce hydrogen. Electrolyzers is another technology which needs to be installed. Then, there's the pipeline itself, that's the project we're talking about, which, separately from that, is going to have compressor stations.

Now, materials and compressor stations is the element of that. There's also construction costs because construction is an important effort to build the pipe safely and reliably. Of course, in California, we at SoCalGas have built, working with our reliable partners, many, many miles of pipe, and I think there's tremendous knowledge base to do that.

Potentially, we need some storage. Again, that need

for storage will evolve over time; there may be less need for it today. There will be likely more need for it as hydrogen market matures, and so the question becomes not just what kind of storage we need but when it needs to be built. Because, from a financial perspective, the later you build the asset, the lower it costs. You don't want to burden the early users with the asset that you don't yet need. And that's just CapEx, what we call CapEx, capital expenditures.

Then, of course, there are operating expenditures, which are fixed and variable costs. And then we need to overlay the range of federal tax credits, the state-level incentives, low carbon fuel standard, and other math.

So that's -- the diagram on the right, of course, shows that all of this needs to be done for all these cost components, for production, for delivery, storage, and permitting is the really important cost component because it's not capital dollars that they put in the ground, but it is the time and money that you spent to permit the project.

To the extent the state is able to compress the timeline, that is ultimately going, not only to allow us to build the project faster, but it's actually going to save cost to a significant degree. That's important too.

So that's the very high-level pictorial presentation of what we're going to do by bringing all these numbers to compare the alternatives on this levelized of cost of

hydrogen basis.

Let me step here.

CHESTER BRITT: Yeah. So, Yuri, you know, in previous presentations, I remember you talking about salability and how important that was related to the cost too.

Can you kind of weave that previous discussion we had a couple meetings ago into this discussion about levelized cost?

YURI FREEDMAN: I can. Thank you, Chester. I think it's a good question because it goes back to, if we find, let's say, or if a developer finds an ability to produce hydrogen somewhere close to the source, that may be very attractive near-term option.

It may be expensive in terms of the production of hydrogen, but maybe you don't need to build the pipeline for that; maybe you can truck this hydrogen so it actually may be the lower delivery cost solution for the small volume of hydrogen.

This, of course, becomes, as the ten trucks that are going to use this, turn into 100 trucks and then a thousand trucks; you need more hydrogen, and that is point where you're going to need to have a large artillery that delivers this to the customers. Because, again, trucking, while may be the immediate and available option, is not really

scaleable.

Not to mention, once we're going to start combusting hydrogen and power generation, we're probably not going to run trucks through the city streets.

It becomes the question of temporal dimension, where solutions that are optimal and lowest cost today may not be the solutions which are optimal and lowest cost ten or twenty years from now and we need to connect those and create that vision of development in the system, not just in space but also in time.

CHESTER BRITT: So is it fair, then, to say that the development of a pipeline allows for the scalability to bring down the cost?

YURI FREEDMAN: Ultimately, the pipeline is the way to bring large amounts of molecules over long distances. That is something which is -- it actually drops the transportation cost compared to alternatives by almost an order of magnitude. That's just the economics of transporting molecules. So, absolutely, pipeline is the solution for scale.

CHESTER BRITT: Yeah. And then, obviously, as technology catches up and drives the efficiency -- or creates the efficiency, the pipeline allows for that throughput of that efficiency to drive down the cost.

YURI FREEDMAN: Indeed. In one of the ways, the

pipeline, of course, can be further scalable is to design them in a way which allows to add compression where you do not need to add all the compression day one because there may not be enough need for that volume, but you actually can increase the throughput of the pipeline by adding compression when the market calls for it.

CHESTER BRITT: See, I'm learning something too.

Does anyone have any other follow-up questions or thoughts?

Yes, please.

I love how you guys tilt up your name tags. That was, like, started by, I think, Jack, but I love it. So it's very helpful.

Katrina.

KATRINA FRITZ: Is it -- okay. Great. Hi. Katrina Fritz, California Hydrogen Business Council.

I may have missed this, Yuri, but I wanted to make sure the cost-effectiveness was also being looked at for the technical alternatives or the other alternatives, or is it just for the technical approach for the pipeline?

YURI FREEDMAN: Again, it may be a lack of clarity, Katrina; we're definitely going to look at alternatives from the cost-effectiveness standpoint; economic and ultimately cost to consumers is a very important part of the analysis.

KATRINA FRITZ: Would you say they'll all be

well-to-gate like what's presented here?

YURI FREEDMAN: We're going to look at the economics of deliberate cost to the consumer, which obviously includes the -- what used to be, well, is no longer, well, it's the solar farm or wind farm. But, ultimately, it's from production to the delivered cost to the consumer.

KATRINA FRITZ: Okay. Thank you.

NICK CONNELL: Perfect. Nick Connell with the Green Hydrogen Coalition. In regard to your economic framework, looking at your CapEx, the renewables and electrolyzer, I could see that having a lot of variance dependent on the developer since, from what I understand, SoCalGas will not be producing the hydrogen, so in your analysis, will you have different inputs where it includes renewables and electrolyzers and then one where it excludes it? Because I think it can really skew the economic numbers from this.

Thanks.

YURI FREEDMAN: First of all, thank you, Nick, for the question. And just to reaffirm, SoCalGas is not looking to be in the hydrogen production business. We're going to be in the transportation of hydrogen business.

With regards to the inputs on the CapEx and, perhaps, OPEX, we are not doing this in a way we're going to capture difference in cost structure of individual developers; we want to make it, if you will, apples to

apples. What we aim to do is to capture the fact that larger parcels of land with better attributes for solar development are going to result in lower cost.

Again, not to ignore the small parcels of land closer to the area, which may have a role to play too, but, ultimately, we're looking to analyze, if you will, the resource and that's the way we're going to approach that.

NICK CONNELL: Perfect. Thank you.

CHESTER BRITT: Thank you.

Ernie, you've been so quite today. I'm expecting you to ask a question sooner or later.

Okay. Any other thoughts?

I actually wanted to go back, Yuri, if I could, to this slide. I know that in any alternatives analysis, you know, purpose and need is a huge part of the analysis because when you're talking about alternatives, you're talking about how you get from one point to another and in doing that you have to make sure that you're addressing the purpose and need of the project.

And you laid out these different elements, and I just wondered if anyone has any thoughts on these as we go through the alternatives analysis about the purpose and need being addressed in the alternatives.

Do we have any thoughts about this?

Yes, Michael.

MICHAEL COLVIN: Thanks. Michael Colvin with EDF. Thank you for bringing this slide back; I actually had a question here, so mind melts this is great.

CHESTER BRITT: Perfect.

MICHAEL COLVIN: Two observations; the first one is, in the lower right-hand corner, one of the identified needs is reduction of the gas run from Aliso Canyon. I can understand why that is a high priority for SoCalGas and for the state, but I want to unpack that for a second.

So Aliso Canyon has two different purposes that it serves. It's both intraday, you know, we can't move gas around fast enough from the boarder to the LA basin, and so we use it for kind of helping to smooth out demand, especially for the electric gas fire generators.

We also have to play a hedging role for smoothing out the seasonality of when gas is cheap versus expensive, and it's not clear to me which of those two kind of primary needs that Aliso Canyon serves, what is the Angeles Link trying to displace?

Is it trying to displace the intraday we can't move gas around fast enough and the electric generators are really needing it, or is it trying to smooth out the long-term seasonal variation?

And I think we need to be a little bit more specific here, because depending on which way -- which of those

answers, it's going to be a very different approach for Angeles Link.

YURI FREEDMAN: Thank you, Michael. And I'll make maybe a high-level comment, but I think first and foremost, this is focused on power generation sector. That's something which -- it is not actually -- if you think about this -- and I'm curious whether you would agree.

In power generation sector, Aliso Canyon plays both roles, because just because you are using this for immediate deliverability does not mean that you cannot procure gas when it's most optimal economically, and then save yourself buying this on the spot market for extreme price.

But I think of the two functions, that deliverability, the dispatchability, which straps straight into the need for that clean dispatchable generation, is the function which I think is going to be first and foremost important.

MICHAEL COLVIN: Okay. That's helpful, but the implication of the question that, I guess, I'm trying to ask is, Aliso Canyon, if it's the seasonal variation, has -- is really targeted towards the core customer basin, helping to protect the bills of core customers. Where if it is, I'm trying to help figure out how to just move gas around fast enough to where we need it, when we need it, that helps all customers to some incident, but it's really targeted towards

the noncore customer base and kind of really helping with that transport service.

And so I'm trying to map on, for Angeles Link, how much of what this section is going for is for core customer needs and affordability and how much of this is for noncore customer base slash just kind of operations and kind of keeping the molecules moving. So I'm really trying to get to the core versus noncore part.

YURI FREEDMAN: Absolutely. I think that I understand the question, and obviously the analysis that you're describing is not part of this particular effort but needs to be performed, of course, with all rigor.

Maybe the one comment I'll say -- I'll make is that part of what I think you have in mind, and we all have in mind, is resiliency and the question about where -- what is resiliency and where the cost of that resiliency accrue, is a complicated question, which may or may not be fully addressed in today's market.

We see sometimes the real data points of what the lack of resiliency means. As we all know it, power price can heat several thousands of dollars per megawatt hour. But the question I think in front of the state is going to ultimately need to be addressed. That's not to take -- that's not to debate your point. I think that that's something the allocation of that cost is going to be very important.

MICHAEL COLVIN: Okay. I have a couple of other thoughts, but I recognize some other people have their hands up, so I want to make certain everyone gets a chance to talk. So I would like to come back, but.

CHESTER BRITT: Please. We appreciate that.

I think, Neil, you wanted to jump in.

NEIL NAVIN: Yeah. Thank you. So Neil Navin. Just maybe to add on to Yuri's comments and respond to Michael. Again, the basis for the application for Angeles Link really focused on the need to address hard to electrify, hard to decarbonize sectors in the economy very specifically.

So I think we -- Michael, this should be a conversation that we take further than just this ten minutes, because I do think we need to reflect the ultimate desire of the state to reduce or eliminate the need for SoCalGas but the recognition that it's used over time may change.

So as we electrify and as we add more renewables, the idea that we have -- I will call it a tail demand for the use of Aliso Canyon to address those hard to electrify, hard to decarbonize sectors of the economy; I think we have to look at understanding how that reflects -- is reflected in this analysis, so.

But I think it's probably worth more than this ten minutes to talk through our thinking on that and make sure we understand that as we go forward.

CHESTER BRITT: All right. Thank you.

Ernie, I see your name tag up.

ERNEST SHAW: Thanks, Chester. I told you I was coming, man.

CHESTER BRITT: I knew you were coming.

ERNEST SHAW: Hey, Mike. What's going on, man? Ernie Shaw, President of 43, Henderson Storage. Thank you for that question, man. Nice sweater, by the way, or whatever that is, vest; I don't know what to call it.

That's what I'm talking about.

But, you know, to kind of like elaborate in kind of like my own words of how I would like to explain it with kind of your concern with Aliso Canyon being which way or the other and all that.

So the Angeles Link, I mean, it's big, right, because, as of right now, Aliso Canyon is like the heart and sole that beats for all the other storage fields and for keeping gas, moving gas on demand to whoever needs it and stuff like that.

So with that alone on its restriction, you know, recently, we got an increase in our storage capacity. Now that gives more towards like sustainability, economics, right, instead of, like, high bills, I mean, it kind of gives that flexibility to kind of move things around.

So that way, you know, we're not just depending on

the little load that we have. We can kind of branch out and kind of give more and have other options available for our, you know, disadvantaged communities to be able to afford better costs when possible.

Or, in a way, to make it easy, like, instead of taking a limo, now you can take an Uber because it's cheaper, you know; instead of a lobster dinner, hey, let's have chicken nuggets for dinner.

So it kind of gives that flexibility. So now when I look back to Angeles Link, it will be able to give a better, broader kind of demand to be able to provide instead of just relying on what's there at Aliso Canyon, to be the heart and soul.

MICHAEL COLVIN: I'm still focusing on the lobster versus chicken nuggets, but your point is very well-taken. I think what I was trying to ask for was something very specific in terms of the criteria of how this project is being evaluated.

So they're saying, Oh, we want to reduce the draw downs and the reliance on Aliso Canyon. Aliso Canyon does a couple of different things, and so how you design the Angeles Link project might differ if you're trying to do something that would smooth out customer bills for seasonal variation or if you're trying to smooth out the need to move the molecules around the LA basin really fast. You would design

the system differently. You would design stuff differently.

So that's what I was really trying to aim for. I'm not putting a value judgment. This is not the time nor the place to put any kind of value judgment on Aliso Canyon. I'm just trying to understand where and how the vision of Angeles Link in reducing the reliance on Aliso Canyon, how that's going to translate into the technical studies and then into the cost-effectiveness.

And it sounds like from Neil's response that we need to have some more conversation about, well, how do we do this, and going to Yuri's point, he says resilience. Well, freelance is already on that slide; it's another column.

So if we're going to have to do a different design for Angeles Link because of Aliso Canyon considerations, I want to know what those are and why. I'm not trying to do anything other than that.

ERNEST SHAW: No. No. Yeah, and point well-taken. And that's what I'm thinking, like, I think on a grander scale, with Angeles Link, it provides that alternative option to be able to have that larger vision instead of depending on what's there currently. And it's like, okay, we can start tapering off of what we have and start focusing it on what's new and cleaner and more reliable.

So, like I said, chicken nuggets versus lobster, you know. Better options. Thank you.

CHESTER BRITT: Thank you. We have someone online who has raised their hand. Matthew Taul. If you could unmute yourself.

MATTHEW TAUL: Hi there. Matthew Tall, engineer with Cal Advocates at the CPU. We've been hearing a little bit about the piping options and compressors. So I guess from an engineer standpoint, I know that hydrogen has a lower eating value, you know, per unit of volume than natural gas.

I'm wondering, in this -- it could be too early in the process, so let me know if that's the case, but is SoCalGas, for the pipeline options, looking to operate at higher pressures to deliver the same kind of heating value as a natural gas pipeline would? Is, instead, SoCalGas looking to have more compressor stations along the way? I'm just wondering kind of operability what the design is starting to look like on the pipeline?

YURI FREEDMAN: Yeah. Thank you, Matthew, for the question. I do think it's a little bit too early because we're obviously at the stage where we're designing the study, as opposed to executing it.

But I will say that what will factor into determination of what you just asked about is not just the new system but also the ability to use our existing assets; that's something that we're going to factor into our analysis, and, ultimately, this is where the levelized cost

of hydrogen comes in.

We need to design the system that is going to get the lowest possible cost for the consumer when we bring it all together; pipelines, compression, existing assets, new assets, and the evolution of this over time. We are going to look for the optimal configuration. What pressure curve, if you will, will this represent over time, we do not yet know.

CHESTER BRITT: All right. Michael, did you have any follow-up questions?

No, please, that's why we're here, and, actually, we're doing really good on time, so if you have some additional thoughts, grab the microphone and just introduce yourself again for the court reporter.

MICHAEL COLVIN: Thanks for the encouragement, Chester. Michael Colvin with Environmental Defense Fund. So at the risk of jumping back to the topic on the project alternative designs, I want to zoom in a little bit more on -- I think Katrina was trying to ask this question, but I want to make certain I'm really understanding the local hub versus nonlocal hub.

So if we can go to that slide with the three columns on it.

Yes, thank you.

I think there's a lot of different ways of doing a localized hydrogen hub, and the words on this particular

screen are vague, and that's fine.

But I'm wanting to just make certain that we're going to get a fair comparison of here is what it would take to do lots of local generation with perhaps lots of some pipeline segments that SoCalGas could own and operate in the great basin, everything else within the LA basin versus one large pipeline going a couple hundred miles.

Even if it's the same total amount of CapEx that is displayed on both options, you know, even if it's the same amount of operating expenses, it probably would be even higher operating expenditures to do a more localized approach because you have to do more individual digs.

I just want to make certain that we're really thinking through what that localized option is, and the reason why I think EDF is particularly curious about this is, frankly, the shorter the distance of transport, the less opportunity there is for there to be a leak along the system line.

And so we just want to make certain that we're thinking through, is this a viable option or not and how do we approach this in the right way.

And so my guidance is, as we're thinking through that localized hydrogen hub, from a technical feasibility perspective, is, when we say "localized hub," we're not doing it because we're trying to save money or we're not doing it

because we're trying to, you know, right size the project down or do something else, it's not about that.

It's about trying to think through what is the highest integrity way of moving that molecule around, and a shorter distance is probably the way to do it, from our perspective.

So lots of small transports as opposed to one transport; that's where I think the heart of the analysis we'd like to see occur.

YURI FREEDMAN: Point taken, Michael. And, I think, again, this is something which is going to come out of this specific analysis between various studies we're doing.

I think, again, not to belabor the point, but-clearly, producing hydrogen closer to demand is going to be more feasible in the near term, just by virtue of the fact that trucking options can be put together in a very short period of time and so can be the construction of renewables and electrolyzers; that's something which is going to happen. There's no doubt about that.

So the real question becomes how this morphs into a scaleable delivery system and also becomes a question almost of list regrets, because I don't want to be penny-wise pound foolish, but at the same time, the hydrogen market is happening now and people are developing solutions now; they need them fairly soon.

So I think that the tension between those is what we need to navigate and develop some options, frankly, in dialog with this group and other stakeholders; they're going to make sense.

CHESTER BRITT: Katrina.

KATRINA FRITZ: Hi. I'll dig a little more into my question, which is tangential to Michael's question. So going back to --

CHESTER BRITT: Would you just -- I'm sorry.

KATRINA FRITZ: I'm sorry. Katrina Fritz, California Hydrogen Business Council.

Going back to the cost-effectiveness of the alternatives, what I have learned from public transit and heavy duty fleet operators is that there's an initial analysis of what does the equipment cost and what does the charging infrastructure cost. And then, as they proceed, they can learn that they actually now have a cost of upgrading the substation.

How will you determine the costs that are included in your analysis, you know, if you don't really know that -- the next level of upgrades are going to be required and will be a system cost for that conversion to those zero-omission vehicles, and, in this case, battery electric vehicles.

YURI FREEDMAN: It's a fair question. If your question is whether or not we include the system upgrades

into the all-in cost, let me come back to you on that because I would like to confirm. I think I know the answer, but I would like to get certainty.

CHESTER BRITT: Did you have a follow-up question, Katrina, or no? That was it. Okay.

I think, Tyson, you've raised your hand again online.

TYSON SIEGELE: Hello. Tyson Siegele with UCAN. Yeah. I had a couple of thoughts that I wanted to share. One is: I really appreciate the discussion around the local hydrogen hub, and I also -- I appreciate the slide here taking a look at electronic transmission; that's something that we had talked a lot about in some of the previous meetings; I think that is a really interesting option to take a look at.

With the grid moving to a 100 percent carbon-free future, we're going to have the ability to make green hydrogen on-site with grid-delivered electricity, and that is, I think, going to be an interesting option for a variety of end users, because they will be able to not only take electricity off the grid, they will be able to produce electricity on-site themselves through solar panels. And so a combination of the two will be able to drive on-site electrolyzers throughout the day.

That is -- and, you know, I get that, you know,

taking a look at cost is really important. I think that the end users are going to be, really, trying to figure out -- if they absolutely have to have hydrogen, how do we do this the least expensive way possible?

And one of the ways to do that is to use existing infrastructure. Existing infrastructure, for instance, in the form of electric transmission. The electric transmission delivered to on-site electrolyzers is an interesting option from an overall alternatives perspective, and while I see the electricity transmission -- or electric transmission, in terms of the delivery, I didn't necessarily get the sense from the slide that that is being taken a look at in terms of a -- an on-site hydrogen generation perspective.

So that's something that I wanted to recommend, in terms of an alternative. Maybe it's already being considered but I wanted to throw it out there; that seems like a great way to decrease costs by using existing infractures. The next --

CHESTER BRITT: So, Tyson, can we just let, maybe, Yuri maybe comment on that point, if you have a chance.

YURI FREEDMAN: Absolutely, Tyson. I think, clearly, the -- you know, we're going back and asking what is the best way to get energy to the user; you can deliver it with electrons or with molecules and it stems to reason we should look at both. We will not be the first who looked at

that.

There's been a good amount of analysis on this front, and we'll make sure to bring this analysis to bear to definitely give this consideration, Tyson.

TYSON SIEGELE: Great, thank you. The other piece that I wanted to comment on is Aliso Canyon. The Aliso Canyon considerations, I know that it's been listed not just in this presentation but in a variety of documents that have been shared with the planning advisory group.

I'm always surprised by the inclusion of Aliso Canyon for two reasons. No. 1, SoCalGas has said that Aliso Canyon cannot be closed just by using the ultimate solution with Angeles Link.

And so so far it hasn't really been quantified, like what percentage of the need for Aliso Canyon is going to be addressed through the Angeles Link. That's definitely something that UCAN would like to see in the final analysis, if Aliso Canyon is still considered.

The other piece, though, that I want to talk about with Aliso Canyon is, there doesn't seem to be a need for it in terms of -- by the time that an Angeles Link project would be online. And the reason that I say that is, within the Aliso Canyon proceeding that's going on right now, which is Investigation 1702002, there is -- and I know SoCalGas is very involved in that.

There is a lot of data there. Some of the data that has been reviewed, there is a couple of different modeling studies that show that Aliso Canyon can be closed and still maintain gas and electric reliability in California well before 2030.

So that's something that, you know, if the anticipation is that Angeles Link is going to be online before 2030, then maybe there is some effect that it will have on Aliso Canyon. If it's not going to be online before 2030, then I don't see how this is going to be an issue in terms of effecting whether or not Aliso Canyon is needed in and keeping in mind, of course, that Aliso Canyon is not the only storage facility. It's only about half of SoCalGas's natural gas storage.

So it's not as though I'm saying we don't need natural gas storage; clearly, there is a need for natural gas storage for an extended period of time. There is data out there, there are studies modeling that show that Aliso Canyon is not needed at least in 2030.

CHESTER BRITT: Yeah. So thank you, Tyson, for your comment and question. We want to try to stay on topic here about the alternatives. I want to give Yuri an opportunity to just -- if there's any general comments about Tyson's comment.

Aliso Canyon keeps coming up, but I know it's not

necessarily part of the alternatives analysis, right?

YURI FREEDMAN: You are correct, and, yeah, at this point -- at this time, I don't have any other comments.

CHESTER BRITT: Okay. Again, we're documenting everything that everybody says, so we'll be, obviously, tracking all of those comments.

Thank you, Tyson, for your input.

I don't see anyone else's hands raised at this point. Anyone else in the room have any other thoughts?

If not, we're going to go ahead and do a quick break. Let's say we'll take 15 minutes -- or a little bit less than 15 minutes. We'll be back at 10:45, and we'll have our presentations on NOx and GHG.

Thank you so much.

(Recess.)

CHESTER BRITT: All right. Hopefully, you guys had a good break. We're going to get started with our last two presentations.

I want to go ahead and introduce Darrell Johnson, who is the SoCalGas manager for environment services. He's going to be making two presentations, first on NOx omissions and greenhouse gas evaluations on the technical approach for both. And we'll turn it over to Darrell and get him started.

DARRELL JOHNSON: Well, thank you, and it's good to see everybody today and have everybody on the phone. Kind of

want to revisit and get an update on where we are in our technical evaluation of NOx.

This kind of reminder, you know, the intention here is to collect and review and analyze the existing research for NOx combustion and, you know, bring the best to bear on approach and the calculation methodology. And just want to say we took some of the comments from previous, you know, members of the PAG and ensured, you know, that we added some additional consideration in our review.

So just wanted to say that the general process for us is to review a number of different categories, right, the legislative process, you know, the equipment processes that are out there, how they're evolving and the research from an academic standpoint, you know, how its evolving, the regulatory and legislative drivers and mandates and information that's previously there as it relates to NOx.

And, you know, we've looked at, you know, academia, you know, UCI and Georgia Institute Tech, we looked at the government, everywhere from EPA, DOE, California Air Resources Board, you know, CEC and all nine of the air districts that the potential project could take place in, with a lot of focus on, you know, the requirements at South Coast Air Quality Management District in San Joaquin Valley, as these agencies start to amend their air quality plans.

We've looked at cabs, you know, sip strategy, and

the clean truck regulations, and suffice it to say, just to give an update, our consultant, Stantec, that we're working with have reviewed approximately 430 sources in their review efforts to ensure that they are, you know, processing the available technology and science behind the combustion of hydrogen and the formation of NOx associated with that.

Next slide, please.

So our NOx omission assessment and our calculation methodology, the technical approaches, again, is based on the review of technical research and anticipating the advancements in technology, the review in evolution of potential regulatory framework, evaluating the potential calculation methodology and selecting and refining the appropriate calculation methodology, and then ultimately preparing an assessment that will be informed by the demand study and the other studies that feed into this.

So the study primarily focused on how NOx is formed in the combustion of hydrogen, right, and how we might control the NOx formed in the combustion of hydrogen, and then, ultimately, how to quantify the NOx from said combustion. And, primarily, we're looking at the three forms of combustion, thermal, fuel, and prompt.

And, again, we're fortunate in the NOx area because NOx is not new. You know, we've been reducing and reporting NOx for quite a while and, you know, the combustion of fuels

is going to promulgate NOx and whether it be hydrogen or methane, some of the things that we, in the evaluation and technical approach to calculation of NOx was the difference between the way we report NOx and concentration PPMV, and the actual, you know, mass volume of NOx associated with what we, you know, measure, say, from a SIMS and how -- we may need to revisit, like, the potential of NOx associated with hydrogen from a mass standpoint to better evaluate its impacts.

That's coming out of the research, and I believe it's Douglas who put out a paper that states that when you evaluate the amount of mass and comparison, that the potential increases associated with the higher temperature combustion of NOx is minimized and reduced in many situations.

And I say that to say that I think we're at a place where we evaluate the research, you know; the elements to control NOx are still there, you know, temperature and residence time and the mixture of air from an equipment standpoint.

And then, of course, we're also looking at mitigation measures and selective and nonselective catalytic reduction and NOx traps as part of the technical approach to evaluate not only the formation of NOx in the equipment itself but the ability to mitigate that NOx.

Next slide, please.

And so as we look at the assessment and the calculation process, we've kind of broken it up into what we're looking at as new infrastructure, which would be NOx that, you know, isn't being changed but would be additional, and that would be in the area of production storage and transmission.

Obviously, we would have to have, you know, the pipeline compression at storage and transmission in order to make the Angeles Link possible. So that would be additional NOx that doesn't exist today. So we're looking at that as kind of a new area of additional NOx that will be calculating.

And then the change in NOx, right, like, so how will NOx potentially change from the existing infrastructure, you know, our power generation primarily, turbines, that, you know, currently have NOx from natural gas or other fuels; how will that NOx change and how best to calculate that.

Also the same thing, the change in our hard to electrify equipment boilers, heaters, ex cetera, in some of our hard to electrify areas, and then the displacement of fuels like diesel fuel in some of our mobility areas and the utilization of hydrogen fuel cells.

So these are the approaches that we're looking at to, basically, set up our combustion calculation. We're looking at the existing omission factors and comparing them

to new considerations for combustion, but we have a lot of existing data and information associated with combustion.

So the hydrogen pieces we look at is basically reducing the CO and CH4 from the combustion and, basically, leaving us more with the small portions of N2O.

So suffice it to say, our process in working with our consultant is to take the myriad of available information out there; we've established our approach to identify omission factors at a unit level, equipment level to ultimately calculate our NOx omissions.

And I'm open to questions.

CHESTER BRITT: All right. Looks like, Katrina, you grabbed the microphone, so I'm assuming you have a question, so we'll take your question first.

KATRINA FRITZ: Katrina Fritz, California Hydrogen Business Council. So I wanted to understand the scope of what you're looking at, Darrell. The -- you're looking at NOx in the end uses of the hydrogen that's going through the pipeline as well as potential NOx omissions from the pipeline? I wanted to...

DARRELL JOHNSON: So we're looking at, you know, NOx that would be potentially created from new infractures associated with Angeles Link, right, and that would be if we have to compress the gas, we're going to need new equipment, whether that be electric driven or 100 percent hydrogen ICEs

or turbines compression equipment. And we're also looking at, basically, the change in fuel use -- utilization at the end users, right, and what that will have on, you know, impacts to NOxs reductions.

So we're really looking at where there's potential increases or reductions in NOx and in ways to mitigate any potential NOxs. So those are the areas of consideration.

KATRINA FRITZ: Can you give a little bit more detail on how you're segmenting the market in the future with hydrogen ICE fuel cell electric hydrogen, pure hydrogen, incumbent fossil fuel end uses and then how you're comparing that to, you know, the probably positive impacts of Angeles Link?

DARRELL JOHNSON: Right. Yes. So I mean, we already have a lot of records on omission currently for existing infrastructure; that's public information and it's reported on a regular basis.

So they're going to evaluate that, and that information would give you throughput and omissions and things like that. We're going to, basically, supplant the potential omissions associated with that and evaluate that in comparison with the fuel change, if you will, and the associated NOx omissions.

CHESTER BRITT: Any other follow-up, Katrina, or?

Nope, okay.

Anyone else have any other questions or comments about that?

Yes, Michael.

NICK CONNELL: Nick Connell, Green Hydrogen Coalition. I know NOx is a large topic when it comes to hydrogen, but will this assessment look at any other types of, like, criteria air pollutants, PPM, and so forth?

DARRELL JOHNSON: I appreciate that. That's a great question, and it's an element that I overlooked. We are looking at VOCs -- at a high-level assessment of VOC and PM, obviously, as precursors to ozone. So that will be part of the assessment as well. And thank you very much for asking the question.

NICK CONNELL: Perfect. Thank you

CHESTER BRITT: All right. Michael.

MICHAEL COLVIN: Michael Colvin, Environmental Defense Fund.

Darrell, great presentation. I really appreciate how holistic you're thinking about this.

Chester, if you could go back to, I think, just one slide. So thank you for this. It seems to me there are -- I think I heard you say this, but I want to clarify.

DARRELL JOHNSON: Please.

MICHAEL COLVIN: There's -- the new sources, as you have on the left-hand side that could potentially come from

the hydrogen production, and then there's the -- on the right-hand side of the screen, there's the existing end uses where NOx is currently happening, and I'm assuming you're anticipating some sort of a decrease or a substitution effect as you're going -- depending if it's combustion versus catalyzed versus how the end use is occurring.

And I'm curious -- well, before I go -- before I go further. That's the way that you're trying to present this, is that there's a potential increase and then a potential substitution displacement?

DARRELL JOHNSON: Correct.

MICHAEL COLVIN: Okay. So the reason why NOx is so important, unlike a greenhouse gas, is that it does have concentration points; it does have hot spots in the state; we, unfortunately, know where those are, and we have really good mapping on it.

And I'm curious how you're going to be overlaying the disadvantaged community maps or the -- basically, where those hot spots are occurring and trying to figure out how you're overlaying the geographic component in this study.

And as we're thinking about the routing of where Angeles Link is going, if you're going to be doing a higher level -- basically, if you're going to over sample or over kind of investigate the places that are hitting the disadvantaged community barrier, you know --

DARRELL JOHNSON: So, Mike, I think that --

MICHAEL COLVIN: And I prefer Michael, by the way.

DARRELL JOHNSON: Okay. Michael, I think the layers in disadvantaged communities will be in the environmental justice section. What we're really going to do is try to calculate the omissions associated with NOx and, you know, the combustion of hydrogen.

So I do believe that will be addressed. I think what we're going to try to identify is, in these sectors and, you know, identify the sources, obviously. So the change or potential increase or decrease in NOx from these sources, that is the scope of the NOx feasibility study. So I think where you're talking about environment justice and impacts will be an additional study.

MICHAEL COLVIN: Fair enough. Maybe I'm being a little too lose with my terminology, but I'm not asking this from an EJ perspective, necessarily. What I'm asking about is the geographic impact of where the NOx is vis-a-vis where Angeles Link could be both routed, in terms of the pipe, and then also where we think the largest end uses of the -- of it is going to be.

Are we going to be seeing a major NOx reduction because of the fuel substitution to hydrogen, and is that going to be concentrated in one area or is that going to be sort of uniformly felt throughout the service territory? I'm

trying to ask it from that perspective.

And the reason why I went to Cal Envioscreen was because it's a really easy way to see the geographic impact. I wasn't trying to get to the EJ questions, necessarily.

And I think Jill is trying to clean up my question.

JILL TRACY: Hey, Darrell. I'll take that real quickly, Michael. That is a very interesting question, and I would like the team, maybe, to take a step back and see what we can do in terms of geographical mapping of that data and whether or not that's appropriate at this stage and whether or not we need to earmark that for a Phase 2 analysis.

I just don't know if we'll have that level of granularity right now, but I think that's a very good point. So thank you.

DARRELL JOHNSON: And thank you, Jill.

CHESTER BRITT: All right. Theo, online, I see your hand raised, so we're going to go to you, if you can unmute your microphone.

THEO CARETTO: Hi, yeah. Theo with Communities for a Better Environment. So, yeah, sort of echoing something that Michael was saying, I think it's going to be really important to see the, not just overall changes in NOx omissions from the project but, specifically, information about the concentration of where those changes are happening.

And then on a slightly different note, I know that

throughout the presentation, there was some optimism about the technological development for pollution controls for NOxs, but, at the same time, especially within the power generation sector, a lot of the conversation has been around combusting hydrogen to meet, like, peek demand, and we know that oftentimes with gas fire turbine generators, a lot -- a majority of the omissions are coming during ramping up and done when omissions reductions technology are less effective, generally.

And so I was wondering, sort of, if you're incorporating the way in which hydrogen may be used in power generation in the analysis of what the NOx omissions are going be.

DARRELL JOHNSON: So thank you, Theo, for that question. Can I ask a clarifying question so that I can make sure I give you the appropriate response? Are you talking or asking if load consideration and the utilization in that regard would be considered in the omissions evaluation?

CHESTER BRITT: Theo, did you mute yourself again? Because we can't hear you.

THEO CARETTO: Thank you. Yeah, I couldn't unmute myself. Yeah. I mean, I don't have a specific recommendation for how you account for those. I'm just wondering if you're considering the ways in which the end uses are going to be operating in your analysis of the

expected NOx omissions we're going to see, I mean...

DARRELL JOHNSON: I think I get the question now, Theo. I think that that's, you know, if the calculation methodology ultimately comes down to equipment unit and omission factor, you know, load and ramp up may be difficult in the overall omissions consideration.

You know, there are a number of omission factors that currently exist for NOx, obviously, and it's more of an activity and throughput relative to the specific loading.

So, I think, in this particular effort, we will be using omission factors that are, you know, in alignment with currently-existing omission factors. And so I think throughput is a greater consideration of the utilization of fuel as opposed to load.

CHESTER BRITT: Does that answer your question, or do you have any follow-up thoughts?

THEO CARETTO: No. That answers my question. It would be great to see whether SoCalGas is able to sort of factor in the -- if we're factoring in currently developing or potentially available feature technology, it would be also great to see SoCalGas factoring in the feature anticipated uses of the end uses. But, yeah, question answered. Thanks.

CHESTER BRITT: Darrell, did you look like you were about to say something?

DARRELL JOHNSON: I believe as we look at the future

potential end uses from a volume and amount and, you know, industry that will be evaluated. Just the specific dynamic of use life load is where I wanted to provide the clarification. So I hope that was helpful, Theo.

THEO CARETTO: Yeah. Thank you.

CHESTER BRITT: And thank you, Theo, for your question.

Tyson, I think your hand is raised, if you can unmute yourself.

TYSON SIEGELE: Thank you. Yes. Tyson Siegele with UCAN. I am taking a look at this and thinking about combustion versus hydrogen options that are noncombustion uses and what has come to mind is: Why are we taking a look at combustion? Are there places that you've taken a look at with the analysis so far that absolutely require combustion?

And, I guess, where I'm going with this is, there are -- for instance, in the power sector, you can do electricity production with fuel cells and so you don't have to have combustion.

Are there other places where combustion is absolutely required and so you're taking a look at NOx for that reason?

DARRELL JOHNSON: Well, I think we're looking at it from the possibility that even the infrastructure that is developed could be 100 percent electricity, some of the

generation as well as 100 percent hydrogen, you know, depending on demand and availability of the electricity.

I think, you know, the production and demand study will kind of -- it does feed into that, but we are evaluating both options because they may both be available at a new facility or existing facilities.

And, more specifically, Tyson, I think that once the, you know, we get into an additional phase where actual facility design and equipment determination is made, then the specific omissions will be more readily defined, but I think we're trying to evaluate the possibilities in Phase 1 that there could be 100 percent electroactivation in some of the turbines and, you know, ICEs as well as 100 percent hydrogen.

TYSON SIEGELE: I think that maybe I didn't express my question well enough. What I'm thinking about in the power sector is using hydrogen but using it with fuel cells. Fuel cells, my understanding, wouldn't create NOx omissions; is that right?

NEIL NAVIN: Can I just jump in?

CHESTER BRITT: Neil wants to jump in, yeah.

NEIL NAVIN: Hey. Neil Navin. Tyson, maybe I can just jump in because I think I did understand your question. You know, if you look at some of the recent studies, including a EDS recent study, about the need for dispatchable power in the coming years, I haven't seen any major power

producers that have articulated a clear path towards multigigawatt fuel cell installations at this point.

So I think, you know, don't get me wrong, I think if we could say all of this could be serviced by fuel cells, that would really be very compelling for the project, because it would have a very significant impact. I think we just want to be balanced in that view.

We would certainly love the ideas that our friends at LADWP and elsewhere embraced the idea of fuel cells earlier and at scale. I think we just want to be realistic that turbines with significant control -- controls are likely to be the first solution and may for some time be there until we get those multigigawatt installations with fuel cells.

So I hope that -- and, again, this may be a discussion about framing the family of possibilities more than a definitive answer or opinion about what is going to take place. You know, I think fuel cells would be -- if we can get Bloom or others to produce ten gigawatts of fuel cells, that would be fantastic; I'm just not sure if we're going to be able to do that in the next ten to fifteen years to address the dispatchable load need. So I hope that helps.

TYSON SIEGELE: Yeah. It definitely does.

One of the studies that has taken a look at this is the SB 100 report, which took a look at a no-combustion study scenario, and in that scenario, taking a look at it, just

taking a look at the chart, it is about 25 gigawatts that they're taking a look at there for hydrogen fuel cell electricity production.

And so that is something that would be a real interest, I think, to the community, being able to say, Okay, it would be great to have hydrogen in a form that doesn't create NOx omissions and is able to produce the clean firm power like the EDF study that you mentioned.

And so both in the power sector as well as in the industrial sectors, it would be great to really sort of just draw a line in the sand and say we will not be selling hydrogen or combustion. When you do that, one of the things that you do is you create a lot of positive response within the community, being able to say, you know, we took a look at it and you don't have to have NOx omissions.

And so that is something I'd really like to see as an option that SoCalGas takes a look at in the -- in this omission study as well as throughout the demand study to be able to say, Do we actually need hydrogen combustion; can we use hydrogen in a way that is not going to create an unsafe environment for California.

NEIL NAVIN: Yeah. Again, this is Neil. Thanks, Tyson. I guess I would point to LADWP as sort of one model of transitioning ultimately over time to fuel cells. Again, I think we can work the idea that there may be multiple

potential outcomes, and I would just say your comment is fully noted and we'll try to make sure we figure out a way to address it, so.

TYSON SIEGELE: Thank you. I appreciate that, Neil.

CHESTER BRITT: Yup. Thank you, Tyson.

Michael, I think you have a follow-up comment.

MICHAEL COLVIN: I do. Darrell, I want to switch gears just for a moment here. What's your year baseline that you're using? What are we comparing the reduction in NOx against; are we doing it against present day values, or are we doing it against where we think we're going to be in some future year with sort of -- with Angeles Link, without Angeles Link scenario? Like, what are we trying to base the reduction against?

DARRELL JOHNSON: So we're looking at 2030 to 2045 kind of as the scenario from the demand study, you know, and the three scenarios, aggressive, and so forth and so on.

As it relates to the comparison to existing omissions, I think we're going to look, probably, at present and maybe have to determine if there's a way to, you know, model or project what future omissions would be in 2030.

MICHAEL COLVIN: Okay. I wish you the best of luck with that. It's going to be --

DARRELL JOHNSON: Yes.

MICHAEL COLVIN: My one observation is it might be

worth breaking out the transportation related to NOx omission reductions or changes separate from the built environment slash power generation industrial customers, and that's because there's a huge transition that's going to be happening one way or the other with the advanced clean fleet role and the advanced clean truck roles happening in California.

Now, obviously, that's a technology neutral rule. Hydrogen could be playing a part there; it could be battery electric vehicles. We just don't know what the right mix is going to be. And I think it would be really important for us to try and call that out, that I think it's going to be a reduction, no matter what, from today's baseline and so, you know, trying to figure out how much you-all are attributing that to be for hydrogen or not, I think would be important.

But I think that's a different conversation for the transportation part of it. For power generation slash hard to decarbonize parts of the economy, the heavy industry sectors, I would love to see those NOx reduction numbers sort of broken out separately because I don't think we have an advanced fleet role or an advanced transportation role that's sort of intervening and this is sort of the best option that the state has come up with.

So if there's a way, as you're doing those interactive effects, to try and say transportation versus not

transportation, I think would be very illuminating.

DARRELL JOHNSON: Yeah. I think we're going to -- you know, in the mobility sector, we're going to have our omissions separate from the others. So we're looking at source categories, omission factors for source categories. So we'll be able to aggregate it appropriately.

CHESTER BRITT: All right. Those of you online that are being shy, I would encourage you to please chime in if you have any other thoughts or questions. But seeing none, I will go to Tyson, again, who has his hand raised.

TYSON SIEGELE: So I wanted to second Michael's point there. The omissions that come from mobility are really important, really interesting. And one of the pieces that SoCalGas used in the Angeles Link application to show, you know, look at the significant omissions reductions that could happen if we shifted to hydrogen.

Now, there was a lot of push back in the Angeles Link proceeding on SoCalGas's numbers, and I think reasonably so. The question that Michael brought up of, you know, how much is battery electric and how much is hydrogen is really the determining factor in how much omissions reduction do we get from hydrogen fuel cell vehicles.

And so one of the -- and that was one of the main questions that I had in the demand study when I was showing those questions with Yuri and Yuri's team on how that's

calculated.

One of the -- one of the pieces that is shared in the demand study is that the Class 8 sleeper cabs will have 204 miles per day on average traveled. And in that particular -- for that particular vehicle type, the assumption is that -- that SoCalGas is making is that hydrogen fuel cell vehicles could be almost 100 percent; I think 98 percent was the top-end of the range for that and created a lot of the omissions reductions within that overall transportation sector.

And so one of the pieces that I wanted to share is a recent -- a recent -- a very short analysis but a recent analysis on the Class 8 trucks and medium and heavy duty in general that is, I think, just wrapped up the 18th day of the study. And so I just dropped that into the chat here.

For Class 8, there are trucks that now go over 300 miles on a single charge, and so more than that average amount for Class 8 sleeper cabs on a single day. And then in addition to that, there's Class 8 trucks in that study that went over 1,000 miles in a day, and so, again, five times more than what the -- what that average is. And so that's one piece.

The other piece is that there, within the drayage Class 8, the slides that were shared in the previous meeting said that they're never going to be cost-effective and yet,

even with that, SoCalGas is estimating that at least 31 percent, so 31 to 38 percent, at least 31 percent are still going to be hydrogen vehicles.

I don't understand how those -- those truck operators are going to compete if their trucks are never cost-effective. And so, again, taking a look at breaking out the mobility sector, how much of the omissions reductions is actually coming from the mobility sector is important, and it's also something that is going to be -- is going to be a really important part of the review of the demand, the demand study, how that demand study really goes through all of the 16 studies. And so, again, breaking out mobility, I completely agree with Michael, that's a great idea.

CHESTER BRITT: Thank you, Tyson. Again, I understand the connection between the studies and, obviously, you've made the point about the demand study being paramount to influencing the other work studies, but we want to just make sure we stay on topic of the NOx omissions.

Michael Galvin, Port of LA. I think you have something to weigh in on that point.

Or no?

Oh, you might want to. Just turn on the mic.

MICHAEL GALVIN: On the issue of adoption for different modes of technology, is that the question, Chester, in regards to heavy duty trucks?

So the issue from the port's perspective is reliability and functionality of the fleet, and that's what we're hearing from operators right now and this doesn't just go for heavy duty trucks, but it also goes for all of our cargo-handling equipment.

Operators today are able to choose one piece of equipment that does the job they need all day long and don't have to be picky about what piece of equipment they're using, from a technological perspective, and that duty cycle on the container terminals is 20 hours and then refuel after that.

On the on-road trucks, the studies that we've done look at a variety of jobs that thees drayage trucks are doing across the region that range from trucks that are going back and forth between local rail yards, could be a five-mile round trip, to going 300 to 400 miles out of the region, but the same applies there, that the users and the owners of those trucks want to be able to select a truck regardless of what it's going to do that day and know that it's going to be able to accomplish its task.

So that's really important in regards to adoption. So we're seeing, generally, from the consumer perspective, that the hydrogen vehicles operate more resiliently and more in line with the diesel comparables.

And so we can see if there is equipment out there and if it's at a reasonable price and if hydrogen can be

delivered at a reasonable price as well that is comparable with diesel, then the adoption rate of hydrogen will be -- or hydrogen equipment in both of those categories, cargo-handling equipment and heavy duty on-road trucks, will be significantly higher.

And that's all going to be made possible by scaling up the hydrogen production and being able to deliver more molecules at a more reasonable cost.

So when that happens, along with the technology advancing with the hydrogen equipment versus battery electric, which is a little bit further along right now, we expect that there will be more adoption of hydrogen equipment going forward, because of its comparability with duty cycle perspective with diesel, which we're not seeing or not have seen despite the further technological advancement and commercialization on the battery electric side of both those heavy duty pieces of equipment.

Not to say that battery electric will not play a role down at the port in regards to light duty and medium duty vehicles, because it makes a lot of sense for those vehicles that don't have the same duty cycle.

But in the heavy duty sector for the larger pieces of equipment that we have on terminals and for the drayage trucks, we really see hydrogen as fitting that role in replacing and displacing diesel equipment in the current

marketplace.

CHESTER BRITT: Thanks for letting me put you on the spot.

Darrell, I think now is the time to get into the next omissions -- what's that? Oh, Michael, did you have a question? I'm sorry.

You're good, okay.

You'll have another opportunity because Darrell is going to be making a similar presentation for GHG, and then we'll have a follow-up discussion on that.

DARRELL JOHNSON: For the audience, you know, the slides for greenhouse gas are very similar to the slides for NOx in the sense that our evaluation of, you know, research data documentation and, you know, scientific literature as part of our needs by which to determine and choose a calculation methodology is pretty much the same.

So as you look at the slides, you know, we looked at 280 different pieces of information or studies or research documents in the evaluation of greenhouse gas, and, you know, I have a long list of, you know, academic government private industry stakeholder, environmental studies, and manufacturers that were reviewed, you know, in the evaluation of greenhouse gas; there's a lot of information out there about greenhouse gas.

So I won't spend a lot of time on this slide, and I

think that, you know, as we share the study information, you'll be able to see the 480 some-odd sources that were evaluated for both NOx and greenhouse gas and Stantec's determination process.

I will say that, just to give you an idea of the process, you know, Stantec went through the evaluation of all of the research and, basically, prioritized the research for relevance to the study, and once that research had been scored and evaluated, it was, then, provided to the University of Irvine to review it from a scientific applicability standpoint and relevancy standpoint as a secondary kind of approach before deciding the calculation methodologies that they would use.

So next slide, please.

So, again, in setting up the implementations scenarios, we're using the, you know, demand study scenario approaches, you know, aggressive, moderate, and so on, to make our evaluation as to what the potential, obviously, throughput and different categories will be for greenhouse gas.

Again, we have a great deal of historical information associated with the calculation of greenhouse gas. So I'll say what I think is kind of probably the more important pieces. We look at, you know, combustion of 100 percent hydrogen as removing, you know, the 90-plus percent

of, you know, the methane and CO elements of greenhouse gas in general, and so we see a great deduction possibility there.

And we will be focusing on the N2O, you know, that is possible from the combustion of hydrogen as a greenhouse gas and evaluating the direct and indirect greenhouse gasses associated with the combustion of hydrogen.

And so we will also be using, you know, a source, omission-facted unit-level calculation methodology and the determination for the calculation approach was basically really kind of driven a great deal by, you know, the existing CARB, MMR, and, you know, EPAs, MMR [sic], and, you know, they looked at MFACT and a number of other considerations.

And I think the alignment with those omission calculation methodologies is going to be the general approach for calculating greenhouse gasses and the omission, you know, calculation assessment.

Next slide, please.

Similar to NOx, we're using this slide to kind of identify how we're, you know, separating our evaluation of greenhouse gasses. Again, the potential greenhouse gasses associated with new infrastructure, production, storage, and transmission and the subsequent equipment and processes in that area.

And then the delta between existing, you know,

combustion sources in the power generation section, the hard to electrify sector, and the mobility sector.

As noted in the beginning of my presentation, because this is a technological assessment and approach, the slides didn't differ because our approaches were fairly similar in our evaluation of documents, determination of calculation processes, and then the assessment of how we would, you know, produce those omissions.

So I'm open to any questions you might have.

Thank you.

CHESTER BRITT: Thank you, Darrell, for the presentation.

So, again, the technical approach is very, very similar, and I was just interested to know if anyone has any follow-up questions on GHG.

Michael. I love you; you're helping this meeting immensely by chiming in first every time.

MICHAEL COLVIN: Yeah. Yeah. Darrell, again, thank you. I'm excited to see the results of this.

Two super specific questions on the GHG site. One, are you measuring just carbon, or are you doing all GHG? Is it CO2 and CO2 equivalents? And, then, what is your GWP; is it GWP 100, or is it GWP 20?

DARRELL JOHNSON: So it would be GWP 100, to answer in reverse. And, you know, I think, you know, if you have

suggestions on what you think, whether it be 25, 100, what GWP determination would be most appropriate, but GWP 100 is the most commonly used right now. So that's the approach we're looking there.

And, you know, we're really talking about combustion and hydrogen and greenhouse gas associated with that. So we're primarily looking at the reduction in CO2 and methane and then the potential increase of N2O, right?

There are, you know, other considerations that, you know, regarding the research around indirect greenhouse gas associated with hydrogen and what we're looking, there is -- to say that there are no regulatory requirements to report that or I should say there have been no EPA, CARB, IPCC, haven't really picked a number yet, right?

So what we will do is we will say what the research is, what the numbers in the research are, and what the potential impacts of that indirect omission are as a portion of the overall report.

MICHAEL COLVIN: I appreciate that answer. I totally understand what you're trying to say. I would highly encourage you to do both GWP 100 and GWP 20. At least the EVS studies that are out there, which are peer-reviewed and are part of the literature now, of indirect and how hydrogen leaks as an indirect greenhouse gas, if we have -- we see them as a short-lived climate pollutant.

And a one-time pulse omission on the GWP 100 basis is completely obliterated, but it does, actually, have a warming effect. And, frankly, if we have infrastructure that is not properly designed or maintained or, you know, thought through for leaks, it goes from a one-time pulse omission to a continuous study source, and it may or may not show up on the GWP 100 year basis, but it will absolutely show up on the GWP 20.

And it's one of those things, if you don't have that right metric, you're going to lose this impact, and we would end up undoing a lot of the climate benefit that we would claim on paper.

So I just talked with our science team earlier this week, and this is like their No. 1 priority of, if you want us to find ways of supporting what you-all are doing, you're going to need to look at both of those metrics.

DARRELL JOHNSON: No, I thank you, Michael, for that comment, and I think that it would be reasonable for us to qualify the two and the potential differential view of each as it relates to overall omission impacts. So I appreciate the comment.

CHESTER BRITT: Thank you, Michael.

Theo, online, I want to go to you next. You have your hand raised, if you can unmute yourself.

THEO CARETTO: Yeah. I'm essentially echoing what

Michael was saying there. Communities for a Better Environment would heavily, heavily urge SoCalGas to perform both the GWP 100 and GWP 20.

And I'm also curious to the extent that SoCalGas is looking at the climate concerns with hydrogen leakage, whether there's any conversation of looking at those climate impacts under different leakage rates. So like a 1 percent leakage rate, 5 percent leakage rate, et cetera.

Because over that short term, like in a GWP 20 scenario, the difference in leakage rates could make tremendous, tremendous difference as in what we're seeing in terms of the climate benefits or determinants of hydrogen being piped all over the state.

Yeah, thanks.

DARRELL JOHNSON: Well, I appreciate the comment. That's a tough one, actually. I think we might be able to put some qualifying statements, but when you talk to climate impact from proposed projects, it's a difficult concept at best.

CHESTER BRITT: All right. Anyone else?

All right. We're almost through with our agenda; we're making really good time today, actually. So you guys might get to lunch early.

We're going to now switch over to Jill Tracy, who is the Angeles Link Senior Director of Regulatory and Policy.

She's going to be updating us on the schedule and approach to Phase 1 study feedback.

JILL TRACY: Hi. Good morning, everyone. Jill Tracy, Angeles Link Senior Director. The reason I'm before you now is we have gotten a lot of feedback from both our PAG and CBO members on the status and the interaction of your group and the CBO group with our subject matter experts on the 16 Phase 1 studies that we're performing.

We had originally -- this is our original schedule that we published at our second quarterly meeting and it shows that we would be issuing a final report in June of next year, and we're pretty much on schedule for the quarterly meetings and the workshops.

But what we have found is that additional time would be prudent at this juncture for folks to take a further, deeper dive. There's a lot of information that we're sharing. We're just able to launch the living library that, hopefully, will help folks have all the resources in one place.

So we're trying to enhance our communication and sharing of information. And then as part of our efforts to support further engagement in stakeholder feedback, we're having a new schedule, Chester, if you want to go to the next slide. And this is the update where you'll see it shows us issuing our final reports in August.

So we're pushing schedule out for eight weeks. So I hope that will give folks a lot more time, in particular, because we're anticipating publishing our preliminary findings and results in the first quarter of next year. And we have already published, through Yuri, our demand study preliminary findings and results.

So I think more data is going to be coming to you-all, and we wanted to give everyone extra time to be able to review that data and then provide us that feedback.

So I'll pause there and see if anybody has any questions.

Okay. Looks like we have a quiet group, so I'm going to turn it back to Emily so she can talk about next steps.

EMILY GRANT: Thank you, Jill. So wrapping up today, our next steps, we're going to have -- we put out a survey for everybody, so thank you to those of you who participated in the survey. We got some great results.

So it looks like we do want to have an October workshop. So we appreciate the enthusiasm. That workshop is going to be on Thursday, October 19th. We'll be doing the same format that we're doing here today.

So we'll be back here at the Energy Resource Center, and we will be, as usual, having a hybrid option, a virtual option. We found that this venue works really, really well

for running a really solid hybrid meeting. So we'll be back here at the ERC and hosting those of you online once again.

Also, an additional save the date for our Q4 meeting in December; that's going to be on Friday, December 15th; that venue is to be determined. We will probably be somewhere else but still in the similar region here, so. But that will be, again, Friday, December 15th.

So you can save that date and plan ahead, and we'd love to see those of you who are joining us online today, perhaps in person for that one, and we can wrap up the year together.

As usual -- so one thing to note too, we'll be releasing which studies we'll be taking, per the survey results, a deeper dive on for those October workshops. One thing to note, those two to three studies that we'll be focusing on, we'll try to get that information out to you next week.

We'll push the feedback deadline on those studies until November 2nd, since we'll be taking a deeper dive on those; you may want additional time to provide your feedback on those studies based off what you learn in the presentations. So we'll push those two to three studies. Those topics, again, will be released next week; we'll push those deadlines for that technical approach feedback until November 2nd.

All the other technical approach feedback, that deadline will remain the same, which is Friday, October 13th. If you have any questions about that, let me know, because I know it gets a little bit confusing.

As usual, the technical approach feedback goes to the Insignia team; that e-mail is listed here on the screen. Again, if you have any questions about that or need that information, just shoot me an e-mail and I'll make sure you have all the correct contact information for Insignia.

And I hope everybody is using the new living library, and if you have any questions about that, as usual, just contact me; hopefully, it's been a useful tool, because, as you've noticed, I'm sure, the documents are coming in abundance and they're not getting any shorter.

So, hopefully, that's been helpful to you. And today's presentation and the meeting recording will be available on the living library hopefully next week.

And I think that is it. Happy to take any questions on our process, if you have them.

Okay. Perfect. Thank you.

CHESTER BRITT: Ernie, it's time for lunch.

So, again, I want to thank everyone for coming. It really does make a difference when you're here in person. And for those of you online who aren't able to join us, again, thank you for your joining us. We had good

participation today.

Tyson, I think you raised your hand at the last second, so let me just switch over to you, and then we'll conclude our meeting.

TYSON SIEGELE: Hi. Yes. Sorry that I was not able to get my hand up quick enough. I had a couple of questions on -- I think, maybe, Jill, these questions are for you.

In terms of the schedule, on the schedule, I appreciate the additional time that you-all have added in here. One of the questions that I have is on the revisions that are in the works for the demand study, and, again, you know, I've talked about how the demand study affects all of the other studies.

When do you anticipate we will get a revised study for that, revised outputs for that; when will we get the -- I know that Yuri had mentioned 48 hours for the response to the questions that I had provided.

In terms of, then, receiving those, being able to comment on those, and then a new set of outputs provided to the Planning Advisory Group, do you have any timelines on when that will occur?

JILL TRACY: I'll defer to Yuri for the ultimate timing, but I do believe that we are not -- the way the schedule has been set up, you have one opportunity -- multiple touch points with our team to provide input and then

there's the deadline for, let's say, the technical approaches, correct, or the preliminary data and findings.

And then the process moving forward is, we provide -- you get that feedback, we evaluate it, and then the next step in the process, Tyson, as I think you can see, is to issue a draft report.

And so at that juncture, you would be providing input on a draft report and that is the process that we have established for all 16 studies.

We think it's a very robust engagement schedule and allows multiple touch points between the quarterly meetings, the issuance of the information and data and then also with our workshops and then our individual touch points, as you've had the opportunity to meet individually with Yuri.

We think that that's a very robust engagement process, and then the process moving forward after -- especially on the demand study because it has its own special time period, then the draft report would be the next deliverable that would come out.

And then I'll turn it over to Yuri so he can address the timing question.

YURI FREEDMAN: Thank you, Jill.

Actually, I'll have to come back to it, Tyson, because I want to be sure that we are going to give you the right time frame, in light of the fact that we just moved our

overall time frame to the right by two months. So let me come back to you.

I can assure you, of course, that between when we're going to provide you the second batch of information and -- you and everybody else, second batch of information, which will happen in the next 48 hours, we want to be sure that you will have enough time to process that and to convert that into your suggestions, you know, between the next step that Jill laid out. But let me come back to you with an exact timing of us issuing -- targeting the issuance of the draft report

TYSON SIEGELE: Got it. Got it.

Okay. And then the other question I had is, I think, maybe, this one is for Emily. The question on recordings and on the transcripts for the meetings.

I was taking a look and, maybe, I'm just not looking in the right folder, but I was taking a look at the living library, I didn't see, for the previous meetings, recordings and transcripts for that meeting; really, either one or the other is fine, but it would be helpful for UCAN to have access to that when we're preparing our comments and going through and trying to get the best information to you-all, in terms of our feedback.

Am I looking in the wrong place; is that available somewhere?

EMILY GRANT: Let me check with Arellano, Tyson; they do most of the posting, and I'll shoot you an e-mail later today and let you know for sure, but we'll get it up, if it's not up there.

TYSON SIEGELE: Great. Great. And then the last piece is, the documents that we had asked for, the Planning Advisory Group had asked for in the past, I'm assuming that those have not been added yet, the contracts with the Phase 1 contractors, the modeling, the computer modeling for the demand study.

All of them are not coming to me immediately, but I was wondering if there has been any change in the position there. Are those going to remain confidential, or are those going to be part of the transparency process?

EMILY GRANT: We haven't changed from the last information that we shared with you. The position hasn't changed.

TYSON SIEGELE: Got it, okay. I think that covers all of the questions. I appreciate your help.

CHESTER BRITT: All right. Michael.

MICHAEL COLVIN: Give the mic right back to Emily, please. Michael Colvin with Environmental defense fund. Emily, it's -- I appreciate the new schedule for submitting comments.

In your postmeeting follow-up today, just so that

it's super clear, can you just say, for the October 13th date, Here are the things that we're looking for comment on, and then for the November date, Here are the two new studies that are going to be covered at the October workshop, because I just want to make certain that I'm being responsive on the right thing at the right time, and I, frankly, am losing the thread a little bit.

And if I am, probably others are too. Maybe I'm just being, you know, maybe it's the I-woke-up-at-4:30, but it would be really helpful.

EMILY GRANT: No, it gets confusing. So it's a great question. So we'll release -- so pretty much there's 16 studies. For now, all 16 of those, the technical approach will be due Friday, October 13th. We're going to -- you want me to list 16?

Well, yeah, you know what? Why don't we have something visual that we'll send out to you so that way it's really, really clear, because that's a good point, what you're making. So we'll list all 16; we'll put a visual together. We're going to pull two to three of those, and that deadline will be pushed because you'll have kind of a deeper dive on those. We want to make sure after that deep dive, you have additional time to comment on those. So we'll get a visual together and send that out. That's a great idea.

CHESTER BRITT: Yeah. And I would just add, we can actually do it by the work studies and have the dates for each of the -- I think it was on one of the presentations that Yuri made, the four opportunities to weigh in on each of the work studies.

We can put what those milestone dates are for each one, so, as Emily mentioned, some of them have different dates and that way, as we move forward, you won't have to be, like, scratching your head and trying to remember all the different dates.

MICHAEL COLVIN: You-all are very smart individuals; I defer to you how to do it.

CHESTER BRITT: We will make it easy for you. I tell my staff all the time, Make it so it's user-friendly.

KATRINA FRITZ: Katrina Fritz, California Hydrogen Business Council. Because we didn't have access to the chat, can you make sure we have access to the studies that Tyson put in the chat?

CHESTER BRITT: Yes.

KATRINA FRITZ: Thank you.

CHESTER BRITT: And that is -- Stevie, let me just ask you: When we post the Zoom recordings, is the chat feature available to people looking at that?

It's not, right?

But we still have access to be able to provide that,

so we can do that for you, sure. Yeah. And we do a summary in the summary report, Katrina, by the way, that we send out as follow-up and that always breaks out the chat as well, in the summary report.

All right. Ernie, I tried to get you to lunch, but here it is. They're setting it up now.

So, again, thank you guys very much. We look forward to seeing you guys again in October, and with that, please drive safe on your way home.

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(Meeting ended.)

CERTIFICATE

OF

CERTIFIED SHORTHAND REPORTER

* * * *

The undersigned Certified Shorthand Reporter of the State of California does hereby certify:

That the foregoing Proceeding was taken before me at the time and place therein set forth.

That the testimony and all objections made at the time of the Proceeding were recorded stenographically by me and were thereafter transcribed, said transcript, being true and correct copy of the proceedings thereof.

In witness whereof, I have subscribed my name, this date: October 4, 2023

Katherine Thomas

Katherine Thomas, CSR No. 14378

APPENDIX 9 - REVISED ANGELES LINK SCOPE OF WORK DESCRIPTIONS

Dear PAG and CBOSG members,

Thank you for your continued involvement in the SoCalGas Angeles Link Project (Project) stakeholder engagement process and for your active participation in the Phase One Studies workshops. The work being conducted for each of the studies is part of an iterative process and the feedback and insights provided by members of the Planning Advisory Group (PAG) and the Community Based Organization Stakeholder Group (CBOSG) is essential to the successful completion of the Angeles Link Project Phase One scope.

The SoCalGas Angeles Link Team has received significant PAG and CBOSG member input both verbally, through in-person and virtual attendee comments/discussions at workshops, and in writing through email and workshop meeting chat notes. Based on this input, the Angeles Link Team has modified and clarified the scope of work for the affected Phase One Feasibility Studies. Attached, please find the revised Angeles Link Scope of Work Descriptions for Phase One Studies document, with all modifications shown in underline/strikeout format for efficiency of review.

In addition, the Angeles Link Team is in the process of cataloging and preparing individual responses to comments received during our July stakeholder workshops and comments received in writing by July 31. Responses to comments will be included in SoCalGas's third quarter quarterly report.

Thank you for your feedback and we look forward to your continued high level of participation in the Project stakeholder engagement process.

Angeles Link
Scope of Work Descriptions for Phase One Studies

Revised September 5, 2023

Contents

INTRODUCTION

SoCalGas is undertaking a series of studies in compliance with the California Public Utilities Commission's (CPUC) Decision Approving the Angeles Link Memorandum Account to Record Phase One Costs (Decision 22-12-055) (Decision).

This document provides a description of work for each study being conducted under Phase One of the Angeles Link Project (Project). Each description of work has~~is~~ be~~ening~~ provided to both Planning Advisory Group (PAG) and Community Based Organization Stakeholder Group (CBOSG) members for feedback and insights and has been updated to incorporate relevant input received to date. SoCalGas views the work being conducted for each of the studies to be part of an iterative process, and will continue to seek feedback from the PAG, CBOSG, and other stakeholders as the work progresses. The work will continue to be modified and adapted as feedback is received and additional information is generated, as appropriate.

The Table 1 below lists each of the Phase One studies along with a brief description of each study. These descriptions were included in SoCalGas's first quarterly report submitted to the CPUC on May 9, 2023, which is available to the public here.

Study descriptions are categorized by three workstreams: Market Assessment & Alternatives, Regulatory, Policy & Environmental, and Engineering Design.

Table 1. Angeles Link Phase One Study Description Summary

Workstream Category	Study	Description
Market Assessment & Alternatives	Demand Study	The Decision requires (OP 6 (a) and OP 6 (c)) SoCalGas to identify hydrogen demand, end uses, and end-users (including current natural gas customers and future customers) of the Project. This study will evaluate potential clean renewable hydrogen demand and assess adoption in the Mobility, Power Generation, and Hard to Electrify Industrial sectors.
	Production Planning & Assessment	The Decision requires SoCalGas to identify the potential sources of hydrogen generation for the Project (OP 6 (b)) and its plans to ensure the quality of the hydrogen gas meets the clean renewable hydrogen standards set in the Decision (OP 6 (j)). This study will evaluate potential sources of clean renewable hydrogen production from renewable sources such as solar and wind, the input requirements, the estimated cost of production, and policies, procedures, and other methods to meet clean renewable hydrogen standards.
	High-Level Economic Analysis & Cost Effectiveness	The Decision requires (OP 6 (d)) SoCalGas to evaluate the cost-effectiveness of the Project against alternatives and determine a methodology to measure cost effectiveness between alternatives. This study will determine a methodology to measure cost effectiveness that includes gathering cost estimates, performing an economic analysis to determine the potential levelized cost of clean renewable hydrogen to be delivered to end-users, and comparing the cost effectiveness of the Project against various project alternatives.
	Project Options and Alternatives	The Decision requires (OP 6 (d)) SoCalGas to consider and evaluate Project alternatives, including a localized hydrogen hub or other decarbonization options such as electrification. SoCalGas is also required (OP 3 (c)) to study a localized hydrogen hub solution under the specifications required to be eligible for federal funding as part of Phase One. This study will evaluate Project options and alternatives, including a localized hydrogen hub.
Regulatory, Policy & Environmental	Water Resource Evaluation	The Decision requires (OP 6 (b)) SoCalGas to identify the potential sources of clean renewable hydrogen generation and water and estimate the costs of the hydrogen for the Project. This study will evaluate the availability of water resources for clean renewable hydrogen production in Central and Southern California regions.

Workstream Category	Study	Description
	Nitrogen Oxide (NOx) and other Air Emissions Assessment	The Decision requires (OP 6 (h)) SoCalGas to assess potential NOx emissions associated with the Project, including appropriate controls to mitigate emissions. The NOx assessment will evaluate NOx and other air emissions associated with storage and transportation of hydrogen, as well as NOx emissions associated with end users. Key areas of focus will be on the Mobility, Power Generation, and Hard to Electrify Industrial sectors. Identification and evaluation of potential mitigation measures will also be included.
	Hydrogen Leakage Assessment	The Decision directs (OP 6 (g)) SoCalGas to assess the risks and mitigations for hydrogen leakage. During Phase One, an evaluation of potential hydrogen leakage associated with production, storage, and transportation of hydrogen will be prepared. Identification and evaluation of potential mitigation measures will also be included.
	Greenhouse Gas Emissions (GHG) Evaluation	The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental laws and public policies. To support environmental laws and public policies, SoCalGas will conduct an initial evaluation of greenhouse gas (GHG) emissions associated with the Project, including the potential for emissions reductions. This assessment will evaluate GHG emissions associated with storage and transportation of hydrogen, as well as GHG emissions associated with end users. Key areas of focus will be on the Mobility, Power Generation, and Hard to Electrify Industrial sectors.
	Environmental & Environmental Social Justice Analysis	The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental law and public policies. Further, the Decision directs SoCalGas to address and mitigate impacts to disadvantaged communities and other environmental justice concerns (OP 6 (l)). SoCalGas will conduct an initial evaluation of a clean renewable hydrogen transportation system's compliance with environmental law and public policies, which will include an assessment of environmental impacts of project alternatives, environmental justice concerns and impacts to disadvantaged communities.
	High-Level Feasibility Assessment & Permitting Analysis	The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct a high-level assessment of potential environmental and regulatory approvals, including federal, state and local environmental permitting and

Workstream Category	Study	Description
		regulatory approvals, regulatory approval timing, and environmental constraints.
	Right-of-Way Analysis	The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing private rights-of-way to accommodate the Project and future right-of-way locations needed.
	Franchise Analysis	The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing franchises to accommodate the Project and future franchises needed for the Project.
Engineering Design	Preliminary Routing/Configuration Analysis	The Decision requires (OP 6 (i)) SoCalGas to identify and compare possible routes and configurations for the Project. This study will (i) determine preferred routing/configuration alternatives for hydrogen system; (ii) consider existing pipeline corridors or rights-of-way, other known existing rights-of-way, franchise rights, designated federal energy corridors or rights-of-way, and the need for new rights-of-way; and (iii) evaluate technical considerations, major crossings, elevations, terrain types, and other potential geographical and urban challenges. This study includes high-level construction staging for implementation of routes and evaluation of a localized hydrogen hub. As part of the configuration analysis, SoCalGas will conduct an initial evaluation of hydrogen storage technology. SoCalGas will assess storage proximity to the Southern California region and both aboveground and underground technologies.
	Pipeline Sizing & Design Criteria	The Decision requires SoCalGas to compare possible routes and configurations (OP 6 (i)) and evaluate safety concerns for the Project (OP6 (f)). This study will: (i) estimate potential pipeline sizes for the pipeline route from production to end-use; (ii) identify specific materials for pipeline, fittings, and differences in operational equipment; (iii) discuss safety considerations, pressures, and maintenance operations associated with design; and (iv) evaluate compression characteristics and options.
	Plan for Applicable Safety Requirements	The Decision requires (OP 6 (f)) SoCalGas to evaluate safety concerns involved in pipeline transmission, storage, and transportation of hydrogen applicable to the Project. This study will evaluate safety concerns and develop an assessment of applicable safety requirements for employee, contractor, system, and public safety.

Workstream Category	Study	Description
	Workforce Planning & Training Evaluation	The Decision requires (OP 6 (e)) SoCalGas to evaluate workforce planning and training. This study will evaluate operations and maintenance protocols for utility workers regarding hydrogen infrastructure and workforce needs in terms of staging and growth for the Project.

MARKET ASSESSMENT & ALTERNATIVES STUDY DESCRIPTIONS

Project Options & Alternatives

Overview

The Decision provides for (OP 6 (d)) SoCalGas to consider and evaluate Project alternatives, including a localized hydrogen hub or other decarbonization options such as electrification. SoCalGas is also required (OP 3 (c)) to study a localized hydrogen hub solution under the specifications required to be eligible for federal funding as part of Phase One. This study will evaluate Project options, ~~and~~ hydrogen pipeline alternatives, including a localized hydrogen hub, and other alternatives, including electrification and hydrogen delivery alternatives like trucking.

Introduction

The Angeles Link system is intended to be dedicated to public use and is anticipated to consist of one or more high-pressure, open-access, common carrier trunk transmission pipelines, distribution pipelines, and appurtenances, including compressor stations. The system will transport clean renewable hydrogen, likely from multiple local and longer term regional clean hydrogen production sources to various delivery points in the Los Angeles Basin (including the concentrated commercial and industrial area in and around the Ports of Los Angeles and Long Beach), and in the broader Southern and Central California region (Project area). The system may also include pipeline delivery of clean renewable hydrogen from third -party storage facilities. The Angeles Link pipeline system may potentially be developed in stages to meet demand needs.

Angeles Link is intended to fulfill several underlying purposes, including the following:

1. To support the State of California's decarbonization goals, including the California Air Resources Board's (CARB) 2022 Scoping Plan for Achieving Net Neutrality, which identifies the scaling up of renewable hydrogen for the hard-to-electrify sectors as playing a key role in the State achieving carbon neutrality by 2045 or earlier. [1]

2. To support the State of California's decarbonization goals in the mobility sector, including the Governor's Executive Order N-79-20[2], which seeks to accelerate the deployment of zero- emission vehicles; CARB's implementation of the Advanced Clean Fleets regulation, which is a strategy to deploy medium- and heavy-duty zero-emission vehicles;[3] as well as the implementation of the March 15, 2021 Advanced Clean Truck regulation,[4] which aims to accelerate a large-scale transition of zero-emission medium-and heavy-duty vehicles.

[1] California Air Resources Board's 2022 Scoping Plan for Achieving Carbon Neutrality (November 16, 2022), at pp. 9-10, available at https://ww2.arb.ca.gov/sites/default/files/2022-12/2022-sp.pdf.
[2] https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf.
[3] Advanced Clean Fleets Regulation Summary | California Air Resources Board.
[4] Advanced Clean Trucks Regulation | California Air Resources Board.

3. To optimize service to all potential end-users in the project area by operating an open access, common carrier clean renewable hydrogen transportation system dedicated to public use.

4. To support improving California's air quality by displacing fossils fuel for certain hard -to- electrify uses, including the mobility sector.

5. To enhance energy system reliability, resiliency, and flexibility as California industries transition fuel usage to achieve the State's decarbonization goals.

6. To enable long duration clean energy storage that can further accelerate renewable development and minimize grid curtailments.

7. To provide a cost effective and affordable open access clean renewable hydrogen transportation system at just and reasonable rates.

8. To provide efficient and safe clean renewable energy transportation in support of the State's decarbonization goals.

9. Over time and combined with other current and future clean energy projects and reliability efforts, to help reduce natural gas use served by the Aliso Canyon natural gas storage facility, facilitating its ultimate retirement, while continuing to provide reliable and affordable energy service to the region.

Description of Work

Angeles Link – Phase One Analysis of Project Alternatives[5]

The Decision requires an evaluation of Project alternatives, including a localized hydrogen hub or other decarbonization options such as electrification (Project Alternatives), as well as an evaluation of costs and environmental impacts of these alternatives.[6] Some of these alternatives may not be feasible and/or may not meet the purpose and need of the Angeles Link Project. These Project Alternatives may include the following:

- Electrification - Customers switching to direct electrification instead of hydrogen in the:
  - Mobility sector (light duty and heavy duty)
  - Power sector (renewable/batteries and clean distributed energy resources (DER))
  - Commercial and Industrial sectors[8]
- Energy efficiency - Customers reducing natural gas consumption in the:
  - Mobility sector (displacing diesel/gasoline)
  - Power sector (reducing natural gas usage due to efficiency in turbines; reducing electron needs due to efficiency in electric equipment)
  - Commercial and Industrial sectors (reducing natural gas usage due to efficiency in commercial and industrial equipment)
- Renewable natural gas (RNG) – Customers using RNG instead of hydrogen for power and industrial sectors
- Continued use of traditional fuels with carbon management (e.g., source-capture, ambient/socialized capture (i.e., air, ocean))
- Alternatives to Hydrogen Pipeline Delivery
  - Trucking, train, marine, and/or hybrid of trucking/train
  - Electric transmission of renewable energy sources for hydrogen production in-basin
- A localized hydrogen hub
- Alternative routes and/or configurations of the entire Angeles Link system, each of which should include a segment that would serve demand in the Los Angeles Basin. These alternative configurations could include:
  - Alternative pipeline phases, segments, and/or configurations
  - Alternative storage locations

[5] SoCalGas proposed to record activities that are divided into three phases of costs. Phase One was proposed to include "preliminary engineering, design, and environmental studies to study supply, demand, possible end users, pipeline configuration and storage solutions and to analyze project alternatives." Phase Two was proposed to include de "a front-end engineering and design ('FEED') study, including design, engineering, and environmental studies or the preferred pipeline system." Phase Three was proposed to include "development of a formal application for a certificate of public convenience and necessary (CPCN) for the potential Project, and preparation of necessary permit applications." Final Decision (D.22-12-055), p.4.

[6] The Final Decision provides that SoCalGas must "…consider and evaluate Project alternatives, including a localized hydrogen hub or other decarbonization options such as electrification, their costs and their environmental impacts." Final Decision D.22-12-055, Ordering Paragraph 5(e).

- Alternative locations for the compressor stations

Cost-Effectiveness Analysis

The Decision requires an evaluation of the cost-effectiveness of the Project against alternatives and determining the methodology to measure cost effectiveness between the alternatives.[7] This analysis will be part of the High-Level Economic Analysis & Cost Effectiveness Study. The cost-effectiveness analysis will: (1) calculate the levelized delivered cost (reasonable range in $/kg) of clean renewable hydrogen (LCOH), (2) determine a cost-effectiveness methodology, and (3) compare cost- effectiveness ~~to~~of the ~~costs of~~ Project and Project Alternatives.

This analysis will use inputs from other Angeles Link studies, including:

1. Hydrogen production capital and operation expenditures (CAPEX and OPEX) estimates
2. Hydrogen delivery (pipeline system) CAPEX and OPEX estimates
3. Environmental and permitting costs estimates
4. LCOH, which would consider use-cases from demand studies that account for electrification adoption potential in the demand sectors

Analysis Outputs and Deliverables

1. Comprehensive economic evaluation of construction capital costs, operations and maintenance costs, and other factors including the asset life, tax credits (e.g., Inflation Reduction Act), incentives (e.g., Infrastructure Investment and Jobs Act Regional Clean Hydrogen Hubs funding), and other potential federal and state initiatives (e.g., low carbon fuel standard credits (LCFS)). The levelized delivered cost (reasonable range in $/kg) of clean renewable hydrogen should be broken out by components (i.e., capital and operating costs for the following: production, transportation, compression, and storage).
2. A methodology to evaluate the cost effectiveness of Project Alternatives
3. A levelized delivered cost comparison of the Project to hydrogen pipeline alternatives ~~system options~~ (e.g. localized hydrogen hub) and to other ~~non pipeine~~ alternatives including non-hydrogen alternatives (e.g., electrification, energy efficiency, renewable natural gas (RNG), traditional fuels with carbon management) and ~~non-pipeline~~ hydrogen delivery alternatives (e.g., trucking, in-basin production).
4. A written report and supporting economic model.

Environmental Considerations of Project Alternatives

The Decision requires consideration and evaluation of the Project Alternatives' environmental impacts. This analysis will be part of the Environmental & Environmental Social Justice

[7] The final decision provides that SoCalGas shall evaluate "the cost effectiveness of the Project against alternatives, which should include a localized hydrogen hub or electrification option, and determining the methodology to measure cost-effectiveness between the alternatives." Final Decision D.22-12-055, Ordering Paragraph 6(d).

Analysis Study. The broader Environmental & Environmental Social Justice Analysis will include a high-level desktop review and analysis of the potential environmental impacts of Project alternatives, including analysis of the potential environmental impacts of pipeline configurations and related aboveground facility alternatives, as well as a review and analysis of other decarbonization alternatives. The analysis will consist of environmental data (e.g., biological resources, cultural and tribal resources, noise, etc.) collection and synthesis, data review and analysis, feasibility flaw analysis, and Geographic Information Systems (GIS) mapping and environmental justice/disadvantaged communities' analysis as described in further detail in the Environmental & Environmental Social Justice Analysis Workstream Description. As part of this analysis, an alternatives matrix will compare potential resource impacts of the Project Alternatives. The report will also include recommendations to avoid or minimize impacts (if warranted).

Demand Study

Overview

The Decision requires (OP 6 (a) and OP 6 (c)) SoCalGas to identify hydrogen demand, end uses, and end-users (including current natural gas customers and future customers) of the Project. This study will evaluate potential clean renewable hydrogen demand and assess adoption in the Mobility, Power Generation, and Hard to Electrify Industrial sectors.

Introduction

The Demand Study will perform a comprehensive assessment of potential clean renewable hydrogen demand in SoCalGas's service territory and will cover three primary sectors:

- Mobility
- Power Generation
- Hard to Electrify Industrial, for example, direct process heating for metals[8]

The Demand Study will incorporate a range of potential usage scenarios, which consists of a conservative scenario, a moderate scenario, and an ambitious scenario for each of the primary sectors. It will also inform various other Angeles Link Phase One studies, such as the P~~p~~roject Options & Alternatives Analysis, the High-level Economic Analysis, the Greenhouse Gas Emissions Evaluation, and the Engineering & Design workstream.

Description of Work

Study Objectives

The aim of the Demand Study is to provide a comprehensive and market-validated outlook for clean renewable hydrogen demand at a range of potential usage scenarios in the Mobility, Power

[8] While the focus of the demand analysis in Phase One will be on Mobility, Power Generation, and Hard to Electrify Industrial sectors, additional sectors of potential future clean renewable hydrogen demand will be analyzed in Phase Two.

Generation, and Hard to Electrify Industrial sectors from present day to 2045. The main objectives include:

- Identify and validate demand/major end uses/representative end users from present to 2045 across three sectors at a range of potential usage scenarios:
    - Mobility, including the anticipated amount of natural gas, diesel and gasoline displaced by clean renewable hydrogen
    - Power Generation, including the anticipated amount of natural gas displaced by clean renewable hydrogen
    - Hard to Electrify Industrial, including identifying which industries within the industrial sectors would be candidates for adopting clean renewable hydrogen, and the anticipated amount of natural gas displaced for each hard to electrify industrial sector
- Consolidate results into a final report, consisting of timeline, demand map and a list of representative adopters and non-adopters
- Support integration of demand results into other Phase One studies, including Project Options and Alternatives Analysis, technical and engineering studies, and project economics evaluation

Technical Approach

1. Sub-sector assessment and priority confirmation
    a. Identify top sub-sectors using historical natural gas consumption data
    b. Align on key data sets and determine how to close information gaps
    c. Assess technological feasibility, gathering inputs from original equipment manufacturers (OEMs) when possible
2. Demand Model Development
    a. Model total addressable market
    b. Apply zero-emission adoption rates to total addressable market
    c. Assess the viability of clean renewable hydrogen vis-a-vis alternatives to determine and apply clean renewable hydrogen adoption rates
    d. Develop demand scenarios
3. Validate and Refine Model Results
    a. Conduct interviews to validate model assumptions and overall results, including availability of clean renewable hydrogen technology, identification of potential end users including current natural gas customers and future customers considering the viability by application and use-case, and costs (capital expenditure (CAPEX) and operational expenditure (OPEX))
    b. Conduct peer-reviews with entities such as academic, regulatory, or government agencies (state and federal) when possible, to provide objective feedback on ~~validate~~ approach, assumptions and outputs
    c. Incorporate input from interviews with end users and peer-reviews into the model and Final Demand Study report as appropriate

d. Incorporate input and feedback from other interested stakeholders (e.g., PAG and CBOSG) into analysis as appropriate.

Market Validation

The demand assumptions will be validated through interviews with potential end users, industry participants across the value chain, and key industry and subject matter advisors.

Group	Engagement Goals	Potential Sector Participants		
		Mobility	Power Generation	Hard to Electrify Industrial
Industry	- Validate cost, equipment, and supply chain assumptions with sector experts - Confirm demand assumptions - Conduct interviews to understand technology availability, conversion costs and alternatives	- Ports & key tenants - Transit agencies - Fleet operators - Fuel station operators - Car and truck manufacturers - Cargo-handling equipment manufacturers	- Power generation operators - Gas turbine, microgrid, and fuel-cell manufacturers	- Steel - Cement - Food / Beverages - Refineries - Other industrial facilities - Industrial equipment manufacturers
Research & Academia	- Engage technical experts to validate assumptions and integrate sub-sector deep dive knowledge	Potential ~~subject matter~~ sources ~~advisors~~: - University of California - National Laboratories		
Public Agencies & Consortiums	- Compare findings against research published by public agencies - Engage agencies and consortiums	Potential ~~subject matter advisors/references~~ sources: - CARB - South Coast Air Quality Management District (SCAQMD) - Hydrogen Fuel Cell Partnership (H2FCP) - California Energy Commission (CEC) - Department of Energy (DOE) - PAG/CBOSG (including CPUC) feedback		

Overview

The Decision requires SoCalGas to identify the potential sources of hydrogen generation for the Project (OP 6 (b)) and its plans to ensure the quality of the hydrogen gas meets the clean renewable hydrogen standards set in the Decision (OP 6 (j)). This study will evaluate potential sources of clean renewable hydrogen production from renewable energy resources such as solar and wind, the input requirements, the estimated cost of production, and policies, procedures, and other methods to meet clean renewable hydrogen standards.

Introduction

This study will cover the following topics:

- Renewable Energy & Clean Renewable Hydrogen Generation Technologies Assessment
- Technology Cost Estimating
- Production Capacity Modeling
    - Renewable Power Production Capacity
    - Clean Renewable Hydrogen Production Capacity
- Demand / Supply Balancing & Optimization
- Market Analysis
    - Renewable Power Market Analysis
    - Clean Renewable Hydrogen Market Analysis
    - Potential Supply Chain Issues
    - 3rd Party Interviews
- Procedures To Support Clean Renewable Hydrogen Production to Meet/Exceed Clean Renewable Hydrogen Standard
- Methods To Verify Compliance with the Clean Renewable Hydrogen Standard
- Map for Clean Renewable Hydrogen Production & Volumetric Changes Over Time

Description of Work

Renewable Energy & Clean Renewable Hydrogen Generation Technologies Assessment

As part of the Production Study, SoCalGas will develop an assessment of renewable power and hydrogen generation technologies to produce clean renewable hydrogen. This assessment of technologies will consider feasibility, maturity, and operating requirements. The technologies identified will be used in the optimization of clean renewable hydrogen production to develop production cost estimates.

The Production Study will identify potential generation technology resources such as solar and wind that may be suitable to producing clean renewable hydrogen as defined in the Decision,

such as hydrogen derived from electrolysis and biomass gasification.[9] This work will include examining the feasibility and maturity of these potential technologies and describing each technology's suitability for clean renewable hydrogen production. The study will also further assess potential technologies relative to their ability to serve clean renewable hydrogen production demand. This assessment will consider each technology's operating characteristics and limitations. For intermittent generation technologies, such as solar and wind, production estimates will be gathered for each of the hydrogen supply areas from publicly available data.

The Production Study will also analyze different electrolyzer types and consider hydrogen generation technologies. The study will also evaluate the different technologies in terms of potential advantages and challenges when working with different types of power generation. This analysis will be based on current technology to optimize the energy conversion efficiency for both the production of clean renewable hydrogen and the preparation for local storage and/or transport. The assessment will also consider how each electrolyzer technology pairs with the intermittency that may be associated with the preferred mix of renewable power generation technologies to provide the greatest amount of electrolyzer operation during power production.

Technology Cost Estimating

Cost estimates for clean renewable hydrogen production technologies will be developed using publicly available data, including those from the National Renewable Energy Laboratory (NREL), the U.S. Energy Information Administration (EIA) and other reputable technology cost estimators. SoCalGas will collaborate with vendors to understand supply chain constraints and how they may impact the Project schedule and phasing. The cost and availability of these emerging technologies will be combined with the technical assessment to identify an optimal clean renewable hydrogen generation scheme.

Production Capacity Modeling

The Production Study will evaluate clean renewable hydrogen production in SoCalGas's service territory taking into account seasonal, geographic, and temporal characteristics. As part of this work, the Production Study will evaluate both the renewable power generating resources and the clean renewable hydrogen producing resources needed to support various levels of clean renewable hydrogen demand across SoCalGas's system. This assessment of hydrogen production capacity will be used to inform the separate assessment of pipeline routing and configuration.

Demand / Supply Balancing & Optimization

The Production Study will consider downstream demand and consumption estimates to determine the appropriate pathways to balance clean renewable hydrogen production to meet the identified demand requirements.

[9] Decision OP 3(a) states, "feasibility studies for the Angeles Link Project shall be restricted to the service of clean renewable hydrogen that is produced with a carbon intensity equal to or less than four kilograms of carbon dioxide-equivalent produced on a lifecycle basis per kilogram and does not use any fossil fuel in its production process." As a result, while hydrogen produced via electrolysis is central to Angeles Link, the Production Study also includes other potential technology pathways that may meet the Decision's definition of clean renewable hydrogen.

Market Analysis

The Production Study will include a market analysis that identifies the current state of (a) renewable energy production in SoCalGas's service territory and (b) clean renewable hydrogen production in the United States (with due consideration of the worldwide market). For the clean renewable hydrogen production market analysis, a compilation will be created of existing and planned clean renewable hydrogen production capacity and expected production for each of the study years. The market analysis will be developed using publicly available information and account for potential supply chain issues. Information developed as part of the market analysis will be validated through third party interviews.

Procedures To Support Clean Renewable Hydrogen Production to Meet the Clean Renewable Hydrogen Standard

The Angeles Link Phase One studies adhere to the clean renewable hydrogen standard set forth in the Decision, which is defined as hydrogen produced with a carbon intensity equal to or less than four kilograms of carbon dioxide-equivalent (CO_2e) produced on a lifecycle basis per kilogram and does not use any fossil fuel in its production process.[10] The Production Study will evaluate the ability to generate the required quantity of hydrogen powered by sufficient renewable resources to meet the Decision's clean renewable hydrogen standard.

Methods To Verify Hydrogen Production Meets the Clean Renewable Hydrogen Standard

The Production Study will assess potential options to ensure the hydrogen received by the Angeles Link Project meets the clean renewable hydrogen standards set forth in the Decision. Potential verification methods may include certifications.

Map for Clean Renewable Hydrogen Production & Volumetric Changes Over Time

The Production Study will develop a model to illustrate production capacity primarily within the SoCalGas service territory. Data attributes for anticipated hydrogen production and volumetric changes over time will be consistent with Demand Study, discussed above.

High-Level Economic Analysis & Cost Effectiveness

Overview

The Decision requires (OP 6 (d)) SoCalGas to evaluate the cost-effectiveness of the Project against alternatives and determine a methodology to measure cost effectiveness between alternatives. This study will determine a methodology to measure cost effectiveness that includes

[10] The Final Decision provides that "Feasibility studies for the Angeles Link Project shall be restricted to the service of clean renewable hydrogen that is produced with a carbon intensity equal to or less than four kilograms of carbon dioxide equivalent produced on a lifecycle basis per kilogram and does not use any fossil fuel in the production process." Final Decision D.22-12-055, Ordering Paragraph 3(a).

gathering cost estimates, performing an economic analysis to determine the potential levelized cost of clean renewable hydrogen to be delivered to end-users, and comparing the cost effectiveness of the Project against various project alternatives.

Note: The summary description for the High-Level Economic Analysis & Cost Effectiveness workstream was provided in the "Project Options & Alternatives" section above.

REGULATORY, POLICY & ENVIRONMENTAL WORKSTREAM STUDY DESCRIPTIONS

Water Resources Evaluation

Overview

The Decision requires (OP 6 (b)) SoCalGas to identify the potential sources of clean renewable hydrogen generation and water and estimate the costs of the hydrogen for the Project. This study will evaluate the availability of water resources for clean renewable hydrogen production in Central and Southern California regions.

Introduction

The purpose of this effort is to provide a study on water availability and options relating to potential clean renewable hydrogen production. The results of this study, coupled with renewable energy generation sites will inform the most advantageous and cost-effective locations for hydrogen production being evaluated in SoCalGas' Production Planning & Assessment Study.

Description of Work

The Water Resources Study will contain two main components: (1) an evaluation of various types of water availability for clean renewable hydrogen production in Central and Southern California; and (2) an evaluation of potential risks and opportunities associated with water availability that may impact the production of clean renewable hydrogen.

Water Resources Availability

As part of this assessment, this study will identify and evaluate potential water sources (e.g., recycled water, advanced treated water, surface water through water exchanges, and other potential sources such as produced (brine) water), quantifiable ranges of available water for potential production areas, and the feasibility of acquiring that water. This assessment will include potential in-basin water sources. Specific activities include:

- Local agency outreach to validate conclusions regarding water supply availability and reliability.
- An analysis of baseline conditions for water resources, including identification of potential water supply sources, existing demands, and the management structure applicable to each.
- An assessment of the typical water quality requirements for the electrolysis process needed for clean renewable hydrogen generation.

- A high-level engineering evaluation to identify water treatment and supporting water infrastructure needs (including conveyance options), potential co-location opportunities, and rough order-of-magnitude cost estimates.~~11~~

Prioritization, Risk Identification, Risk Management

As part of this assessment, this study will also identify potential risks associated with access to water supply for the project (including water rights and water quality) and develop strategies to manage those risks. This study will then prioritize potential options for water supply development based on the goals, risk profile, opportunities, and benefits identified. Specific activities include:

- Identification of risks and opportunities impacting access to water supply for clean renewable hydrogen production, including issues that could interrupt water supply, how and when each issue may occur, and how each issue may affect supply reliability.
- Evaluation of water options that should be prioritized based on goals, risk profile, opportunities, and benefits.
- ~~Development of analogous water use activities to provide context for potential water needs of clean renewable hydrogen production to support the Project.~~ [11]

Nitrogen Oxides (NOx) Emissions Assessment

Overview

The Decision requires (OP 6 (h)) SoCalGas to assess potential NOx emissions associated with the Project, including appropriate controls to mitigate emissions. The NOx assessment will evaluate NOx and other air emissions associated with storage and transportation of hydrogen, as well as NOx emissions associated with end users. Key areas of focus will be on hard to electrify industrial sectors, the mobility sector, and power generation.

Introduction

The objective of this study is to assess the potential for both NOx emissions increases and reductions resulting from Angeles Link and to identify potential NOx mitigation measures to reduce potential NOx emissions. Although NOx will be the primary focus of this emissions assessment, the study will also include a high-level assessment of other potential emissions.

Description of Work

Study Approach

[11]This activity was eliminated before work was initiated as the information was no longer considered necessary to support the Water Resources Evaluation study.

The consultant will estimate NOx associated with the anticipated storage and transportation of hydrogen and estimate NOx emissions from end users (mobility, power generation, and hard to electrify industrial sectors). Additionally, potential NOx mitigation measures will be identified to control NOx emissions. Where applicable, the consultant will rely on specific technical information (about facilities, equipment, processes, throughputs, etc.) that is available including, from the Demand Study and other ongoing Phase One feasibility studies, regulatory (including the SCAQMD) and transportation agencies, and other available information and studies. If specific information is not available, the consultant will develop estimates based on availability of related data or documented assumptions. The study will also include a high-level assessment of other potential emissions.

Technical Approach

Identify Emissions Source Types and Mitigation Measures

The consultant will identify the following to develop emission calculation approaches:

1. NOx and other emissions from end users in the Hard to Electrify Industrial sectors, Mobility (focused on heavy-duty trucks), and Power Generation (initial focus on existing power plants such as Scattergood, Haynes, Harbor, and Valley) sectors.
2. NOx and other emissions from storage and transportation of hydrogen.

NOx Mitigation Measures

For each source type identified above, the consultant will also identify potential NOx mitigation measures for existing, emerging/new, and alternate equipment. The consultant will use a top-down evaluation to prioritize and rank the measures identified for each source type.

Determine Calculations Approaches and Methodologies

For each emission source type identified, the consultant will prepare calculations to estimate emissions and mitigation of emissions. Studies may identify calculation approaches for a particular source type based on emission factors, stoichiometric calculations, testing data, continuous emissions monitoring systems, or other approaches based on types of datasets that may be available.

For the selected calculation approach, the consultant will determine the calculation method including the equations, constant and variable data, and configuration information to conduct the calculations.

Conduct Emissions Calculations

The consultant will prepare emission calculations using the emission factors and activity data compiled for each of the source types. The tool will be designed to conduct calculations at the unit level (per unit equipment count, unit distance, unit throughput, or other unit parameters, as applicable). The emissions calculation tool will scale from unit level information to estimate

impacts across the geographic region that Angeles Link spans. Emission calculations will utilize information from evaluated research, the Demand Study, and other Phase One feasibility studies.

Hydrogen Leakage Assessment

Overview

The Decision directs (OP 6 (g)) SoCalGas to assess the risks and mitigations for hydrogen leakage. During Phase One, an evaluation of potential hydrogen leakage associated with production, storage, and transportation of clean renewable hydrogen will be prepared. Identification and evaluation of potential mitigation measures will also be included.

Introduction

This scope includes study of potential clean renewable hydrogen leakage associated with hydrogen production/transportation/storage. Anticipated sources include, but are not limited to, electrolyzers, pipeline venting, compressor venting, compressor rod packing, fugitive components (i.e., valves, flanges, connections, etc.), above ground tanks, and underground reservoirs. The objective of this study is to assess potential leakage of hydrogen related to Angeles Link and to identify mitigation measures to reduce the potential leakage.

Description of Work

Study Approach

The consultant will evaluate potential sources of hydrogen leakage associated with the production and storage/transportation of hydrogen related to the proposed Angeles Link Project. Where applicable, the consultant will rely on specific technical information that is available including, from other ongoing Phase One feasibility studies and other available information and studies. If specific information is not available, the consultant will develop estimates based on availability of related data or documented assumptions.

Technical Approach

Identify Potential Hydrogen Leakage Source Types and Mitigation Measures.

The consultant will identify the following:

Potential hydrogen leakage source types including processes and equipment involved in hydrogen production, storage, and transport. Research conducted under the parallel Production Study, Preliminary Routing/Configuration Analysis, and Storage Studies (Underground Storage and Aboveground Storage) will help inform the analysis of potential leakage related to these sources.

Mitigation Measures

For each potential source of leakage identified above, the consultant will also identify potential mitigation measures for existing, emerging/new, and alternate equipment including available sensors and leak detection methodologies. The consultant will use a top-down evaluation to prioritize and rank the measures identified for each source type.

Determine Calculations Approaches and Methodologies

For each source type identified in the above task, the consultant will identify potential calculation approaches for leakage. Based on a review of available studies and preliminary data, the consultant will outline the options for calculation approaches and evaluate the options to determine the best calculation approach for each source. Criteria for evaluation may include accuracy, availability of data, scalability of leakage calculations, probabilistic analysis, etc.

For the selected calculation approach, the consultant will determine the calculation method including the equations, constant and variable data, and configuration information that would be needed to conduct the calculations. Calculation methods will be scalable such that changes to anticipated equipment counts, mitigation measures, estimated throughput, or the anticipated number of scenarios could be easily incorporated into calculations.

Conduct Leakage Calculations

The consultant will develop a calculation tool and include each potential source of leakage. The tool will be built for scalability to accommodate changes in equipment/component counts, lengths of pipelines, compression needs, storage requirements, throughputs, and configurations. The calculation tool will be tested for accuracy and ease of use. The emissions calculation tool will scale from unit level information to estimate impacts across the geographic region that Angeles Link spans. Estimates will include information from evaluated research, the Demand Study, and other Phase One feasibility studies, as applicable.

Greenhouse Gas Emissions Evaluation

Overview

The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental laws and public policies. To support environmental laws and public policies, SoCalGas will conduct an initial evaluation of greenhouse gas (GHG) emissions increases and decreases from end users associated with the Project. This assessment will evaluate GHG emissions associated with compressors for storage and transportation of hydrogen, as well as GHG emissions associated with end users. Key areas of focus will be on the Mobility, Power Generation, and Hard to Electrify Industrial sectors.

Introduction

This scope includes a study of GHG emissions associated with fuel use by compressors and by end users in the Mobility, Power Generation, and Hard to Electrify Industrial sectors. The

objective of this study is to assess the potential for both GHG increases and reductions resulting from Angeles Link and to identify mitigation measures to reduce potential GHG emissions.

Description of Work

Study Approach

The consultant will estimate GHG emissions associated with the anticipated storage and transportation of hydrogen and estimate potential GHG emissions and GHG emissions reductions from end users (Mobility, Power Generation, and Hard to Electrify Industrial sectors). Additionally, potential GHG mitigation measures will be identified to control GHG emissions. Where applicable, specific technical information (about facilities, equipment, processes, throughputs, rates, costs etc.) that is available from the Demand Study and other parallel Phase One studies, regulatory agencies, or other studies will be used. If specific information is not available, general information available from the same sources will be used. If general information is not available, estimates based on availability of related data or documented assumptions will be developed.

Technical Approach

Identify Emissions Source Types and Mitigation Measures

The consultant will identify the following to develop emission calculation approaches:

1. GHG emissions from end users in the Hard to Electrify Industrial processes, Mobility (focused on heavy-duty trucks), and Power Generation (initial focus on existing power plants such as Scattergood, Haynes, Harbor, and Valley) sectors.
2. GHG emissions from storage and transportation of hydrogen.

GHG Mitigation Measures

For each source type identified above, the consultant will also identify potential GHG mitigation measures for existing, emerging/new, and alternate equipment. The consultant will use a top-down evaluation to prioritize and rank the measures identified for each source type.

Determine Calculations Approaches and Methodologies

For each emission source type identified, the consultant will prepare calculations to estimate emissions and mitigation of emissions. Studies may identify calculation approaches for a particular source type based on emission factors, stoichiometric calculations, testing data, continuous emissions monitoring systems, or other approaches based on types of datasets that may be available.

For the selected calculation approach, the consultant will determine the calculation method including the equations, constant and variable data, and configuration information to conduct the calculations.

Conduct Emissions Calculations

The consultant will prepare emission calculations using the emission factors and activity data compiled for each of the identified source types. The tool will be designed to conduct calculations at the unit level (per unit equipment count, unit distance, unit throughput, or other unit parameters, as applicable). The emissions calculation tool will scale from unit level information to estimate impacts across the geographic region that Angeles Link spans. Estimates will include information from evaluated research, the Demand Study, and other Phase One feasibility studies, as applicable.

Environmental & Social Justice Analysis

Overview

The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental law and public policies. Further, the Decision directs SoCalGas to address and mitigate impacts to disadvantaged communities and other environmental justice concerns (OP 6 (l)). SoCalGas will conduct an initial evaluation of a clean renewable hydrogen transportation system's compliance with environmental law and public policies, which will include an assessment of environmental impacts of project alternatives, environmental justice concerns and impacts to disadvantaged communities.

Introduction

This scope includes a desktop analysis of the Project's potential environmental impacts, potential environmental impacts of selected alternatives, and potential environmental justice concerns related to the Project.

Description of Work

Desktop Environmental Analysis

Under this task, a desktop analysis for a preferred potential pipeline transportation system route and for a second preferred potential pipeline transportation system route will be conducted. The desktop analysis will be performed using GIS and review of aerial imagery. Research of online databases will also be used to obtain relevant information and aid in the analysis. The following steps will be taken to conduct the analysis and prepare reports for the potential pipeline routes and associated facilities, production facilities, and potential storage facilities.

- *Data Collection and Synthesis*: Collect available public data and data from other projects in Southern and Central California, including, but not limited to, landownership, conservation areas, vegetation communities, species data, wetland and waters information, known hazards sites, and soils and geological hazards data.

  Data Review and Analysis: Assess and analyze the types of resources that intersect with potential pipeline transportation facilities. The resource areas that ~~will~~ could be analyzed include air quality/greenhouse gas emissions, ~~aesthetics, agriculture and forestry~~

~~resources~~ biological resources, cultural and tribal resources, energy, ~~energy, geology, and soils,~~ hazardous and hazardous materials, hydrology and water quality, and land use and planning.~~, noise, and transportation.~~

- *Feasibility Analysis*: Review unique identifiers for areas that have potential permitting challenges, as identified in the High-Level Feasibility & Permitting Analysis.

Alternatives Analysis - Environmental

Note: The summary description for the Alternatives Analysis that will be performed as part of the Environmental and Social Justice Analysis workstream was provided in the "Project Options & Alternatives" section above.

Environmental Justice Analysis

~~Analysis under t~~This task will in~~clude a summary analyzing~~volve conducting an Environmental Justice (EJ) screening and preparation of a Stakeholder Engagement Plan. The EJ screening analysis will include an assessment of potential environmental justice (EJ) impacts to disadvantaged communities and proposed actions for mitigating potential impacts. This analysis will use CalEnviroScreen and consider other agency tools. This information may also include EPA EJScreen data, the Biden-Harris Administration's Climate and Economic Justice Screening Tool, community facilities, Census data, and demographic data.

The analysis will also demonstrate the Project's alignment with applicable goals and objectives in the CPUC's Environmental and Social Justice Action Plan 2.0, as well as potential impacts and benefits to disadvantaged communities and other low-income communities of color. Assembly Bill 617 communities located in SoCalGas's service territory that have been selected by the California Air Resources Board to participate in the Community Air Protection Program will be highlighted in the impact and benefits analysis.

After the CalEnviroScreen has been run and evaluated, a methodology will be established for identifying and delineating EJ communities, including underserved or potentially vulnerable communities. Following the development of the methodology, the consultant will identify final parameter values to review the preferred alternative(s) and work with the data collected by GIS to map EJ communities.

The information gathered through EJ screening and PAG/CBO feedback will facilitate preparation of the Environmental Justice Community Engagement Plan. The Environmental Justice Community Engagement Plan will establish an approach for engaging disadvantaged communities with activities anticipated to occur during Phase Two, which will focus on gathering community input to address concerns and mitigate impacts and educating communities on hydrogen related topics of most interest to community members.

High-Level Feasibility Assessment & Permitting Analysis

Overview

The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct a high-level assessment of potential environmental and regulatory approvals, including federal, state and local environmental permitting and regulatory approvals, regulatory approval timing, and environmental constraints.

Introduction

This analysis is intended to build upon the conceptual pipeline permit assessments in a Hydrogen Pipeline Study completed in 2021 by SPEC Services for SoCalGas (Appendices 6a-6d: Proposed SoCalGas H2 System Pipeline Permit Identification, Strategy, and Risk completed in 2021) ("2021 Study")[12] but it will describe in more detail potential permitting challenges for the proposed Angeles Link Project. For pipeline sections studied under the 2021 Study, updates will focus on changes in pipeline sections and changes in applicable material environmental regulations since the 2021 assessments. A new high-level feasibility assessment and permitting analysis report for the potential routes for proposed Angeles Link Project will be completed.

Description of Work

The analysis by pipeline segment will include the following information: (1) potential environmental permit requirements for each route including but not limited to: (a) federal, state and local jurisdictions with environmental permitting authority; (b) environmental permits potentially triggered for each pipeline route; and (c) high level permitting schedule for each proposed route; (2) discussion of environmental review subject to CEQA and/or NEPA including potential lead agencies; and (3) identification of permitting pathways for each proposed routes, including a discussion of environmental constraints that could make each route potentially un-permittable (if applicable). This analysis will be further informed based on available information from the concurrent market assessment & alternatives Phase One feasibility studies.

Right-of-Way Analysis

Overview

The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing private rights-of-way to accommodate the Project and future right-of-way locations needed.

Introduction

The Right-of-Way Analysis will include a land rights and rights of way (ROW) rights review for potential pipeline transportation system routes.

Description of Work

This review includes identifying existing pipeline easements and ROWs where pipelines can potentially be installed and locations that may require new easements or ROWs, with a focus on preliminary routes identified in the engineering preliminary routing/configuration analysis.

Franchise Analysis

Overview

The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing franchises[13] to accommodate the proposed routes and future franchises needed for the proposed routes.

Introduction

This study includes identifying existing franchises to accommodate the proposed routes and future franchises needed for the proposed routes.

Description of Work

The Franchise Analysis will assess existing franchise agreements (including, to the extent applicable, municipal ordinances and/or charters that implicate the same) vis-a-vis preliminary routing concepts. This work includes initial review and analysis of: (1) the number and types of SoCalGas projects in applicable municipalities; (2) an assessment of SoCalGas's rights in its existing franchised ROWs (including existing franchise agreement payment mechanisms and other terms or conditions that may implicate clean renewable hydrogen as well as related municipal ordinances and charters) and (3) potential terms or conditions, as developed, for clean renewable hydrogen franchises.

[13] A contract, generally in the form of an ordinance passed by a municipality, that grants SoCalGas 'the right, privilege and franchise to lay, construct, operate, maintain, use, repair, replace or remove pipelines, and appurtenances thereto, for transmitting and distributing gas for any and all purposes under, along, across over or upon a municipality's city's existing rights-of-way.'

ENGINEERING & DESIGN WORKSTREAM STUDY DESCRIPTIONS

Preliminary Routing/Configuration Analysis

Overview

The Decision requires (OP 6 (i)) SoCalGas to identify and compare possible routes and configurations for the Project. This study will (i) determine preferred routing/configuration alternatives for hydrogen system; (ii) consider existing pipeline corridors or rights-of-way, other known existing rights-of-way, franchise rights, designated federal energy corridors or rights-of-way, and the need for new rights-of-way; and (iii) evaluate technical considerations, major crossings, elevations, terrain types, and other potential geographical and urban challenges. This study includes high-level construction staging for implementation of routes and evaluation of a localized hydrogen hub. As part of the configuration analysis, SoCalGas will conduct an initial evaluation of hydrogen storage technology. SoCalGas will assess storage proximity to the Southern California region and both aboveground and underground technologies.

Introduction

This study will consider the following areas, including those that are evaluated in other studies:

- Pipeline routing & constructability factors
- Potential production and storage locations
- Potential locations of demand

Description of Work

In addition to integrating information from other workstreams, this work will evaluate pipeline routing constructability factors, develop route evaluation criteria to determine the most feasible route, and develop preferred pipeline routes.

Pipeline Routing Constructability Factors

The following constructability factors will be considered when refining and evaluating each of the conceptual system pipeline routing scenarios:

- *Workspace* - Assess the proposed routing in terms of required workspace to successfully install the new hydrogen pipeline for each route. Workspace considerations include new permanent and temporary easements, existing pipeline corridors and rights-of-way, additional temporary workspaces, staging areas, and access roads required for construction feasibility among various terrain and environment types.
- *Crossing Methods* - Appropriate crossing methods will be determined for feasibility; considerations include pipe/utility crossings, spans, private or public roadways, highways, railroads, and environmentally sensitive areas.
- *Open-Cut Trench* - Proposed routing will be reviewed to determine the limits of open-cut installation for the new pipeline routes, including the extent of how open-cut trenching will affect the required workspace footprint and construction production rate for a single

and multi-pipeline corridor.

- *Trenchless Installations* - Review all locations within the conceptual routes to evaluate proposed trenchless installations at locations such as Union Pacific Rail Roads, Caltrans, waterbodies, and environmentally sensitive areas. Includes high-level evaluation of potential for shallow Horizontal Directional Drilling application, reducing surface impacts.
- *Construction Methods* - Determine the most appropriate methods for the installation of the new hydrogen pipeline routes and identify alternative construction methods where applicable, along with potential construction schedule/cost impacts.
- *Mainline Valves* - Valve siting and spacing will be performed referencing 49 CFR Part 192 and industry best practices. Additional line break mainlines valve will be considered for crossing seismically active faults.

Evaluation Criteria

Route evaluation criteria will be developed to determine the most feasible route. Evaluation criteria will be quantifiable characteristics of a pipeline, generally reflecting such things as the following: constructability, sustainability, access, workspace, land use, biological, cultural, socioeconomic, and aquatic resources. The evaluation criteria will be separated into three main categories:

1. Engineering Constraints (e.g., pipeline length and diameter; number of infrastructure crossings; soil and geotechnical conditions)
2. Social Constraints (e,g., number of parcels or residences crossed, land uses, historic locations, community designations)
3. Environmental Constraints (e.g., biological resources, known hazardous sites, permits required, environmental justice)

Preferred Route Selection and Development of the Feasibility Study Report

Evaluation criteria will be used to establish the preferred pipeline route. To account for different levels of concern, a weighted value will be established and assigned to each factor to reflect the priority it will be given during the route evaluation process. These weights will be utilized to compare various routes. The goal is to determine the top-scoring routes for each of the routing scenarios to consider for further evaluation. Once these routes are identified, GIS maps will be prepared.

Pipeline Sizing & Design Criteria

Overview

The Decision requires SoCalGas to compare possible routes and configurations (OP 6 (i)) and evaluate safety concerns for the Project (OP6 (f)). This study will: (i) estimate potential pipeline sizes for the pipeline route from production to end-use; (ii) identify specific materials for

pipeline, fittings, and differences in operational equipment; (iii) discuss safety considerations, pressures, and maintenance operations associated with design; and (iv) evaluate compression characteristics and options.

Introduction

The Pipeline Sizing and Design Criteria Study will cover seven topics:

- Preliminary Basis of Design
- Pipeline Sizing Evaluation & Pressure Profile
- Hydrogen Compression Requirements
- Operational Considerations
- Material Selection
- Evaluation of Options for the Underground Storage of Hydrogen
- Excluded Options

Description of Work

Preliminary Basis of Design

The study will first develop a preliminary basis of design, which will be informed by work previously conducted in the 2021 Hydrogen Pipeline Study.[14] Components of the preliminary basis of design include:

- Design pressure and maximum allowable operating pressure
- Piggability
- Corrosion allowance
- Supervisory Control and Data Acquisition (SCADA) System, Control, Philosophy, Communication, & Monitoring
- Pipe Coating

Many of these components of the preliminary design basis and routing will require iteration and refinement throughout the Phase One process, including to identify optimal pipeline routing, diameter, design, compressor station location(s) and material specifications.

Thus, the Preliminary Basis of Design will continue to be updated throughout Phase One, incorporating optimized data derived from other Angeles Link Phase One studies.

[14] The 2021 Study is available at https://www.socalgas.com/sustainability/hydrogen/angeles-link/technical-documents/spec-reports.

The Preliminary Basis of Design will comply with the following criteria aspects:

1. Applicable federal, state, and local laws and regulations
2. Applicable gas standards and specifications
3. Applicable industry best practices
4. Pipeline design factors including:

    a. *Design Pressure & Maximum Allowable Operating Pressure (MAOP)* - Considering the importance of material specification selection, as it pertains to achieving a low percentage of SMYS (Specified Minimum Yield Strength), due to hoop stress operating pressure among Department of Transportation (DOT) Class Locations.

    b. *Piggability* - Considering the importance of employing piggable fittings, mainline valves, and pig trap stations, in a pipeline design to verify it is feasible for future integrity smart pig runs and potential impacts on routing options.

    c. *Corrosion Allowance* - Considering corrosion allowance in the development of pipe wall thickness. Metallurgical analysis of the relationship between the proposed pipeline material, pipeline medium, and existing site conditions will be utilized to determine the appropriate limits of this allowance.

    d. *SCADA System, Control Philosophy, Communication, & Monitoring* - Developing a conceptual design basis for the necessary SCADA monitoring of hydrogen system.

    e. *Pipe Coating* - Developing recommendations for pipe coatings for each installation method and environment for each conceptual system pipeline routing scenario.

Pipeline Sizing Evaluation & Pressure Profile

Pipeline sizing options will be developed to meet the needs of the anticipated operating conditions for the new hydrogen pipeline, including high-level considerations for resiliency and reliability, incorporating each step in the sequential supply/demand increase of the Angeles Link system. Multiple sizing options will be reviewed, focused on maintaining reasonable pressure loss, and provide for future capacity sizing considerations. Linear feet, elevation changes, and pipeline inner diameter will determine the systems' hydraulic profile or system curve. Optimizing the system curve will be both a result of and an input to the routing study.

Hydrogen Compression Requirements

Compressor station location(s) will be evaluated to determine and optimize total compression horsepower (hp) and heat exchange requirements for the system. The system curve will dictate locations that need additional energy input to transport the hydrogen and maintain system pressures in the required delivery range, including high-level considerations for resiliency and reliability. Optimizing the total energy input into the system, utilizing existing assets and rights-of-way, avoiding environmentally sensitive and poor constructability areas will be inputs to the routing study.

Operational Considerations

The number and nominal diameter (ND) of pipelines will be determined to optimize cost when considering pigging requirements, the need to install mainline valves (MLVs), and automated crossover valves which will be required between pipelines.

Material Selection

The accompanying required wall thickness and grade will be determined per 49 CFR Part 192 and industry best practice (e.g., ASME B31.12, Hydrogen Piping and Pipelines). The necessary metallurgical recommendations will also be identified to promote longevity in the lifecycle of the new pipeline. Pipeline material considerations from a supply standpoint will also be reviewed to inform construction timelines.

Evaluation of Options for the Storage of Hydrogen

The study will evaluate the potential for storage of hydrogen in aboveground and geologic environments including salt caverns, hard rock caverns/mineshafts, and depleted oil and gas fields.

For all options, the evaluation will include identification of potential storage sites and a detailed evaluation of the following:

1. Readiness level of the sites for hydrogen storage
2. Risks associated with deployment (start-up), routine operations, and associated Environmental Health and Safety (EHS) considerations
3. Expected operating characteristics including injection and withdrawal limitations and capabilities
4. Assessment of proven examples
5. Suitability for daily or seasonal usage
6. High-level economic analysis and costing

Excluded Options

Evaluation of technologies that transport hydrogen via other chemical carriers like ammonia and dibenzyltoluene are excluded from the scope of this work.

Plan for Applicable Safety Requirements

Overview

The Decision requires (OP 6 (f)) SoCalGas to evaluate safety concerns involved in pipeline transmission, storage, and transportation of hydrogen applicable to the Project. This study will evaluate safety concerns and develop an assessment of applicable safety requirements for employee, contractor, system, and public safety.

Introduction

SoCalGas seeks to evaluate safety considerations and develop plans for applicable safety requirements, which will consist of a safety assessment with the following features:

- Listing of Safety Considerations
- Listing of Specifications, Standards, Protocols
- Employee, Contractor, System, and Public Safety

Description of Work

Listing of Safety Considerations

The safety assessment will include the following features:

1. High-level characterization of the physical and chemical properties of hydrogen that could impact safety in the proposed gas transmission system (including pipeline, compression, storage, and transportation).
2. A description of key safety risks, including seismic events, and potential mitigations (utilizing available industry standards).
3. A summary of the key safety codes in the US and globally.
4. Specifications, standards, and protocols for leak detection and employee safety.
5. Typical operations and maintenance considerations for 100% hydrogen systems to guide pipeline and facilities handling.
6. A description of organizations accredited to undertake hydrogen safety training, operator training, ~~and~~ operator qualifications, and opportunities for collaboration with other stakeholders (community colleges, ports, etc.).
7. A summary of public safety concerns and stakeholder engagement processes, including approximate timing of engagement, to help guide the development of Hydrogen Public

Awareness Plans.

8. High-level evaluation of existing safety programs, plans, and systems for applicability to 100% hydrogen systems.
9. A summary of lessons learned and other relevant information gained from actual experiences that could be applicable to the proposed Angeles Link system (including pipeline, compression, storage, and transportation).

Listing of Specifications, Standards, Protocols

The study will identify applicable codes, specifications, and standards currently under use. In addition, it will reference industry codes as applicable to develop a list of potential new specifications and protocols which may be under development.

Employee, Contractor, System, and Public Safety

Existing internal standards and procedures applicable to SoCalGas employees, contractors, system, and public safety will be evaluated for potential updates as applicable to hydrogen.

Workforce Planning & Training Evaluation

Overview

The Decision requires (OP 6 (e)) SoCalGas to evaluate workforce planning and training. This study will evaluate operations and maintenance protocols for utility workers regarding hydrogen infrastructure and workforce needs in terms of staging and growth for the Project.

Introduction

As part of this analysis, SoCalGas seeks to conduct an assessment and complete a strategic evaluation of current workforce and internal training standards compared to future workforce classification and training needed to strategically build, transfer, and transition workforce to maintain and operate hydrogen infrastructure. The analysis will identify updates to internal standards to demonstrate compliance with federal and state law, including 49 CFR Part 192 and applicable CPUC General Orders (such as General Order 112-F).

The study will address:

- Operations & Maintenance Protocols
- DOT and Other Construction Qualification / Protocols
- Timeline for Workforce Staging
- Comparison to Existing Company Facilities
- Risk / Mitigation Assessment
- Change to Existing Processes
- Changes to Technology & Implementation

Description of Work

Operations & Maintenance Protocols

The study will evaluate current natural gas operations and maintenance protocols for applicability to hydrogen system protocols, which will include reviewing existing Company requirements, 49 CFR Part 192, and CPUC General Order No. 112-F.

DOT and Other Construction Qualification / Protocols

Construction qualifications for clean renewable hydrogen facilities will require pipe material specifications, welding specifications, and other typical construction activities specifications that are specific to hydrogen and may potentially overlap with existing qualifications. These will be reviewed and may include modifications to existing specifications or additional, stand-alone specifications.

DOT drug and alcohol testing requirements are specified by 49 CFR Part 199; the study will review the Company drug and alcohol testing policy for any needed changes.

Timeline for Workforce Staging

The study will include a quantitative analysis on the timeline for workforce staging and growth in the construction and long-term maintenance and operation of the Angeles Link Project, including an estimate of jobs created. As the construction timetable is produced, the timeline for workforce staging and growth may be updated to reflect the additional information. Opportunities for partnering with local training centers, colleges and industry will be considered.

Comparison to Existing Company Facilities

Existing SoCalGas processes and procedures will be reviewed for existing natural gas facilities (per 49 CFR Part 192 subparts A through P) and an analogous comparison will be performed for hydrogen facilities. Potential modifications applicable to hydrogen gas will be considered along with the comparison process.

Risk / Mitigation Assessment

A review of the existing risks associated with workforce planning and training applicable to hydrogen pipeline operation will be conducted. Technical competency gained through training and previous work experience will be reviewed as part of this risk and mitigation assessment, including lessons learned from prior incidents as applicable to hydrogen.

Change to Existing Processes

A review will be conducted of the following existing internal processes:

1. Leak survey
2. Leak detection
3. Leak mitigation and repair
4. Control room and emergency response protocols
5. Integrity management (as specified in 49 CFR Part 192, Subpart O and ASME B31.8S)

Potential gaps in existing processes and considerations related to the safe operation and maintenance of hydrogen pipelines will be identified.

Changes to Human Resource Considerations

Recommendations with respect to human resources considerations will be developed in the following areas:

1. Hydrogen system control room management philosophy, including:
    a. Potential for additional controllers for the Angeles Link system (separate from the existing natural gas system controllers)
2. Potential for separate job classifications for the Angeles Link system, such as:
    a. Facility operations
    b. Facility maintenance
    c. Leak survey
    d. Valve maintenance
    e. Emergency response
    f. Public liaison with emergency response agencies

Changes to Technology & Implementation

A review of the potential changes or additional technology needs related to pipelines transporting 100% clean renewable hydrogen, including:

1. Close Internal Survey (CIS)
2. Systems Analysis Programming (SAP) and Asset Management/GIS
3. SCADA – Capacity and scalability of existing SCADA to include hydrogen system

As certain physio-chemical properties of hydrogen may differ significantly from natural gas, additional considerations to the technology utilized on the system must be reviewed. A system reliability assessment will be performed to specify the system controls needed to understand normal operational patterns, recognize abnormal operational conditions, and to have the capability to schedule maintenance and predict curtailment conditions.

APPENDIX 10 - TECHNICAL APPROACH DOCUMENT

Angeles Link
Technical Approach for Phase One Studies

Table of Contents

INTRODUCTION

SoCalGas is undertaking a series of studies consistent with the California Public Utilities Commission's (CPUC) Decision Approving the Angeles Link Memorandum Account to Record Phase One Costs (Decision 22-12-055) (Decision).

As part of SoCalGas' effort to provide transparency to the Planning Advisory Group (PAG) and Community Based Organization Stakeholder Group (CBOSG) members, we have proposed a study milestone review and feedback process. PAG and CBOSG members have been provided the opportunity to review descriptions of work for each Phase One feasibility study (Milestone or Step 1) and will be provided with the opportunity to review and provide feedback on technical approaches (i.e., methodology), data and preliminary findings, and study draft reports. This document provides the second step in the review and feedback process, which is the technical approach for each study being conducted under Phase One of the Angeles Link Project (Project). Technical approaches presented reflect feedback provided by PAG and CBO members on Phase One descriptions of work. Each technical approach is being provided to both PAG and CBOSG members for feedback. SoCalGas views the work being conducted for each of the studies to be part of an iterative process, and will seek feedback from the PAG, CBOSG, and other stakeholders as the work progresses. The work may be modified and adapted as feedback is received and additional information is generated, as appropriate.

The technical approach for each study is categorized by three workstreams: Market Assessment & Alternatives, Regulatory, Policy & Environmental, and Engineering Design. This follows the same format that was provided in the Phase One Study Description to PAG/CBOSG members on July 6th, 2023.

MARKET ASSESSMENT & ALTERNATIVES TECHNICAL APPROACH

Project Options & Alternatives

Overview

The Decision provides for Order Paragraph (OP 6 (d)) SoCalGas to consider and evaluate Project options and alternatives, including a localized hydrogen hub or other decarbonization alternatives such as electrification. SoCalGas is also required (OP 3 (c)) to study a localized hydrogen hub solution under the specifications required to be eligible for federal funding as part of Phase One. This study will evaluate Project options, hydrogen pipeline alternatives, including a localized hydrogen hub, and other alternatives, including electrification and hydrogen delivery alternatives like trucking.

Technical Approach

SoCalGas will 1) identify and evaluate a range of options to the proposed Project that may meet the Project's purpose, need, and objectives, and 2) compare the Project to hydrogen pipeline alternatives and other alternatives. Other alternatives include:

- Non-hydrogen alternatives (e.g., electrification)
- Hydrogen delivery alternatives (e.g., trucking, in-basin production).

The underlying purpose of the Project, along with potential project options and alternatives that may be studied, are set forth within the Scope of Work Descriptions for Phase One Studies.

1) Hydrogen pipeline system options and alternatives

Information for the *Project Options & Alternatives Study* will be compiled from work being completed within other Angeles Link Phase 1 studies including:

- *Preliminary Routing/Configuration Analysis*
- *Pipeline Sizing & Design Criteria*
- *High-Level Economic Analysis & Cost Effectiveness*
- *Environmental & Social Justice Analysis*.

To see how the different information will be gathered within the individual studies – please reference the specific study.

Engineering & Design Alternatives

SoCalGas will evaluate engineering and pipeline design alternatives as part of its work in the *Preliminary Routing/Configuration Analysis* and *Pipeline Sizing and Design*. That analysis will be incorporated into this study.

Data developed as part of the Angeles Link Phase One *Production Planning & Assessment* and other studies conducted as part of the Market Assessment & Alternatives workstream, coupled

with the *Preliminary Routing / Configuration Analysis* and *Pipeline Sizing & Design Criteria* analysis, will inform review of a potential phased approach for implementation of Angeles Link.

- This approach will consider production capacity and demand availability at various points in time (e.g., 2030, 2035, 2040, 2045) and will identify the infrastructure required to meet those needs at that specific point in time.
- The analysis will also consider future scalability and appropriate pre-investment for future implementation.
- Next, options will be developed and evaluated for a clean renewable hydrogen pipeline system, considering factors such as sustainability, constructability, permitting, environmental considerations, equity, along with operability, maintenance and other factors.
- Lastly, options and alternatives to the pipeline system including hydrogen pipeline alternatives, such as a localized hub, and other alternatives, such as non-hydrogen alternatives and hydrogen delivery alternatives, will be developed and evaluated.

2) Other Alternatives

Non-Hydrogen Alternatives

SoCalGas will identify, build upon, and evaluate non-hydrogen alternatives (e.g., electrification, energy efficiency, renewable natural gas (RNG), natural gas with carbon management) across mobility, power, and industrial use cases. This will require the establishment of defined criteria and factors that could impact the viability of the alternative, such as:

- The ability for the alternative to meet specific end user requirements
- The propensity to adopt alternatives economically at scale
- The ability for the alternative to be implemented in a timely manner
- The technical feasibility to the extent this has not been determined in other studies.

Hydrogen Delivery Alternatives

SoCalGas will identify, build upon, and evaluate hydrogen delivery alternatives (e.g., trucking, in-basin hydrogen production) across mobility, power, and industrial end use cases. This will require the establishment of defined criteria and factors that could impact the viability of the assessed alternatives, such as:

- The ability for the alternative to meet specific end user requirements
- The propensity to adopt alternative delivery options economically at scale
- The ability for the alternative to be implemented in a timely manner
- The technical feasibility to the extent this has not been determined in other studies.

Note: Cost-effectiveness, which will aim to compare the cost-effectiveness and economic feasibility of clean renewable hydrogen delivery via the Project, pipeline alternatives, hydrogen

delivery alternatives and and non-hydrogen alternatives across power, mobility, and industrial use cases, will be addressed in the *High-Level Economic Analysis & Cost Effectiveness* study.

The *Environmental Analysis* study will include a high-level desktop analysis of the potential environmental impacts of alternatives to the Project.

Demand Study

Overview

The Decision requires (OP 6 (a) and OP 6 (c)) SoCalGas to identify hydrogen demand, end uses, and end-users (including current natural gas customers and future customers) of the Project. This study will evaluate potential clean renewable hydrogen demand and assess adoption in the Mobility, Power Generation, and Industrial sectors.

Technical Approach

Technical Approach – Demand Model Methodology

Modeling for the demand study begins with assessment and prioritization of sub-sectors. This assessment takes into account historical fuel consumption and existing public data sets. Part of the technological feasibility is analyzed by gathering inputs from original equipment manufacturers (OEMs) where possible. These inputs then inform the actual modeling of demand. Modeling methodology includes:

- Modeling the total addressable market of hydrogen demand
- Applying zero-emission adoption rates
- Assessing the viability of clean renewable hydrogen against alternatives to estimate clean renewable hydrogen adoption rates.

The next step in the process is to validate and refine the preliminary model outputs. This done in part through PAG and CBOSG feedback and in part through interviews with market participants to help validate model assumptions and overall outputs including:

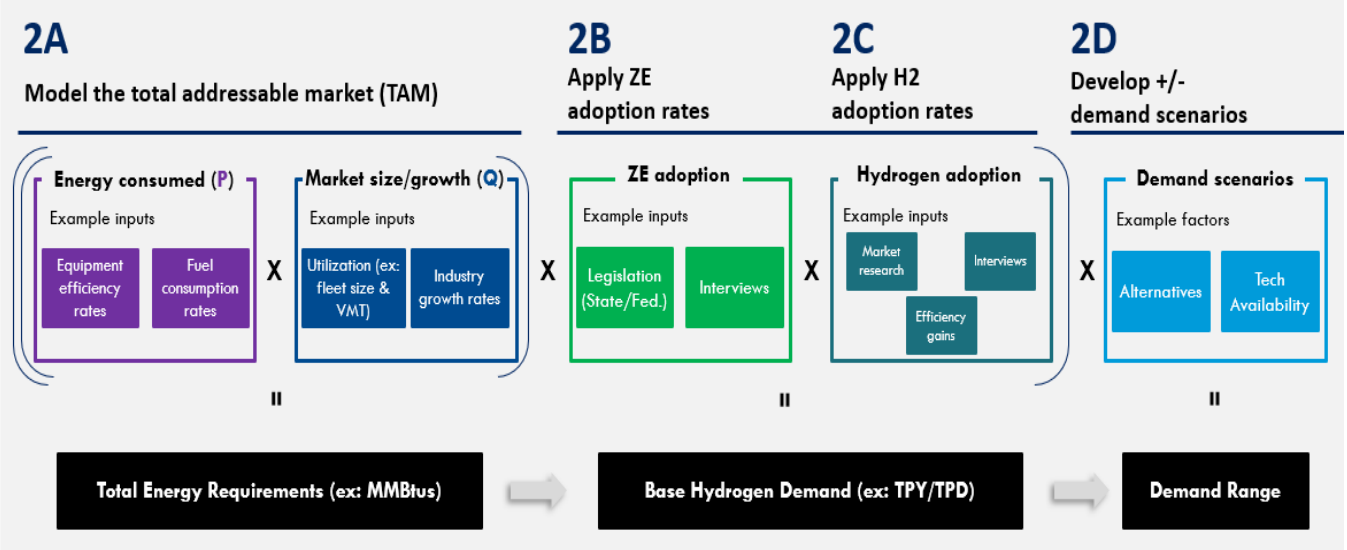
- Availability of clean renewable hydrogen technology
- Identification of potential end users including current and future natural gas customers
- Consideration of end-use viability
- Capital expenditure and operational expenditure costs.

Peer-reviews may also be conducted to help validate approach, assumptions, and preliminary outputs. Feedback from these interviews and interactions are incorporated into the model and *Demand Study* as appropriate.

Technical Approach – Demand Model Development Details

The graphic below illustrates demand modeling methodology and information flow in more detail.

- The approach begins with assessing the total addressable market of hydrogen demand, which involves determining energy consumption inputs such as equipment efficiency rates or fuel consumption rates and applying them to market inputs such as existing fleet sizes and industry growth rates.
- The next steps are to apply zero-emission adoption rates, which are informed by data such as existing regulations and legislation, and then determining estimated hydrogen adoption rates, which are informed by data such as market research, forecasted technology efficiency gains, and further market interviews.
- The final step in developing the model and developing different demand scenarios is to apply variables such as demand alternatives and technology availability.



Technical Approach - Demand Scenarios Details

In the development of potential demand forecasts, different scenarios may have assumptions (e.g., legislative and regulatory drivers) that will influence the calculated modeling output. This Study will focus on developing three scenarios: conservative, moderate, and ambitious, as detailed below for each of the primary sectors:

Description of Scenarios*

Conservative	Scenario assumes lower adoption rates for hydrogen across a limited set of use-cases within prioritized sectors and sub-sectors, primarily driven by existing legislation. **Mobility:** On-Road Vehicles – Heavy-Duty Vehicles (HDV),

	Medium-Duty Vehicles (MDV); Off-Road Vehicles – Cargo Handling Equipment (CHE), Ground Support Equipment (GSE), Agricultural (Ag), Construction & Mining (C&M), Commercial Harbor Craft (CHC), Ocean Going Vessels (OGV)** **Power:** Peaker, Baseload **Industrials:** Cogen***, Food & Bev, Metals, Stone, Glass, and Cement, Paper, Chemicals, Aerospace and Defense
Moderate	Scenario assumes increased hydrogen adoption across an expanded set of use-cases within prioritized sectors and sub-sectors, driven by existing legislation. **Mobility:** HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV** **Power:** Peaker, Baseload, Cogen **Industrials:** Cogen***, Food & Bev, Metals, Stone, Glass, Cement, Paper, Chemicals, Aerospace and Defense
Ambitious	Scenario assumes more ambitious policies are put in place and businesses are incentivized to support widespread hydrogen adoption within prioritized sectors and sub-sectors. **Mobility:** HDV, MDV, CHE, GSE, Ag, C&M, CHC, OGV**, Aviation **Power:** Peaker, Baseload, Cogen **Industrial:** Refineries, Cogen, Food & Bev, Metals, Stone, Glass, Cement, Paper, Chemicals, Aerospace and Defense

**Base market growth rate approach and assumptions vary per sector and per scenario*

***Diesel consumption only, not main engine heavy fuel*

****Cogeneration in Conservative and Moderate scenarios excludes cogeneration plants at refineries*

Technical Approach – Primary Factors Driving Adoption Rates

Estimating and forecasting hydrogen adoption rates for the Mobility, Power Generation, and Industrial sectors will be assessed primarily against four factors. These factors are Policy and Legislation, Technology Feasibility, Commercial Availability, and Business Readiness. Descriptions of these four factors are below:

1. Policy and Legislation – This factor considers if there is a legislative or policy mandate that would accelerate the transition to hydrogen. It also looks at any incentives that would drive adoption.
2. Technology Feasibility – This factor considers if hydrogen is technically and/or operationally feasible for adoption in that sector and includes comparisons against alternatives to hydrogen.
3. Commercial Availability – This factor considers if hydrogen enabled equipment is commercially available, the cost to own, and includes comparisons against alternatives to hydrogen.
4. Business Readiness – This factor considers the industry's or sub-sector's overall disposition or readiness for adoption of hydrogen technology.

Market Validation

The demand assumptions will be validated through interviews with potential end users, industry participants across the value chain, and key industry and subject matter advisors. Below is a summary of groups to be engaged and key objectives.

Group	Engagement Goals	Potential Sector Participants
Industry	- Validate cost, equipment, and supply chain assumptions with sector experts - Confirm demand assumptions - Conduct interviews to understand technology availability, conversion costs and alternatives	**Mobility Sector** - Ports & key tenants - Transit agencies - Fleet operators - Fuel station operators - Car and truck manufacturers - Cargo-handling equipment manufacturers **Power Generation Sector** - Power generation operators - Gas Turbine, microgrid, and fuel-cell manufacturers **Industrial Sector** - Steel - Cement - Food/Beverages - Refineries - Other industrial facilities - Industrial equipment manufacturers
Research & Academia	- Engage technical experts to validate assumptions and integrate sub-sector deep dive knowledge	**Potential sources:** - University of California - National Laboratories
Public Agencies & Consortiums	- Compare findings against research published by public agencies - Engage agencies and consortiums	**Potential sources:** - CARB - South Coast Air Quality Management District (SCAQMD) - Hydrogen Fuel Cell Partnership (H2FCP) - California Energy Commission (CEC) - Department of Energy (DOE) - PAG/CBOSG (including CPUC) feedback

Overview

The Decision requires SoCalGas to identify the potential sources of hydrogen generation for the Project (OP 6 (b)) and its plans to ensure the quality of the hydrogen gas meets the clean renewable hydrogen standards set in the Decision (OP 6 (j)). This study will evaluate potential sources of clean renewable hydrogen production from renewable energy resources such as solar and wind, input requirements, estimated cost of production, and policies, procedures, and other methods to meet clean renewable hydrogen standards.

Technical Approach

Following up on the Study Descriptions, the discussion below provides more detail on the work that is planned to be performed. The specific approach continues to evolve based on on-going feedback and discussion.

Technical Approach – Renewable Energy Technologies

The approach for assessing renewable energy technologies and costs will include the following steps:

- Potential generation technology resources that may be suitable to producing clean renewable hydrogen (as defined in the Decision) will be identified. These resources will include but may not be limited to solar, wind, hydroelectric, biomass, and geothermal.
- The feasibility and maturity of potential renewable technologies identified will be assessed for clean renewable hydrogen production.
- Technology operating characteristics will be developed for technologies deemed suitable to support Angeles Link hydrogen production. Operating characteristics and limitations, including representative manufacturers and sizing will be developed based on public sources.
- Storage technology operating characteristics and capabilities will be evaluated in the context of being able to move energy from intermittent renewable resources to meet operating requirements needed for hydrogen production.
- For suitable technologies, production estimates for intermittent resources will be developed using NREL's System Advisory Model.
- For renewable generation, technology costs will be developed using NREL's ATB data, and potentially other sources such as EIA. These sources are consistent with sources used for the CPUC 2022-2023 IRP. Costs by resource type will be included.

Technical Approach – Clean Renewable Hydrogen

The approach for assessing clean renewable hydrogen production technologies and costs will include the following steps:

- Potential hydrogen production resources that may be suitable to producing clean renewable hydrogen (as defined in the Decision) will be identified. These resources will include, but may not be limited to, different electrolyzer types (Alkaline, PEM, AEM, SOEC),

production of clean renewable hydrogen from biogas, and naturally occurring hydrogen. A general discussion will be included for each potential technology addressing the operating characteristics, potential benefits, safety, and technology readiness level (TRL).

- The technology assessment will focus on an evaluation of current technologies (mature and emerging) that are approaching a maturity point and potential state of availability during the Angeles Link Phase 1 planning horizon (through 2045) to help optimize production processes.
- The technologies will be compared on a qualitative basis evaluating key parameters including land usage, efficiency, scalability, and technology maturity
- Costs will be presented considering capital expenses, operating expenses, fuel, and tax credits. This will inform potential selections of technology with clear benefits relative to other technologies to use as the basis for Phase 1 study. Costs will be sourced from publicly available data where available. Where necessary, in-house data and data obtained from vendors will be used.

Technical Approach – Production Capacity Modeling

The approach to be used to develop the production capacity modeling, including the maximum available renewable capacity to serve hydrogen production, will include the following steps:

- Identify existing, planned, and potential renewable resources that will be expected to serve system electricity load per the CPUC 2022-2023 IRP.
- Use GIS tools to identify land available for hydrogen production development (exclude land required for existing or planned renewable generation).
- Assess and exclude, where feasible, areas with hard constraints (e.g., national parks, road/railroad easements).
- Develop maximum MW and MWh of renewable energy production potential available for future development to serve H2 production. Land requirements by renewable technology will come from NREL renewable land requirement assumptions.
- Translate that maximum renewable energy production potential to a maximum H2 production.
- To develop available hydrogen production capacity, the maximum renewable generation load curve will be used to determine the maximum hydrogen supply based on design parameters and inputs from other studies that may impact hydrogen production potential.

Technical Approach – Demand/Supply Balancing

The approach to be used to perform the analysis of demand/supply balancing and optimization will include the following steps:

- General: Utilize a spreadsheet model that will calculate hydrogen production and renewable power supply relative to demand
- Convert hydrogen demand needs into electricity needs to support hydrogen production.
- Develop renewable power hourly portfolio model with various resources.
- Develop the pro forma and financial assumptions to quantify development and operating costs for renewable technologies for each year over the life of renewable resources.

- Optimize portfolio capacity factor by evaluating renewable generation profiles relative to demand load factors.
- Size production to demand quantities and results from the *Demand Study*. Hydrogen production will initially be sized to demand (spread across various regions). The size of electrolyzers will be optimized with storage based on the demand shape, hydrogen production capability (ramping, cycling), and renewable portfolio generation profile (which will be shaped to the hydrogen demand as best as possible).
- Various durations of storage will be considered.
- Quantify curtailed energy from the portfolio.
- Renewable energy costs may need to be updated to adjust for substation and transmission line costs should the energy generation location be further from the hydrogen production facility than initially conceptualized.
- The process to determine the size of hydrogen electrolyzers, hydrogen storage, and renewable energy generation will be iterative in nature.

Technical Approach – Market Analysis for Renewable Energy

The approach to perform the market analysis for renewable energy will include the following steps:

- Develop geographical representation of renewable energy potential in the SoCalGas territory for solar and wind. Sources will include NREL and EIA.
- Develop listing of existing and planned renewable projects in territory considering publicly available information (e.g., CPUC 2022-2023 IRP, CAISO resources, WECC resources).
- Summarize existing, planned, and potential renewable energy buildouts by technology and provide insights on future renewable resource supply and costing.

Technical Approach – Market Analysis for Hydrogen Production

The approach to perform the market analysis for hydrogen production will include the following steps:

- Look at SCG hydrogen *Demand Study* and production estimates
- Identify potential supply constraints, or accelerators
- Research and quantify the plans of the leading electrolyzer manufacturers through 2045, including electrolyzer projects greater than 1 MW through 2045 with a focus on major countries
- Summarize the gap between planned electrolyzer projects and manufacturing in a spreadsheet and report
- Include focus in the SoCalGas region

Technical Approach – 3rd Party Evaluations

The approach to conduct 3rd party evaluations of the market analysis will include the following steps:

- Provide SoCalGas with a listing of potential 3rd parties.
- Setup interview dates
- Conduct interviews, logging questions and feedback.
- Evaluate interviewee feedback and determine if market analyses need to be modified.
- Update market analyses as appropriate.

Technical Approach – Meet/Exceed Clean Renewable Hydrogen Standard

The approach to identify procedures and methods to support hydrogen production to meet/exceed the Decision's clean renewable hydrogen definition will include the following steps:

- Assess each system input and the system as a whole through the lens of a life-cycle analysis for adherence to the Decision's clean renewable hydrogen definition, including achieving 4 kg-CO2e/kg-H2 on a lifecycle basic. These requirements will be incorporated into the analysis of the various hydrogen generation technologies. Therefore, any combined power generation and hydrogen production resulting in greater than 4 kg- CO2e/kg-H2 or that is otherwise inconsistent with the Decision's clean renewable hydrogen definition will be noted and flagged as deficient.
- The completed production analysis will include the ability to generate hydrogen powered by sufficient renewable resources. If during different five-year increments, the system is incapable of generating sufficient hydrogen within the emissions threshold, the emissions associated with any remaining hydrogen will be noted.
- Report on options (e.g., power purchase agreements (PPA), virtual PPAs, renewable energy certificates (RECs)) to ensure all hydrogen received by the Angeles Link Pipeline is supplied by hydrogen the meets the Decisions' clean renewable hydrogen definition.
- Report on current state of methods to verify hydrogen meets the Decisions' clean renewable hydrogen definition. Consider countries with existing certification (e.g., Germany (renewable only), France (both renewable and low-carbon), and the UK (both renewable and low-carbon). For Phase 1 of Angeles Link, engage with entities on potential certification standards.

High-Level Economic Analysis & Cost Effectiveness

Overview

The Decision requires (OP 6 (d)) SoCalGas to evaluate the cost-effectiveness of the Project against alternatives and determine a methodology to measure cost effectiveness between alternatives. This study will determine a methodology to measure cost effectiveness that includes gathering cost estimates, performing an economic analysis to determine the potential levelized cost of clean renewable hydrogen to be delivered to end-users, and comparing the cost effectiveness of the Project against various project alternatives.

Technical Approach

- Utilize potential Angeles Link Project configurations (informed by other studies as needed, including *Production Planning & Assessment*, and *Preliminary Routing/Configuration*

Analysis) for analysis and identify critical assumptions for modeling alternative approaches.

- Utilize Class 5 cost estimates from other studies (*Production Planning & Assessment*, and *Preliminary Routing/Configuration Analysis*) to develop economics of the Angeles Link Project. Class 5 cost estimates will include capital expenditures for total installed costs as well as operation and capital maintenance expenses to operate the facilities thorough its useful life. The project economics will be based on a normalized timeframe taking into consideration the different useful lives for each of the value chain components for delivering hydrogen. The project economics will also include the evaluation of cost of capital in order to evaluate investment returns.
- Calculate the levelized cost of delivering hydrogen (including inputs from other studies as needed for production, transportation, compression, and storage) as a reasonable range in $/kg for the Angeles Link Project. The levelized cost of delivering hydrogen will also take into consideration the different federal and state financial support mechanisms such as tax credits, LCFS, etc.
- Perform a cost effectiveness comparing the Angeles Link Project to hydrogen pipeline alternatives, such as the localized hub, and other alternatives, such as non-hydrogen alternatives (e.g., electrification) and hydrogen delivery alternatives (e.g. trucking), as described in *Project Options & Alternatives Study* above. Cost effectiveness comparison will include project costs and other costs related to emissions as informed by the studies in the Environmental workstream.

REGULATORY, POLICY & ENVIRONMENTAL WORKSTREAM TECHNICAL APPROACH

Water Resources Evaluation

Overview

The Decision requires (OP 6 (b)) SoCalGas to identify the potential sources of clean renewable hydrogen generation and water and estimate the costs of the hydrogen for the Project. This study will evaluate the availability of water resources for clean renewable hydrogen production in Central and Southern California regions.

Technical Approach

The *Water Resources Evaluation* study is broken up into six main tasks to evaluate the availability of water resources for clean renewable hydrogen production.[1] The tasks generally fall within two components of the Water Evaluation Study: (1) an evaluation of various types of water availability for clean renewable hydrogen production in Central and Southern California; and (2) an evaluation of the potential risks and opportunities associated with water availability that may impact the production of clean renewable hydrogen.

An overview of the approach taken for each key task of the *Water Resources Evaluation* study is provided below.

Water Resources Availability Analysis

Agency Outreach Task

The purpose of agency outreach is to validate approach and conclusions, as well as to facilitate development of further conclusions, to the extent possible, regarding water supply reliability. The approach for task is as follows:

- Create a list of key water agencies and managers that could support the production of clean renewable hydrogen that would be transported by the project, based on current and planned projects, and proximity to potential production areas.
- Develop global questions for all parties identified for outreach.
- Define communication protocols and develop responses for anticipated questions.
- Send initial outreach emails and schedule virtual meetings with respondents.
- Conduct virtual meetings with outreach contacts and collect information verbally regarding water supply availability or potential to develop water supply.
- Investigate suggestions made by outreach contacts regarding potential supply sources.

Water Resources Availability Task

This task will provide discussion of the baseline conditions for water resources, including identification of potential water supply sources and the management structure applicable to each, to provide context/baseline for the analysis of water feasibility for the proposed project. The approach for this task is as follows:

[1] The scope of the Water Study has been adjusted over time as the needs of the analysis have been refined.

- Identify any potential water sources that could support the production of clean renewable hydrogen that would be transported by the Project.
- Conduct research of specific water supply sources including recycled water, advanced water treatment concentrate, brine line flow, oil and gas industry water, surface water (i.e., exchange agreements), inland brackish groundwater, and dry weather flows. Water supply sources will include potential in-basin water sources.
- Review current (2020) Urban Water Management Plans (UWMPs) for water agencies responsible for management of the identified water supply sources.
- Consider input received from outreach contacts identified in Agency Outreach Task.
- Quantify potential supply availability for each source, to the extent of data availability.
- Identify sources suggested for consideration by water agencies and managers where there may be opportunities for mutual benefit (such as reuse of flows that are currently managed as waste or nuisance (ex., water quality treatment discharge, brine line flows, dry weather flows)).

Water Quality Requirements for Clean Renewable Hydrogen Production Task

The purpose of this task is to assess the minimum water quality requirements and efficiency of the electrolysis process and determine the total potential capacity of the electrolyzers that could be supported by the available water resources. This information will inform the Acquisition and Purification Cost Estimate Task of the *Water Resources Evaluation* study. The approach for this task is as follows:

- Collect water quality specifications for the electrolyzers that could be used to produce the clean renewable hydrogen that would be transported by the Project from vendors and conduct a desktop review to evaluate the efficiency of these systems.
- Assess the pretreatment requirements for potential water supply sources, including consideration of electrolyzer efficiencies.
- Establish water quality requirements of the electrolyzers based on electrolyzer type (e.g., alkaline, polymer electrolyte membrane or solid oxide).

Acquisition and Purification Cost Estimate Task

The purpose of this task is to provide a high-level engineering evaluation to identify treatment and supporting infrastructure needs (including conveyance options), identify collocated opportunities, and develop rough-order-of-magnitude (ROM) cost estimates. This task considers the findings of the *Water Resources Evaluation Task* and the *Water Quality Requirements for Clean Renewable Hydrogen Production Task*.

The approach for this task is as follows:

- Evaluate treatment process(es) for potential water sources identified in *Water Resources Evaluation Task*.
- Analyze the recovery of water through the treatment process and evaluate strategies for residual management and disposal.

- Estimate total water demand needed to meet the potential production target of clean renewable hydrogen production target that would be transported by the Project.
- Develop a preliminary conceptual sizing of treatment facilities.
- Calculate ROM cost estimates for required infrastructure using a proprietary cost estimation tool to develop the cost estimates and conceptual layouts for treatment facilities.
- Estimate life cycle costs of acquiring and producing water, based upon published information on water pricing.

Prioritization, Risk Identification, Risk Management Analysis

Risk and Opportunities Identification and Management Task

The purpose of this task is to identify potential risks and opportunities associated with access to water supply for the Project (including water rights and water quality) and develop strategies to manage potential risks. Approach for this task includes:

- Identify mitigation measures where possible to manage risks as feasible.
- Identify potential benefits to local communities by use of identified water sources.
- Evaluate the regulatory landscape to identify potential triggering events that could upset the water supply, such as drought regulations and regional supply issues.
- Develop a risk profile for issues that could interrupt water supply, how and when issues may occur, and how issues may affect supply reliability.

Water Option Prioritization Analysis Task

The purpose of this task is to prioritize options for water supply development based on goals, risk profile, opportunities, and benefits. The approach for this task is as follows:

- Use a proprietary analysis tool for quantitative evaluation.
- Develop criteria for prioritizing options for water supply based on findings from the Risk and Opportunities Identification and Management task and the prioritization criteria as primary inputs into a Multi-Objective Decision Analysis (MODA) tool to score and rank the options.
- Evaluate potential benefits through steps including: 1) Input parameters, 2) Confirm evaluation criteria, 3) Establish relative criteria weights, 4) Score options against criteria, 5) Calculate results, 6) Confirm results with sensitivity outputs.
- Prioritize potential water supply sources based on goals, risk profile, opportunities, and benefits.

Nitrogen Oxides (NOx) Emissions Assessment

Overview

The Decision requires (OP 6 (h)) SoCalGas to assess potential NOx emissions associated with the Project, including appropriate controls to mitigate emissions. The NOx assessment

will evaluate NOx and other air emissions associated with storage and transportation of hydrogen, as well as NOx emissions associated with end users. Key areas of focus will be on hard-to-electrify industrial sectors, the mobility sector, and power generation.

The objective of this study is to assess the potential for both nitrogen oxides (NOx) emissions increases and reductions associated with the Angeles Link Project and to identify potential NOx mitigation measures to reduce potential NOx emissions. Although NOx will be the primary focus of this emissions assessment, the study will also include a high-level assessment of other potential emissions with a focus on volatile organic carbon (VOC) which is the other precursor to ozone and particulate matter (PM) which is the primary pollutant associated with diesel combustion.

Background

Study Approach

The study will estimate NOx associated with the anticipated storage and transportation of hydrogen and estimate NOx emissions from end users (mobility, power generation, and hard to electrify industrial sectors). Additionally, potential NOx mitigation measures will be identified to control NOx emissions. Where applicable, the study will rely on specific technical information (about facilities, equipment, processes, throughputs, etc.) that is available including, from the demand study and other ongoing Phase One feasibility studies, regulatory (including the SCA) and transportation agencies, and other available information and studies. If specific information is not available, estimates based on availability of related data or documented assumptions will be developed. The study will also include a high-level assessment of other potential emissions.

Technical Research

The study will collect, review, and analyze technical research studies and information related to NOx emissions associated with the combustion of hydrogen. This analysis will include:

- Available literature and studies from research-based academic institutions such as the University of California Irvine (UCI) Combustion Laboratory and the Georgia Institute of Technology and private organizations such as the Electric Power Research Institute (EPRI)
- Existing, proposed, and potential future regulatory requirements from federal agencies including the United States Environmental Protection Agency (US EPA), the United States Department of Energy (US DOE), state agencies such as the California Air Resources Board (CARB) and the California Energy Commission (CEC), and local agencies including the nine local air districts located within the geographic scope of this study such as South Coast Air Quality Management District (AQMD) and San Joaquin Valley Air Pollution Control District (APCD)
- Technological developments and timelines from manufacturers working on hydrogen technology

- Presentations and data releases from government agencies and laboratories including the US DOE and the National Renewable Energy Lab (NREL); and potential NOx emissions mitigation measures from technological advancements.

The study will research available literature and studies to evaluate:

- How NOx is formed from the combustion of hydrogen
- How NOx might be controlled when combusting hydrogen
- How to quantify the formation of NOx from the combustion of hydrogen.

Preliminary information reviewed regarding the formation of NOx indicates:

- NOx may be formed via three pathways during combustion: thermal NOx, fuel NOx, and prompt NOx.
- Valuable information regarding the formation of NOx is available from publications by the US EPA and other regulatory agencies, academia and research institutions.
- Control of NOx emissions from the combustion of hydrogen begins with designing equipment to account for the unique properties of hydrogen, as outlined in many studies and reports, including government publications by the US EPA and the US DOE.
- Aftertreatment such as three-way catalysts, selective catalytic reduction, and lean NOx traps will also be analyzed.

Research conducted by entities such as academic institutions will be evaluated to determine the best available methods for quantifying emissions of NOx from the combustion of hydrogen fuels. EPA and other regulatory data will be evaluated for potential NOx emission factors related to hydrogen fuels, and relevant regulatory data regarding NOx emission limitations for combustion units.

Review of Other Information and Data

There are parallel Angeles Link Phase One studies that will provide further details and scenario options needed to complete this study. These include the *Production Planning & Assessment*, *Preliminary Routing/Configuration Analysis*, and the *Demand Study*.

Technical Approach

The following assessment process (Figure 1) will be used for this technical approach. The approach will be based on review of technical research studies, research of anticipated technological advancements, and review of expected evolution of regulatory frameworks.

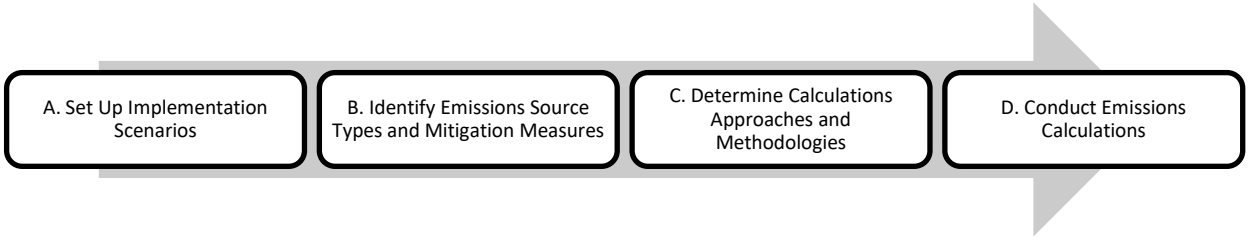


Figure 1. NOx emissions assessment process for the Angeles Link Project.

Set Up Implementation Scenarios

To evaluate NOx emissions and emissions changes associated with Angeles Link, the baseline scenario will be compared to the Project scenario. The Project scenario will include the timeframe from 2030 to 2045. The end use sectors are anticipated to achieve the ability to accommodate 100% hydrogen fuel use at different times due to the availability of technology and the feasibility of transitioning existing equipment and building new infrastructure. The use of hydrogen as fuel for each end-use sector will be evaluated beginning with 2030 based on the details obtained from the parallel studies. NOx emissions will be calculated using the approaches described in the next steps.

Identify Emissions Source Types and Mitigation Options

The study will evaluate NOx and other emissions potentially associated with the following by developing emission calculation approaches and methodologies:

- Production
- Transmission and Storage
- Hard to Electrify Industrial End Users, Mobility (focused on heavy-duty trucks), and Power Generation (initial focus on existing power plants))

NOx emissions are a result of combustion of fuel. NOx is created from the conversion of nitrogen in fuel and ambient air at elevated temperatures resultant from combustion. For each topic identified above, the study will:

- Identify potential NOx mitigation measures for existing, emerging/new, and alternate equipment.
- Use a top-down evaluation to prioritize and rank the measures identified for each.

Evaluation of NOx emission mitigation options will be focused on technologies that minimize combustion temperatures and post-combustion NOx emission control technology such as catalytic reduction.

Hydrogen Production

Two potential clean renewable hydrogen production options will be analyzed. The first is the production of clean renewable hydrogen using the process of electrolysis which uses electricity to split water molecules into oxygen and hydrogen.

- The electrolyzers will be powered by renewable electricity.
- No combustion sources are anticipated and therefore, there is no potential for NOx emissions associated with electrolyzers.

The second potential clean renewable hydrogen production option includes bio gasification and biogas fueled steam methane reformers.

- Steam methane reforming is a process in which the biogas reacts with steam in the presence of a catalyst to produce hydrogen and carbon dioxide.
- This option is anticipated to have the potential for NOx emissions and those potential emissions will be evaluated in this study.

Hydrogen Transmission and Storage

For the purpose of this study, hydrogen will be transmitted using pipeline to end users. Transmission and storage of hydrogen will require the use of compressors.

- Compressors are assumed to be driven by 100% hydrogen fueled turbines or internal combustion engines, or grid electricity powered motors.
- If the compressor drivers are electric motors, there will be no potential for NOx emissions to occur on site.
- If the compressor drivers are turbines or engines, they will be fueled by 100% hydrogen and there is the potential for NOx emissions.
- For grid electricity interruptions, hydrogen-fueled back-up generators may also be used, which would also have the potential for NOx emissions.

Hydrogen Industrial End Users

Potential NOx emissions source types from end users in three key sectors are being evaluated: Power Generation, Mobility, and Hard to Electrify Industrial sectors. Information obtained from the parallel *Demand Study* will help inform the analysis of end uses in each of these three sectors, as well as their respective subsectors.

- Power generation units such as turbines are the primary source for potential NOx emissions in the first sector.
- Source types with the potential for NOx emissions in the Mobility Sector include heavy-duty trucks, port vehicles/cargo handling equipment, marine vessels, and airplanes.
- Hard to electrify industrial subsectors include energy intensive industries such as refining; food and beverage manufacturing; primary and fabricated metals; stone, clay, and glass (including cement); chemical manufacturing; wood and paper; petroleum products; mining; ammonia production; industrial launderers; co-generation; and textile manufacturing.
- Source types with the potential for NOx emissions in the three sectors include, but are not limited to, hot water boilers, steam generating units, process heaters, furnaces/kilns, internal combustion engines, turbines, and miscellaneous combustion equipment.
- The parallel *Demand Study* will define the anticipated use of hydrogen.

Determine Calculations Approaches and Methodologies

For each emission source type identified, calculations to estimate emissions and mitigation of emissions will be prepared.

- Studies may identify calculation approaches for a particular source type based on emission factors, stoichiometric calculations, testing data, continuous emissions monitoring systems, or other approaches based on types of datasets that may be available.
- For the selected calculation approach, the calculation method including the equations, constant and variable data, and configuration information to conduct the calculations will be determined.
- Potential NOx emissions and mitigations will be assessed for each of the emissions source types identified in the section above.
- NOx emissions will be calculated at the unit level and scaled based on activity data quantified using information from the parallel studies identified above.
- Calculations will be prepared for the conservative, moderate, and ambitious scenarios evaluated in the parallel *Demand Study*.

Key Considerations

- Availability of consistent, useable data across the geographies and impacted sectors;
- Methods for projecting the change in demands for equipment and source types; and
- A repeatable process that can be applied for different scenarios.

Preliminary Calculation Methodology

The study will evaluate potential for NOx emissions based on the type of equipment and specific source categories. Identification of potential opportunities to minimize and mitigate NOx will also be evaluated. Unit level estimates will be scaled to determine NOx emissions related to the Project.

Assumptions

- Regardless of combustion characteristics associated with hydrogen combustion, the California regulatory environment is anticipated to not allow increases in NOx emissions.
- Simplified repeatable calculation techniques using representative emission factors and activity data (leveraging emission inventory technique) are required to quantify combustion NOx emissions across the universe for equipment categories and source types.

Conduct Emissions Calculations

The study will prepare emission calculations using the emission factors and activity data compiled for each of the topic areas.

- The tool will be designed to conduct calculations at the unit level (per unit equipment count, unit distance, unit throughput, or other unit parameters, as applicable).
- The emissions calculation tool will scale from unit level information to estimate impacts across the geographic region that Angeles Link spans.
- Emission calculations will utilize information from evaluated research, the *Demand Study*, and other Phase One feasibility studies.

Hydrogen Leakage Assessment

Overview

The Decision directs (OP 6 (g)) SoCalGas to assess the risks and mitigations for hydrogen leakage. During Phase One, an evaluation of potential hydrogen leakage associated with production, storage, and transportation of clean renewable hydrogen will be prepared. Identification and evaluation of potential mitigation measures will also be included.

The objective of this study is to assess potential leakage of hydrogen associated with Angeles Link and to identify mitigation measures to reduce the potential leakage. This scope includes a desktop study of potential clean renewable hydrogen leakage associated with hydrogen production/transportation/storage. Anticipated sources include, but are not limited to, electrolyzers, pipeline venting, compressor venting, compressor rod packing, components (i.e., valves, flanges, connections, etc.), above ground tanks, and underground reservoirs.

Background

Study Approach

The study will evaluate potential sources of hydrogen leakage associated with the production and storage/transportation of hydrogen associated with Angeles Link. Where applicable, the study will rely on specific technical information that is available including, from other ongoing Phase One feasibility studies and other available information and studies. If specific information is not available, estimates based on availability of related data or documented assumptions will be developed. Hydrogen leakage can include intentional or unintentional releases. For example, rod packing, degassing, blowdowns on compression equipment, pipelines, vessels etc. are designed to release to support maintenance activities, manage safety risks, and address emergency events. This evaluation will include both intentional and unintentional releases.

Technical Research

The study will collect, review, and analyze technical research studies and information related to the potential for hydrogen leakage and opportunities to minimize and mitigate leaks of hydrogen. This analysis includes:

- Studies from research-based academic institutions such as Columbia University and the University of Wyoming and private organizations such as the Frazer-Nash Consultancy
- Existing, proposed, and potential future regulatory requirements from federal agencies including the United States Environmental Protection Agency (US EPA), the Pipeline and Hazardous Materials Safety Administration (PHMSA), the United States Department of Energy (US DOE), state agencies such as the California Air Resources Board (CARB) and the California Energy Commission (CEC), and local agencies including each of the nine local air districts located within the geographic scope of this study such as South Coast Air Quality Management District (South Coast AQMD) and San Joaquin Valley Air Pollution Control District (San Joaquin Valley APCD)
- Technological developments and timelines from manufacturers working on hydrogen technology
- Presentations and data releases from government agencies and laboratories including the US DOE and the National Renewable Energy Lab (NREL)
- Potential mitigation measures from technological advancements.

The resources specified by stakeholders in the feedback will be included such as the literature identified by Environmental Defense Fund (EDF) in their July 31, 2023, letter.

Review of Other Information and Data

There are parallel Angeles Link Phase One studies that will provide details to further inform this study. These include the *Production Planning & Assessment, Preliminary Routing/Configuration Analysis*, and Storage Studies (Underground Storage and Aboveground Storage).

Technical Approach

The following technical approach (Figure 1) will be used for this assessment based on review of existing technical research studies, research of anticipated technological advancements, and review of expected evolution of regulatory frameworks.

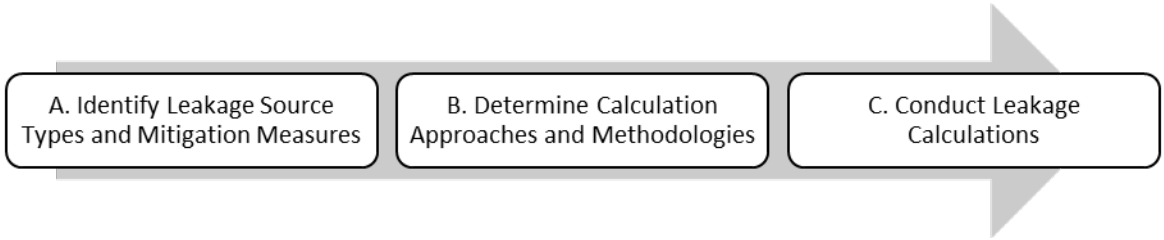


Figure 1. Hydrogen Leakage assessment process for the Angeles Link Project.

Identify Leakage Source Types and Mitigation Options

The study will complete an evaluation of potential leakage and opportunities to minimize and mitigate leakage associated with the following:

- Production

- Transmission and Storage

For each potential source of leakage identified above, potential mitigation measures for existing, emerging/new, and alternate equipment including available sensors and leak detection methodologies will be identified. A top-down evaluation to prioritize and rank the measures identified for each source type will be used.

Hydrogen Production

Two potential hydrogen production options will be analyzed. The first is the production of clean renewable hydrogen produced using the process of electrolysis, which uses electricity to split water molecules into oxygen and hydrogen.

- The electrolyzers will be powered by renewable electricity.

The second potential clean renewable hydrogen production option includes bio gasification and biogas fueled steam methane reformers.

- Steam methane reforming is a process in which the biogas reacts with steam in the presence of a catalyst to produce hydrogen and carbon dioxide.

Leakage may occur from electrolyzers and steam methane reformers:

- During purging, bleeding, or the process of removal of impurities.
- Through piping components such as valves or connections.
- Leakage of hydrogen through the casing of the electrolyzer and steam methane reformer is assumed to be negligible and could be mitigated through laminated gaskets and welded joints.

Hydrogen Transmission and Storage

Hydrogen is anticipated to be transmitted via pipelines to end users.

- The transmission and storage of hydrogen will require the use of compressors, where the seals/packing vents have the potential to release hydrogen.
- Also, blowdowns, purging, and other venting processes may result in hydrogen releases.
- Potential leaks may occur from pipelines components, including valves and connectors, and equipment handling hydrogen.

Information from the parallel Angeles Link Phase One studies including the preliminary routing and configuration analysis would be used to quantify the potential for leakage, if available.

Determine Calculations Approaches and Methodologies

For each source type identified in the above task, the study will identify potential calculation approaches for leakage. Based on a review of available studies and preliminary data, the study will outline the options for calculation approaches and evaluate the options to determine the best calculation approach for each source. Criteria for evaluation may include accuracy, availability of data, scalability of leakage calculations, probabilistic analysis, etc.

For the selected calculation approach, the calculation method including the equations, constant and variable data, and configuration information that would be needed to conduct the calculations will be determined.

- Calculation methods will be scalable such that changes to anticipated equipment counts, pipeline lengths, and mitigations could be easily incorporated into calculations.
- Potential leakage will be assessed for each of the topics identified in the section above.
- Potential leakage will be estimated at the unit level and scaled based on data from the parallel studies identified above.

Key Considerations

Codes, regulations, and standards applicable to hydrogen value chain systems and equipment provide guidance for the design, construction, and operation of systems to minimize leakage.

Preliminary Calculation Methodology

The study will evaluate potential for hydrogen leakage for the anticipated types of equipment such as electrolyzer, compressor, pressure vessels, and pipelines, and will also include:

- Valves, flanges, connections, etc.
- Design, procurement, installation, operational, and maintenance considerations.
- Identification of areas susceptible to leakage and potential opportunities to minimize and mitigate leakage.
- The identification of emerging monitoring technologies.

Conduct Leakage Calculations

The study will develop a calculation tool and include each potential source of leakage.

- The tool will be built for scalability to accommodate changes in equipment/component counts, lengths of pipelines, compression needs, storage requirements, throughputs, and configurations.
- The calculation tool will be tested for accuracy and ease of use.
- The emissions calculation tool will scale from unit level information to estimate impacts across the geographic region that Angeles Link spans.
- Estimates will include information from evaluated research, the *Demand Study*, and other Phase One feasibility studies, as applicable.

Overview

The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental laws and public policies. To support environmental laws and public policies, SoCalGas will conduct an initial evaluation of greenhouse gas (GHG) emissions increases and decreases from end users associated with the Project. This assessment will evaluate GHG emissions associated with compressors for storage and transportation of hydrogen, as well as GHG emissions associated with end users. Key areas of focus will be on the Mobility, Power Generation, and Hard to Electrify Industrial sectors.

This scope includes a study of GHG emissions associated with fuel use by compressors and by end users in the Mobility, Power Generation, and Hard to Electrify Industrial sectors. The objective of this study is to assess the potential for both GHG increases and reductions resulting from Angeles Link and to identify mitigation measures to reduce potential GHG emissions.

Background

Study Approach

The study will estimate GHG emissions associated with the anticipated storage and transportation of hydrogen and estimate potential GHG emissions and GHG emissions reductions from end users of clean renewable hydrogen (Mobility, Power Generation, and Hard to Electrify Industrial sectors). Additionally, potential GHG minimization and mitigation measures will be identified to control GHG emissions. Where applicable, specific technical information (about facilities, equipment, processes, throughputs, rates, costs etc.) that is available from the *Demand Study* and other parallel Phase One studies, regulatory agencies, or other studies will be used. If specific information is not available, general information available from the same sources will be used. If general information is not available, estimates based on availability of related data or documented assumptions will be developed.

- US EPA's Greenhouse Gas Reporting Program (GHGRP) and California Air Resources Board's (CARB's) GHG Mandatory Reporting Regulation (MRR) define "greenhouse gas" as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF6), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other fluorinated greenhouse gases. For reporting and inventory comparisons, hydrogen itself is not considered a GHG by CARB, US EPA, or the International Panel for Climate Change (IPCC) at this time. For this study, two types of GHG emissions will be assessed: Direct and Indirect.

- CO2, CH4, and N2O emissions are direct GHGs that are released during the combustion of fossil fuels such as natural gas, diesel, gasoline, jet fuel, etc. The potential for some end users to combust blended hydrogen with natural gas may occur prior to some end users being able to combust 100% hydrogen. Therefore, direct GHG emissions that may potentially occur from these types of activities are being evaluated. Combustion of 100% hydrogen is not expected to release significant GHGs. The study will also evaluate GHG emissions reductions obtained from switching from 100% fossil fuels such as natural gas, diesel, gasoline, jet fuel, etc. to hydrogen.

Technical Research

The study will collect, review, and analyze technical research studies and information related to GHG emissions associated with the combustion of hydrogen. This analysis includes:

- Studies from research-based academic institutions such as the UCI Combustion Laboratory and the Georgia Institute of Technology and private organization such as the Electric Power Research Institute
- Existing, proposed, and potential future regulatory requirements from federal agencies including the United States Environmental Protection Agency (US EPA), the Pipeline and Hazardous Materials Safety Administration (PHMSA), the United States Department of Energy (US DOE), state agencies such as the California Air Resources Board (CARB) and the California Energy Commission, and local agencies including each of the nine local air districts located within the geographic scope of this study
- Technological developments and timelines from manufacturers working on hydrogen technology;
- Presentations and data releases from government agencies and laboratories including the US DOE and the National Renewable Energy Lab (NREL)
- Potential mitigation and minimization measures from technological advancements.

Review of Other Information and Data

There are parallel Angeles Link Phase One studies that will provide details needed to complete this study. These include the *Production Planning & Assessment, Preliminary Routing/Configuration Analysis,* and the *Demand Study*.

Technical Approach

The following technical approach (Figure 1) will be used for this assessment based on review of technical research studies, research of anticipated technological advancements, and review of expected evolution of regulatory frameworks.

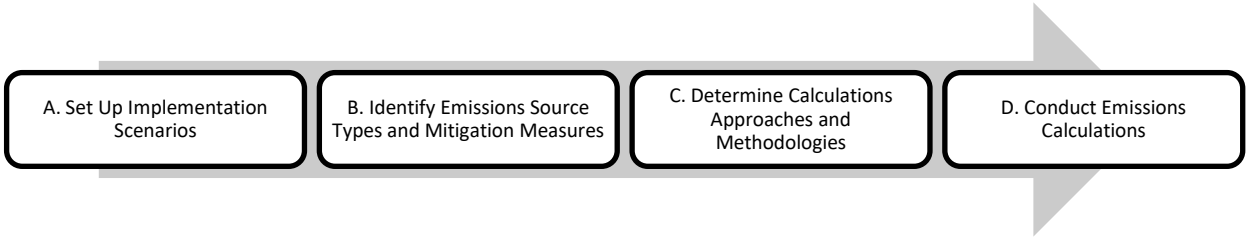


Figure 1. GHG emissions assessment process for the Angeles Link Project.

Set Up Implementation Scenarios

To evaluate GHG emissions and emissions changes associated with Angeles Link, the baseline scenario will be compared to the Project scenario. The Project scenario will include the timeframe from 2030 to 2045. The end use sectors are anticipated to achieve the ability to accommodate 100% hydrogen fuel use at different times due to availability of technology and feasibility of transitioning existing equipment. The use of clean renewable hydrogen as fuel for each end-use sector will be evaluated beginning with 2030 based on the details obtained from the parallel studies. GHG emissions will be calculated using the approaches described in the next steps.

Identify Emissions Source Type and Mitigation Options

The study will evaluate direct and/or indirect GHG potentially associated with the following by developing emission calculation approaches and methodologies:

- Production
- Transmission and Storage
- Hard to Electrify Industrial End Users, Mobility (focused on heavy-duty trucks), and Power Generation (initial focus on existing power plants)

For each topic identified above, potential GHG mitigation measures for existing, emerging/new, and alternate equipment will be identified. A top-down evaluation to prioritize and rank the measures identified for each will be used.

Hydrogen Production

Two potential hydrogen production options will be analyzed. The first is the production of clean renewable hydrogen using the process of electrolysis which uses electricity to split water molecules into oxygen and hydrogen.

- The electrolyzers will be powered by renewable electricity.
- No combustion sources are anticipated and therefore, there is no potential for GHG emissions associated with electrolyzers.

The second potential clean renewable hydrogen production option includes bio gasification and bio gas fueled steam methane reformers.

- Steam methane reforming is a process in which the biogas reacts with steam in the presence of a catalyst to produce hydrogen and carbon dioxide.

- This option is anticipated to have the potential for GHG emissions and those will be evaluated in this study.

Hydrogen Transmission and Storage

Transmission and storage of hydrogen will require the use of compressors.

- Compressors are assumed to be driven by 100% hydrogen fueled turbines or internal combustion engines or grid electricity powered motors.
- If the compressor drivers are electric motors, there is the potential for indirect GHG emissions if the source of electricity is not renewable.
- If the compressor drivers are turbines or engines, they are assumed to be fueled by blended hydrogen or 100% hydrogen and there is the potential for direct GHG emissions.
- For grid electricity interruptions, hydrogen-fueled back-up generators may also be used, leading to the potential for direct GHG emissions.

Hydrogen End Users

Current GHG emissions source types that may convert from fossil fuels to hydrogen are being evaluated in three key areas: Power Generation, Mobility, and Hard to Electrify Sectors. Information obtained from the parallel *Demand Study* will help inform the analysis of end uses in these three sectors, as well as their respective subsectors.

- Power generation units such as turbines are the primary source for current GHG emissions in the first sector.
- Source types with the current GHG emissions in the Mobility Sector include heavy-duty trucks, port vehicles/cargo handling equipment, marine vessels, and airplanes.
- Hard to electrify industrial subsectors include energy intensive industries such as refining; food and beverage manufacturing; primary and fabricated metals; stone, clay, and glass (including cement); chemical manufacturing; wood and paper; petroleum products; mining; ammonia production; industrial launderers; co-generation; and textile manufacturing.
- Source types with the current for GHG emissions in the three sectors include, but are not limited to, hot water boilers, steam generating units, process heaters, furnaces/kilns, internal combustion engines, turbines, and miscellaneous combustion equipment.
- The parallel *Demand Study* will define the anticipated use of hydrogen.

Determine Calculations Approaches and Methodologies

For each emission source type identified, the study will prepare calculations to estimate emissions and mitigation of emissions.

- Studies may identify calculation approaches for a particular source type based on emission factors, stoichiometric calculations, testing data, or other approaches based on types of datasets that may be available.

- For the selected calculation approach, the calculation method including the equations, constant and variable data, and configuration information to conduct the calculations will be determined.
- Potential emissions and mitigations will be assessed for each of the emissions source types identified section above.
- GHG emissions will be calculated at the unit level and scaled based on activity data quantified using information from the parallel studies identified above.
- Calculations will be prepared for the conservative, moderate, and ambitious scenarios evaluated in the parallel *Demand Study*.

Key Considerations

- Availability of consistent, useable data across the geographies and impacted sectors;
- Methods for projecting the change in demands for equipment and source types; and
- A repeatable process that can be applied for different scenarios.

Preliminary Calculation Methodology

The study will evaluate direct GHG emissions from combustion of fossil fuels and fuel blends based on the type of equipment.

- Indirect GHG emissions from grid electricity usage will be estimated using the grid emission factors such as those from US EPA's "The Emissions & Generation Resource Integrated Database" (eGRID).
- Identification of potential opportunities to minimize and mitigate GHG will also be evaluated.
- Unit level estimates will be scaled to determine GHG emissions related to Angeles Link.

Assumptions

Clean renewable hydrogen will be used as fuel for reciprocating internal combustion engines and/or turbines powering storage and transmission compressors; or grid electricity will be used for electric motor compressors.

Conduct Emissions Calculations

The study will prepare emission calculations using the emission factors and activity data compiled for each of the topic areas.

- The tool will be designed to conduct calculations at the unit level (per unit equipment count, unit distance, unit throughput, or other unit parameters, as applicable).
- The emissions calculation tool will scale from unit level information to estimate impacts across the geographic region that Angeles Link spans.
- Estimates will include information from evaluated research. The *Demand Study*, and other Phase One feasibility studies, as applicable.

Overview

The Decision directs (OP 6 (n)) SoCalGas to provide the findings from Phase One feasibility studies demonstrating compliance with environmental law and public policies. Further, the Decision directs SoCalGas to address and mitigate impacts to disadvantaged communities and other environmental justice concerns (OP 6 (l)). SoCalGas will conduct an initial evaluation of a clean renewable hydrogen transportation system's compliance with environmental law and public policies, which will include an assessment of environmental impacts of project alternatives, environmental justice concerns and impacts to disadvantaged communities.

Technical Approach[2]

Overview

SoCalGas will conduct a high-level desktop environmental analysis of the Project, including analysis of transportation pipelines and appurtenance facilities, to make an initial assessment of compliance with environmental law and public policies. The high-level desktop analysis will also include an initial assessment of potential environmental impacts of project alternatives, environmental justice concerns, and impacts to disadvantaged communities. The high-level desktop analysis will also review potential environmental impacts in key resource areas related to potential third-party production facilities and potential storage facilities that may support the Project. Given that the Project consists of clean renewable hydrogen transportation system and that third parties will likely construct and operate the potential production and storage facilities, analysis of potential environmental impacts related to the production and storage facilities will be conducted at a very high level during this Phase One analysis.

The environmental analysis of the Project could focus on these resources areas—air quality/greenhouse gas emissions, biological resources, cultural and tribal resources, energy, hazards and hazardous materials, hydrology and water quality, and land use and planning, — that are described in the following sections. In general, the desktop environmental analysis will be performed using geographic information system (GIS) data and review of aerial imagery. Research of online databases will also be conducted to obtain relevant information and aid in the analysis. The following steps will be taken for each resource area to conduct the analysis.

First, SoCalGas will collect all available public data including, but not limited to, landownership, conservation areas, vegetation communities, species data, wetland and waters information, known hazards sites, and soils and geological hazards data. In addition, SoCalGas will evaluate whether data from other SoCalGas projects in Southern and Central California is available for use and determine if any past projects overlap; if so, they will be added to the GIS library that is developed for the analysis and used by planners and Subject Matter Experts (SMEs) to evaluate potential impacts from the Project.

[2] This technical approach document does not include the High-Level Feasibility Assessment and Permitting Analysis because it is a screening analysis that has already been described in the work descriptions document.

Once the GIS library has been compiled, planners and SMEs will review the data and assess the types of resources that intersect with potential facilities, including the pipelines and appurtenances (e.g., compressor stations), third-party production facilities, and third-party storage facilities. Each resource area analysis (e.g., biological resources, cultural resources, noise) requires a different approach and will involve some level of GIS review, aerial photography review, and consideration of local and municipal regulations.

In order to evaluate the pipeline routes, potential routes have been broken into study areas ranging from 31 miles to 358 miles and made up of different segments corresponding to the *Preliminary Routing/Configuration Analysis*. Potential environmental impacts of the selected alternatives carried forward for further review will also be evaluated at a high desktop level.

Methodology specific to each resource area, including anticipated data sources, is described in the sections that follow.

Air Quality/Greenhouse Gas (GHG) Emissions

Based on the *Preliminary Routing/Configuration Analysis* work study, an initial, high-level analysis will be made to determine:

- If the proposed Project will potentially conflict with or obstruct implementation of the applicable air quality plan, result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard or expose sensitive receptors to substantial pollutant concentrations.
- Additionally, for GHG emissions, the analysis will determine if the Project would generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment or conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

Biological Resources

SoCalGas will use existing, publicly available GIS data to identify or estimate the biological resources crossed by the Project, including flora, fauna, and critical habitat. Sources of data include:

- The National Wetland Inventory (NWI) from the U.S. Department of Fish and Wildlife (USFWS)
- California Natural Diversity Database from the California Department of Fish and Wildlife (CDFW)
- Critical Habitat data from CDFW, USFWS, and the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS)
- Vegetation Classification and Mapping Program and other data sets as necessary (e.g., U.S. Forest Service Calveg system, Bureau of Land Management Desert Renewable Energy Conservation Plan, or the California Department of Forestry and Fire Protection

Fire and Resource Assessment Program) information on land cover and natural vegetation communities
- USFWS Information for Planning and Consultation; NMFS Essential Fish Habitat
- USFWS Habitat Conservation Plan Areas
- And other data as appropriate.

This analysis may also include additional detailed analysis within areas identified in the High-Level Feasibility Assessment & Permitting Analysis.

A 100-foot-wide corridor will be evaluated for the pipeline routes; however, impacts to biological resources will not be evaluated as part of this desktop study where the pipeline is within paved roadways.

- Otherwise, documented locations of federally and state-listed threatened or endangered species within 0.25 mile of Project components will be tabulated and plotted on maps for analysis. Similarly, critical habitat, riparian habitat, and wetland areas will be identified where data exists.
- An initial assessment will be made regarding the number of square feet or acres of sensitive habitat (i.e., critical habitat, riparian habitat, wetland, wildlife corridors, nursery sites, or habitats identified in conservation plans) that overlap the Project, as well as a list of threatened, endangered, or fully protected species that have been previously documented within 0.25 mile of Project components.
- Candidate species, species of special concern, and rare plants will not be included in the Phase One analysis but may be considered in a later phase when more design details for the Project are available.

This data will be tabulated and shown on maps as appropriate. An initial assessment will be made on whether measures are available to reduce or avoid impacts if any are identified.

Cultural and Tribal Resources

SoCalGas' cultural resources consultant will use the California Historical Resources Information System to identify any known cultural resources that are recommended or determined eligible for the California Register of Historical Resources or the National Register of Historic Places. Resources listed as being locally significant will be researched as well. Records will be collected with 0.5 mile of the Project components; however, potential impacts will be analyzed within the area around facility boundaries for the desktop analysis. A summary of the resources and an analysis of whether mitigation measures are available to reduce or avoid impacts will be discussed.

Energy

Based on the *Preliminary Routing/Configuration Analysis* work study, an initial assessment will be made to determine if the Project could result in wasteful, inefficient, or unnecessary consumption of energy resources during the construction or operation phases, as well as identify conflicts with state or local plans for renewable energy or energy efficiency. This high-level analysis will be limited to the clean renewable energy system and will not evaluate individual

equipment or materials used to construct or operate the transportation system.

Hazards and Hazardous Materials

For Phase One, the hazards and hazardous materials section will focus on obtaining known hazardous materials sites from the California State Water Resources Control Board through use of its GeoTracker database.

- Cleanup fund sites and other contaminated sites will be tabulated and analyzed as they relate to the pipeline and appurtenant facilities.
- In addition, an initial assessment will be made to determine hazardous substances that could be used during construction and operation.

Hydrology and Water Quality

Existing, publicly available GIS data on hydrology and water quality will be overlain with the pipeline corridor and facility footprint to determine where the pipeline crosses named and unnamed surface waterways and groundwater basins.

- Sources of data for this analysis include the National Hydrography Dataset from USGS, the NWI data from USFWS, Department of Water Resources groundwater data, and Federal Emergency Management Agency Flood Insurance Rate Maps.
- An initial assessment will be made on whether measures are available to reduce or avoid impacts, if any are identified.

Land Use and Planning

The resource area will build off the results of the High-Level Feasibility Assessment & Permitting Analysis, which may identify key areas that need further land use and planning analysis as part of this study.

- This analysis will not be done at the individual parcel level; it will assess major land use categories within the counties or cities that occur along the pipeline routes and appurtenant facilities.
- An initial assessment of the conflicts between the Project facilities and current land uses will be provided and recommendations on whether measures are available to reduce or avoid any identified impacts.

Environmental Justice

The Environmental Social Justice Analysis will involve two parts: (1) conducting an Environmental Justice (EJ) screening and (2) preparation of a Stakeholder Engagement Plan. Part two has been added in response to stakeholder comments received on the scope of the Environmental Social Justice Analysis.

The EJ screening will include a high-level overview of the disadvantaged communities

potentially affected, which will be identified from available environmental justice screening tools, such as CalEnviroScreen and the Biden-Harris Administration's Climate and Economic Justice Screening Tool. High-level maps using preliminary Angeles Link routing and agency approved GIS screening tools will be prepared. Demographic information pertinent to the high-level analysis will be described, and any recommendations to avoid/reduce potential impacts and/or changes already incorporated to benefit potentially affected disadvantaged communities will be included.

The analysis will also evaluate the Project's alignment with applicable goals and objectives in the California Public Utilities Commission's Environmental and Social Justice Action Plan 2.0, as well as potential impacts and benefits to disadvantaged communities and other low-income communities of color located in SoCalGas's service territory. Assembly Bill 617 communities that have been selected by the California Air Resources Board to participate in the Community Air Protection Program will be highlighted in the impact and benefits analysis.

The information gathered through EJ screening and PAG/CBO feedback will facilitate preparation of a community focused Environmental Justice Community Engagement Plan. The Environmental Justice Community Engagement Plan will establish an approach or framework for engaging disadvantaged communities with activities anticipated to occur during Phase Two, which will focus on gathering community input to address concerns and mitigate impacts and educating communities on hydrogen related topics of most interest to community members.

Right-of-Way Analysis

Overview

The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing private rights-of-way to accommodate the Project and future right-of-way locations needed.

Technical Approach

The *Right-of-Way (ROW) Analysis* consists of reviewing potential routes in multiple segments to assess the potential availability of existing private ROWs as well as future ROW locations to accommodate the Project. The review entails 1) identification of private parcel ownership for each segment, and 2) evaluation of terms and conditions of existing ROW agreements where the potential routes parallel existing pipelines in private properties.

Data collection:

Private ownership research will be conducted by retrieving publicly available real estate/property ownership data and public property record information through county tax roll databases and other real estate data service providers such as Data Tree by First American and Land Vision by Lightbox.

Existing ROW research will be conducted by first reviewing GIS and other Company facility maps to determine relevant existing ROW agreements, followed by retrieving the associated documents from the repository where Company ROWs are stored.

Data evaluation:

Parameters used when evaluating ownership data include:

- Identification of parcels owned by federal, state and local governmental agencies, railroads, other utilities, and private owners with known history which may present acquisition challenges due to long lead time or onerous permitting requirements.
- Detailed title due diligence review for individual private parcels is not part of the ownership data evaluation.

Parameters used when evaluating terms and conditions of existing ROW agreements include:

- Identification of ROW widths
- Type(s) of product allowed to be transported in the ROW
- Whether installation of multiple pipelines is allowed within the ROWs
- Any other limitations or restrictions that may prevent the utilization of existing ROWs.

Approach consideration and review:

For selected segments, a ROW Analysis Summary will be provided, as well as line list providing private parcel ownership information, assessor parcel numbers, and where applicable, existing ROW information and significant terms of the ROW agreement. Assumptions in compiling the line lists and summary reports are as follows:

- Where potential routes parallel public ROWs, assume installation of new pipeline within franchise streets.
- Where potential routes parallel Caltrans controlled-access ROWs, assume installation outside of state ROW in either franchise streets or private parcels adjacent to Caltrans ROW.
- Where potential routes parallel existing pipelines in private ROWs, assume 25’ as minimum width required to accommodate the new pipeline, in addition to existing pipeline(s) already installed within the ROWs.

Overview

The Decision requires SoCalGas to identify and compare possible routes and configurations for the Project (OP 6 (i)). As part of this assessment, SoCalGas will conduct an initial evaluation to review the potential availability of its existing franchises[3] to accommodate the proposed routes and future franchises needed for the proposed routes.

Technical Approach

Source considerations:

The *Franchise Analysis* consists of reviewing potential routes in multiple segments to assess the potential availability of existing public ROWs as well as future ROW locations to accommodate the Project. The review entails 1) identification of franchise agreements for each segment, and 2) evaluation of terms and conditions of existing franchise agreements where the potential routes would be sited in franchised, public ROWs.

Data collection:

Franchise Agreement research will be conducted by reviewing existing digital and hard copy franchise agreements. The Franchise Analysis will assess existing franchise agreements and, to the extent applicable, relevant provisions in municipal ordinances and/or charters vis-a-vis preliminary routing concepts. This work will include initial review and analysis of:

- The number and types of SoCalGas projects in applicable municipalities
- An assessment of SoCalGas's rights in its existing franchised ROWs (including existing franchise agreement payment mechanisms and other terms or conditions that may implicate clean renewable hydrogen as well as related municipal ordinances and charters)
- Potential terms and conditions, as developed, for clean renewable hydrogen franchises.

Data evaluation:

Certain criteria will be evaluated when assessing franchise agreements, including the term, the subject matter (including purposes and uses) of the grant, the specific public rights-of-way that the franchise agreements provide access to as well as other terms and conditions of each franchise agreement. In addition, SoCalGas will also evaluate municipal charters, as applicable, and relevant ordinances related to or that otherwise implicate hydrogen and/or pipelines in the public right-of-way.

SoCalGas will note and document where new or modified franchise agreements may be necessary to support potential routes and alternatives. The analysis will be synthesized in a

[3] A contract, generally in the form of an ordinance passed by a municipality, that grants SoCalGas 'the right, privilege and franchise to lay, construct, operate, maintain, use, repair, replace or remove pipelines, and appurtenances thereto, for transmitting and distributing gas for any and all purposes under, along, across over or upon a municipality's city's existing rights-of-way.'

database/spreadsheet, allowing for land use/franchise comparisons across different potential routes and alternatives.

Approach consideration and review:

For each potential segment, a Franchise Analysis Summary will be provided, as well as a detailed line listing the municipality that owns/operates the public right of way, terms and expirations dates, and pertinent terms and conditions information.

ENGINEERING & DESIGN WORKSTREAM TECHNICAL APPROACHES

Preliminary Routing/Configuration Analysis

Overview

The Decision requires (OP 6 (i)) SoCalGas to identify and compare possible routes and configurations for the Project. This study will (i) determine preferred routing/configuration alternatives for hydrogen system; (ii) consider existing pipeline corridors or rights-of-way, other known existing rights-of-way, franchise rights, designated federal energy corridors or rights-of- way, and the need for new rights-of-way; and (iii) evaluate technical considerations, major crossings, elevations, terrain types, and other potential geographical and urban challenges. This study includes high-level construction staging for implementation of routes and evaluation of a localized hydrogen hub. As part of the configuration analysis, SoCalGas will conduct an initial evaluation of hydrogen storage technology. SoCalGas will assess storage proximity to the Southern California region and both aboveground and underground technologies.

Technical Approach

Approach consideration and review:

SoCalGas' 2021 Report studied conceptual high-level pipeline routings to transport various levels of clean renewable hydrogen to supply demand in the LA Basin along existing Federal Energy Transit Corridors. These potential routes and several alternatives were collected into one System. These routes will be evaluated from an overall System standpoint to determine routes and staging that support both forecasted supply and demand modeling and long-term resiliency. The evaluation process is summarized below:

System Evaluation

Step One: Identify general system routing/pathways and functional zones considering potential Production and Demand locations

Step Two: Identify preferred routes in each of the functional zones: Connection, Collection, Central

Route Evaluation

Step Three: Refine preferred routes and compare to determine preliminary ideal alignment

Step Four: Identify preferred route combinations with components from each of the functional zones and validate to ensure constructability and assess social justice implementation.

The System evaluation (Steps 1 and 2) will aim to assess the overall layout and pathways to safely transport clean renewable hydrogen. The individual routes will be cataloged into three functional zones – Connection, Collection, and Central and combined to form a continuous pipeline network.

- The **Connection Zone** will identify assets necessary to access San Joaquin Valley (Interstate-5/State Route-99 corridor), High Desert (Interstate-15 corridor), Low Desert (Interstate-10 corridor), and Southern Desert (Interstate-40 corridor) supplies.
- The **Collection Zone** will aim to create flexibility between the anticipated areas of higher production and anticipated areas of higher demand.
- The **Central Zone** will assess pipeline and other assets that connect between potential assets in LA Basin.

Assessment will be done from a functional standpoint, assessing the operational characteristics that the segment supports within a conceptual fully built-out clean renewable hydrogen system. Independent factors such as production, demand, storage, and design parameters will then be used in Step Two to identify preferred routes within each functional area based on criteria discussed further herein. Application of design parameters will be further applied to identify potential compression needs in conjunction with anticipated operational model. Preferred routes will be identified in each of the three functional areas.

Those routes identified for further consideration will be used as the basis for which routes are further refined. Preferred routes will be identified in each of the three functional zones identified within the system evaluation. In Step Three, route evaluation will be conducted on a point-to-point basis to determine benefits and elements that may require further refinement. Pipeline characteristic evaluation will be completed by assessing a variety of different evaluation criteria that fall within social, environmental, and engineering categories to assess which features may be more prevalent along a route. This allows for a systematic and quantifiable comparison to aid preferred Project selection.

Lastly, in Step Four, preferred routes from the three functional zones will be grouped to create continuous pathways of transmission. These pathways will be again evaluated from a safety and engineering standpoint to validate constructability, as well as from an environmental social justice standpoint for implementation.

Data collection including regulatory review:

The contractor will work with SoCalGas to collect data from other integrated Angeles Link Phase 1 Studies and GIS. Data compilation will include:

- Literature review and compiling of various information such as jurisdictions and parcel boundaries, infrastructure, soil and geological surveys, floodplain and wetland maps, and other environmental reports.
- Land use and zoning information, as well as the most recent publicly available aerial photography, will be obtained for the project area.
- Information will be obtained from various sources, including federal, state, and local agencies, and information databases accessible through the internet.

Calculation approach:

System evaluation will integrate information from the Demand and Production studies under a variety of different scenarios to identify areas with the greatest opportunity to maximize access and transmission.

- Route evaluation will utilize mileage that is applicable to one criterion compared to another.
- A range of criteria will be used for the process to identify relative significance and create the ability to quantify impacts and identify potentially affected resources, design constraints, and/or potential for lower costs.

Data evaluation:

SoCalGas will evaluate the following categories of information, including, but not limited to:

Route Evaluation Criteria Categories		
Engineering	Social	Environmental
Class Location (Class 1, 2,3,4)	Assembly Bill 617 - Community Air Protection	Air Quality / GHG Emissions
Length in High Consequence Areas (HCA)	Proximity to Sensitive Receptors	Cultural and Tribal Resources
Length in Moderate Consequence Areas (MCAs)	Rural Lands	Land Use & Planning
Length of Bore Crossings	Senate Bill 535 - Disadvantaged Communities	Biological Resources
Length of HDD Crossings	Urban Lands	Energy
Length of Overhead Utilities Within 25 Feet		Hazards & Hazardous Materials
Length of Pipeline		Hydrology and Water Quality
Length Parallel but Outside Existing ROW		Permitting Considerations
Length With a Slope Greater Than 15 Percent		
Length Within a Roadway		
Length Within Existing ROW		
Number of Bore Crossings		
Number of HDD (Horizontal Directional Drill) Crossings		
Number of Railroad Crossings		
Number of Road Crossings		
Soil and Geotechnical Conditions Anticipated		
Temporary		
Underground Foreign Utilities		
Workspace Required		

Pipeline Sizing & Design Criteria

Overview

The Decision requires SoCalGas to compare possible routes and configurations (OP 6 (i)) and evaluate safety concerns for the Project (OP 6 (f)). This study will: (i) estimate potential pipeline sizes for the pipeline route from production to end-use; (ii) identify specific materials for pipeline, fittings, and differences in operational equipment; (iii) discuss safety considerations, pressures, and maintenance operations associated with design; and (iv) evaluate compression characteristics and options.

Technical Approach

Approach consideration and review:

Pipeline Sizing, Pressure Profile, and Compression

Evaluation of pipeline sizing will consider the results of the production model generated as part of *Production Planning & Assessment* Study. Pipeline sizing options will be developed to meet the needs of the anticipated operating conditions for the new clean renewable hydrogen pipeline system, incorporating each step in the sequential supply/demand increase of the Angeles Link systems developed in the Production and Demand studies. A summary report will be developed illustrating multiple sizing options focused on maintaining reasonable pressure loss and provides

suggestions for future capacity sizing considerations and potential staging to accomplish various demand/supply scenarios.

In addition to performing hydraulics along the refined pipeline routes, multiple scenarios will consider various ways to optimize the pipeline system including the following items:

- Quantities of piping and other materials required for the Project.
- Pipeline operating pressure to optimize system capacity and required system compression (horsepower).
- Loops and branches to reduce required wall thickness, improve resiliency and reliability, and optimize pipeline nominal diameter
- Phased/staged installation of required pipeline section

Hydrogen compression requirements will be assessed along the selected pipeline routes, to determine:

- Total compression requirements (horsepower)
- The total number of compressor stations and their locations
- Heat exchange requirements for the system.

Repurposing

SoCalGas will assess repurposing of existing natural gas pipelines through:

- Evaluation of location
- Pipeline attributes such as grade and wall thickness
- Operational parameters such as in-line inspection records, design level, minimum operating pressure, and maximum allowable operating pressure.

Storage

Storage of hydrogen will be evaluated and incorporated into the sizing optimization.

- Underground storage technologies will be evaluated from a technology readiness level (TRL), location, and by characteristic to rank and establish potential to support operational models and system evaluation.
- Aboveground storage technologies will be evaluated as well from a characteristic standpoint, including cost, capacity, and siting.
- All methods of storage share the goal of safely meeting storage capacity needs with suitable injection and production rates.

Design Basis:

A preliminary design basis will be developed to identify key factors including the operating and design characteristics of clean renewable hydrogen for the various routes and segments, which will be used in the determination of preliminary pipeline sizing, compression requirements, and pipeline material selection. These factors will become further available as the study progresses.

Many of the components of the preliminary design basis and routing will require iteration to finalize, including:

- Routing
- Operating and design characteristics
- Pipeline diameter
- Quantity and sizing of compressor stations and their locations
- Material specifications.

SoCalGas' 2021 Report and appendices were consulted as the first step of the pipeline sizing and design criteria. Once preferred routings are identified, a hydraulic study will be completed to determine the required pipe diameter and compressor station(s) based on the pipeline routing and the desired delivery pressure to the LA Basin and end-use customers.

The preliminary design basis will include the following criteria:

- Federal, state, and local laws and regulations
- Gas standards and specifications
- Industry best practices
- Pipeline engineering and design factors including the following:
  - Design Pressure & Maximum Allowable Operating Pressure
  - Piggability
  - Corrosion Allowance
  - Supervisory Control and Data Acquisition (SCADA), Control Philosophy, Communication, & Monitoring
  - Pipe Coating
  - Constructability Factors

The preliminary design basis will be prepared once appropriate data from the Production, Demand, and Water Resources Analysis has been developed.

Plan for Applicable Safety Requirements

Overview

The Decision requires (OP 6 (f)) SoCalGas to evaluate safety concerns involved in pipeline transmission, storage, and transportation of hydrogen applicable to the Project. This study will evaluate safety concerns and develop an assessment of applicable safety requirements for employee, contractor, system, and public safety.

Technical Approach

Approach consideration and review:

A focus on all aspects of safety and consideration of the physio-chemical properties of

hydrogen is required. A safety assessment will be conducted to include the following features:

1. *High-level characterization of the physical and chemical properties of hydrogen that impact safety in the gas transmission system (including pipeline, compression, storage, and transportation)* – Size of hydrogen molecules, Btu content of hydrogen, combustion temperature of hydrogen, flammability and explosive range, challenges of compressibility, storage, and transportation (by hydrogen trailer) will be addressed. INGAA Foundation safety-related studies will be referenced.

2. *A description of key safety risks, including seismic events, and potential mitigations (utilizing available industry standards)* – API Pipe specifications for 100% hydrogen pipe are in development and will help guide specifications on pipe, valves, and fittings that are approved for 100% hydrogen.

3. *A summary of key safety codes in the US and globally* – US codes and standards to be reviewed will include 49 CFR Park 192, ASME B31.12, and CPUC General Order No. 112-F. International codes will be researched and reviewed; INGAA Foundation safety-related studies also reference other global standards and codes which will be included in the review.

4. *Specifications, standards and protocols for leak detection and employee safety* – SoCalGas will focus on leak detection equipment and safety training for working on hydrogen systems.

5. *Typical operations and maintenance considerations for 100% hydrogen systems to guide pipeline and facilities handling* – 49 CFR Part 192 is the primary federal code for operations and maintenance of pipeline systems transporting natural "and other gases" like hydrogen. GO 112-FE contains additional requirements by the CPUC. Both 49 CFR Part 192 and GO 112-FE will be reviewed and considered as a basis. The study will also consider the potential for future requirements and how to plan for regulatory changes.

6. *A description of organizations accredited to undertake hydrogen safety training, operator training, operator qualifications, and opportunities for collaboration with other stakeholders (community colleges, ports, etc.)* – Training and operator qualification organizations will be researched to determine accreditations.

7. *A summary of public safety concerns and stakeholder engagement processes, including approximate timing of engagement, to help guide development of Hydrogen Public Awareness Plans* – Discussion and education topics will be generated by the consultant and through engagement with external stakeholders. This plan would identify topics to pursue in support of educational opportunities to create awareness in regards to hydrogen safety.
8. *High-level evaluation of existing safety programs, plans, and systems for applicability to 100% hydrogen systems.*
9. *A summary of lessons learned and other relevant information gained from actual experience that could be applicable to the proposed Angeles Link system (including pipeline, compression, storage, and transportation).*

Data evaluation:

SoCalGas will review existing company standards and specification sheets to identify potential impacts, required updates, and/or new processes to be created due to the introduction of the Angeles Link Project. As part of this process, SoCalGas will:

- Create a listing of all standards and specification sheets to track review process
- Conduct a gap analysis for each standard to identify those standards that would be impacted by the introduction of a 100% clean renewable hydrogen system
  - Establish criteria to identify impacts
  - Apply criteria to evaluate standards
  - Determine if existing standards will require an update and/or a new standard
- Review the availability and existence of potential future specifications and standards
- Create timeline/schedule for implementation of changes and additions

Workforce Planning & Training Evaluation

Overview

The Decision requires (OP 6 (e)) SoCalGas to evaluate workforce planning and training. This study will evaluate construction practices and operations and maintenance protocols for utility workers regarding hydrogen infrastructure and workforce needs in terms of staging and growth for the Project.

Technical Approach

Source considerations:

Federal regulations (49 CFR Part 192 Subparts A through P) and CPUC General Order No. 112-F provide a basis for establishing training programs and workforce planning. These rules and regulations contain requirements for procedures that cover a wide range of areas from materials, design, construction, welding, corrosion, testing, operations and maintenance, qualification of pipeline personnel, and integrity management.

Approach consideration and review:

In addition to the federal and CPUC requirements noted above, SoCalGas may have existing Company requirements and protocols that may be part of the evaluation and utilized as the overall basis for proposed updates to existing protocols where applicable. The following areas will be assessed as part of this task:

1. Operations & Maintenance Protocols – Existing SoCalGas natural gas operations and maintenance procedures provide a basis for starting evaluations for hydrogen-specific requirements. Operations and maintenance protocols will be reviewed to provide guidance on including significant language about hydrogen safety, abnormal operating conditions, PPE required and other topics. Additionally, 49 CFR Part 191, 49 CFR Part 199 (Drug &

Alcohol), and GO 112-F will be reviewed for further requirements as well as any California-specific standards such as CalOSHA Title 8 and Cal Gov. Code § 4216. A log of procedures and associated regulatory requirements will be generated to document the guidance on existing standards and potential new standards.

2. Department of Transportation (DOT) and Other Construction Qualification/Protocols – Design and construction requirements including welding, weld flaw criteria, pipe specifications are likely to be developed by API. Protocols will be reviewed and any changes necessary will be identified and incorporated. Pipe manufacturers are actively engaged in evaluating additional pipe specifications for 100% hydrogen systems in conjunction with API and other agencies. A log of specifications and associated regulatory requirements will be generated to document the guidance on existing specifications and potential new specifications.

3. Timeline for Workforce Staging – As the pipeline routing and design is completed and the location of hydrogen production sites, storage sites, and compressor station sites are developed, Operations Management SMEs will review staffing models used on the natural gas system and create the workforce staging and staffing plan, including an estimate of jobs created, for Angeles Link. The staffing model may require updating as the final design for the hydrogen design is developed. The analysis will consider how acquiring the required operations personnel and initiating the training and Operation Qualification (OQ) process may necessarily require the hiring process to start well in advance of planned operations. In addition, opportunities for partnering with local training centers, colleges and industry will be considered.

4. Comparison to Existing SoCalGas Facilities – SoCalGas will review existing SoCalGas natural gas facilities as a basis for applicability to hydrogen facilities and assess potentially required modifications. An existing SoCalGas compressor station and an existing SoCalGas pipeline segment will be used as a starting point for the comparison. Operations Management SMEs and Labor Relations SMEs will be consulted during this comparison.

5. Risk/Mitigation Assessment – SoCalGas will review potential risks associated with workforce planning and training applicable to hydrogen pipelines. As the project proceeds from design to construction to commissioning, effective training will be under constant updates and review. The consultant will review and provide a list of accredited training and operator qualification third party companies who can assist with increasing the effectiveness of workforce training, including lessons learned from prior incidents as applicable to hydrogen.

6. Changes to Existing Processes – SoCalGas will review existing processes related to:

    - Leak Survey
    - Leak Detection
    - Leak Mitigation and Repair
    - Control room and emergency response protocols
    - Integrity Management

Federal regulations (49 CFR Part 192) contain significant language for these processes for the transportation of natural gas – and other gases (such as hydrogen) – by pipeline. Operations Management, Regulatory Compliance, and Control Room Management SMEs will provide input.

A summary report of integrity management issues for the hydrogen pipeline system will be provided.

7. Changes to Human Resource Considerations – SoCalGas will review and develop recommendations regarding human resources issues, including consideration of:

    - Hydrogen system control room management; and
    - Potential for separate job classifications in: Facility operations
        - Facility maintenance
        - Leak Survey
        - Valve maintenance
        - Emergency response
        - Public liaison with emergency response agencies

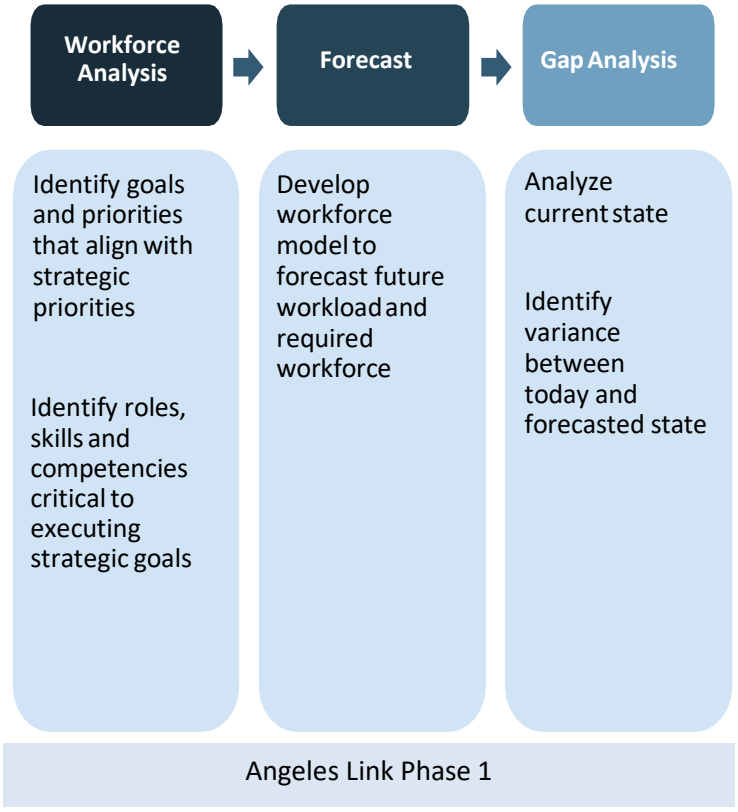
As part of this process, SoCalGas will consult with Labor Relations SMEs as the study progresses on determining if field personnel and gas control personnel and emergency response personnel can hold dual classifications and operator qualifications in both natural gas and hydrogen. A summary report will consider all the classifications specified within the Company.

8. Changes to Technology & Implementation – SoCalGas will review the potential changes to or additional technology needed to transport 100% hydrogen, including:
    - Close Interval Survey (CIS) – Review and summarize any requirements pertaining to hydrogen.
    - System Analysis Programming (SAP) and Asset Management (GIS) – To be reviewed and summarized from the perspective of Hydrogen System Operations and Integrity Management. Traceable, Verifiable and Complete records of the new hydrogen system are a must have consideration according to the Mega Rule changes to 49 CFR Part 192.
    - SCADA – Capacity and scaling of existing SCADA to include the hydrogen system. SCADA becomes the primary network to monitor system performance, gather critical operating data including leak detections indications, compressor performance, hydrogen productions, and hydrogen storage. These systems will add significant numbers of field data points to the SCADA system necessitating a review of the capacity of existing SCADA system.

Data evaluation:

SoCalGas will perform modeling that takes into account business data that measure and describe work volumes, how employees work, current staffing needs, and labor costs in both time and money. The staffing model will provide insights into the utilization of internal & external resources, identify internal & external factors that drive work volume and forecast workforce level required on specific tasks to meet the objective of the Project. The skills and knowledge required to meet organizational needs of the Project are assessed as well. This evaluation will highlight skill gaps, plan future employee training, promote employee engagement, and drive more accurate external recruitment efforts.

Workforce Capacity Planning Model



APPENDIX 11 - PAG/ CBOSG MEMBER COMMENTS REVISED 2/20/24

PAG MEMBER COMMENTS

From:	Charles Wilson
To:	ALP1 Study PAG Feedback
Cc:	Grant, Emily
Subject:	Feedback and Question
Date:	Tuesday, July 25, 2023 10:43:35 AM
Attachments:	image001.png

Thank you for the workshops last week. Unfortunately, I was not able to participate in the Thursday workshop.

The question I had that did not appear to be asked was on the water access, capacity, and availability in the production of hydrogen. How are you planning to address the water needs for hydrogen production and how will that drive costs to your project?

The same question should be asked as well on the energy side, which sounded like it did get asked. Since hydrogen production is energy intensive, what how do hydrogen producers plan to access needed energy, particularly along the coast, for production needs? How does this impact line route, siting and easement need for your project?

Thanks again.

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July 31, 2023 **VIA ELECTRONIC MAIL**

Southern California Gas Company
Angeles Link Planning Advisory Group
ALP1_Study_PAG_Feedback@insigniaenv.com

RE: Comments on Planning Advisory Group (PAG) workshops on Proposed Preliminary Studies – July 18 & 20, 2023

The following is a global comment by the Public Advocates Office at the California Public Utilities Commission (Cal Advocates) as part of the Southern California Gas Company Angeles Link Planning Advisory Group (SoCalGas PAG) relating to all studies currently being undertaken.[1]

The Commission identified the need to study a localized hub solution in Decision Ordering Paragraph 3(c),

> SoCalGas shall study a localized hydrogen hub solution, under the specifications required to be eligible for federal funding provided through the Infrastructure Investment and Jobs Act, as part of Phase One.

Ordering Paragraph 5 (e), and

> How did the planning process consider and evaluate Project alternatives, including a localized hydrogen hub or other decarbonization options such as electrification, their costs and their environmental impacts?

[1] These studies are being conducted in response to the Ordering Paragraph 6 of the Commission Decision (D.) 22-12-055 in Application (A.) 22-02-002 - Application of SOUTHERN CALIFORNIA GAS COMPANY (U904G) for Authority to Establish a Memorandum Account for the Angeles Link Project. Throughout we will refer to this as the Decision.

Ordering Paragraph 6 (d);

> Evaluation of the cost-effectiveness of the Project against alternatives, which should include a localized hydrogen hub or electrification option, and determining the methodology to measure cost-effectiveness between the alternatives.

To enable a fair comparison between potential alternatives and ensure the widest range of reasonable alternatives for evaluation by stakeholders and the Commission, a local hub scenario should be developed and evaluated in the following studies identified in the Scope of Work:[2]

- Water Resource Evaluation;
- Demand Study;
- Production Planning & Assessment;
- High-Level Economic Analysis & Cost Effectiveness;
- Project Options and Alternatives;
- High-Level Feasibility Assessment & Permitting Analysis;
- Preliminary Routing/Configuration Analysis;
- Environmental & Environmental Social Justice Analysis; and
- Greenhouse Gas Emissions (GHG) Evaluation.

A local hub scenario should assess the availability of the precursors for hydrogen generation and the feasibility of generating hydrogen near the main source of demand. Such a scenario would evaluate both the existing water and energy transmission infrastructure, and the ability to expand such infrastructure to facilitate the development of hydrogen generation near the main source of demand.

Both pipeline and hub scenarios should be informed by the Demand Study and the Water Resource Evaluation, but additional analysis of existing energy infrastructure, as well as potential land use and zoning constraints is also needed. During the July 20, 2023 PAG workshop, SoCalGas confirmed that its analysts would be assessing water availability across the whole of the LA Basin; this would include the availability of raw, waste, and brine water sources that could be used as for hydrogen generation. Looking at these water sources is a good start towards evaluating the widest range of solutions. SoCalGas should also assess the spare capacity and/or feasibility of expanding existing capacity to electrical infrastructure to

[2] SoCalGas – Angeles Link – Scope of Work Descriptions for Phase One Studies. Provided to PAG July 2023.

support a hub. In addition, SoCalGas should identify land use and zoning opportunities and barriers that would affect development of a hydrogen hub. The availability of both existing water and energy in concert with zoning and land use opportunities are likely to drive the ultimate location of hydrogen generation and thus the need for hydrogen transmission pipelines.

Cal Advocates recognizes that development of these studies is an iterative process. Both pipeline and hub scenarios can be informed by and in turn inform the GHG studies, Environmental & Environmental Social Justice Analysis, and the High-Level Feasibility Assessment & Permitting Analysis. Ultimately, as a part of the analysis SoCalGas should compare the cost effectiveness and feasibility of a transmission pipeline solution against a local hub solution. For both hub and pipeline scenarios SoCalGas should provide clear and concise descriptions, including all assumptions and parameters used to define the scenarios. Indeed, a hub system could well be a "least-regrets" start if broader hydrogen initiatives move more slowly or if greater hazards than benefits arise with the installation of a hydrogen pipeline crossing the entirety of the LA Basin.

A hub versus pipeline comparison provides the greatest contrast in potential solutions to the development of hydrogen infrastructure. By using two distinct planning scenarios i.e. one that assesses the feasibility of co-locating hydrogen generation with the demand versus a scenario that assumes the hydrogen generation will be located at a distance from demand, SoCalGas will avoid prematurely precluding potentially viable alternatives. Further, the use of two distinct planning scenarios would enable both stakeholders and decisions makers to fully understand the trade-offs that would be necessary to develop hydrogen infrastructure in California.

Sincerely,

Arthur (Iain) Fisher, PhD
Supervisor, Safety Analysis

Cc: Emily Grant
Edith Moreno
Chester Britt

July 31, 2023

Chester Britt
Planning Advisory Group Facilitator

Emily Grant
Angeles Link Senior Public Affairs Representative
Southern California Gas Company

Alisa Lykens
Director
Insignia Environmental

Subject: Environmental Defense Fund Phase One Study Topics and Scope of Work Comments

As a follow-up to the Angeles Link Project Public Advisory Group (PAG) quarterly meetings held July 18 and 20, 2023, Environmental Defense Fund (EDF) shares the following comments and feedback.

First, EDF fully supports the recognition by Southern California Gas Company (SoCalGas) that hydrogen can function as an indirect greenhouse gas (GHG) and that the role of hydrogen as an indirect GHG directly informs the importance of addressing hydrogen leakage concerns around the proposed Angeles Link project, as expressed by Darrell Johnson, Environmental Services Manager, SoCalGas, at the PAG meetings. EDF suggests that SoCalGas and Insignia Environmental examine all possible research and literature around this topic. Specifically, EDF recommends the following resources be included in the Phase One study:

- Warwick, N. J., Archibald, A. T., Griffiths, P. T., Keeble, J., O'Connor, F. M., Pyle, J. A., and Shine, K. P.: "Atmospheric composition and climate impacts of a future hydrogen economy", *Atmos. Chem. Phys. Discuss*. [preprint], https://doi.org/10.5194/acp-2023-29, in review, 2023.
- Hauglustaine, D., Paulot, F., Collins, W. *et al.* "Climate benefit of a future hydrogen economy", *Commun Earth Environ* **3**, 295 (2022). https://doi.org/10.1038/s43247-022-00626-z
- Bertagni, M.B., Pacala, S.W., Paulot, F. *et al.* "Risk of the hydrogen economy for atmospheric methane", *Nat Commun* **13**, 7706 (2022). https://doi.org/10.1038/s41467-022-35419-7

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Additionally, EDF recommends the following resource for leakage analysis included in the Phase One study, in particular related to detection technology.

- Environmental Defense Fund, "As Climate Concerns About Hydrogen Energy Grow, New Tech Unveiled at CERAWeek Delivers Unprecedented Results Measuring Leaks, Other Emissions", March 5, 2023.

Second, EDF notes that the information provided on the draft scope of work shared by SoCalGas remains general; and raises the following comments and questions.

On the issues of hydrogen leakage and GHG emissions impact:

- Phase One study should examine all other possible sources of hydrogen emissions—including, but not limited to, venting and purging of hydrogen—in addition to hydrogen leakage; and include those other possible sources should be included in Phase One study calculations.
- Will hydrogen emissions be included and/or considered in the GHG emissions impact calculations? Will SoCalGas and Insignia provide a full range of GHG emissions considered?
- EDF supports estimating leakage and GHG emissions impact for each emissions source type. Are SoCalGas and Insignia planning any empirical measurements around the emissions sources?

On the issue of NOx emissions:

- Will NOx emissions include emissions related to industrial, commercial, or residential hydrogen combustion? EDF recommends that those sources be included if hydrogen use in relevant sectors are considered within the Phase One study.
- The Phase One study should also cover adjustments necessary to achieve NOx emissions from hydrogen use that would be "no worse" than corresponding fossil fuel use, including any changes in after-treatment performance and generation load with hydrogen combustion.

EDF looks forward to continued engagement with SoCalGas, Insignia Environmental, and other PAG members throughout the Angeles Link Phase One Study process.

Respectfully,

Michael Colvin
Director, Regulatory and Legislative Affairs

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Energy Decarbonization Analyst

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From: Vismonte, Jesse
To: ALP1 Study PAG Feedback
Cc: Rucic, Nermina; Habib, Paul
Subject: LADWP - June Q2 Meeting Comments - PAG
Date: Monday, July 31, 2023 4:18:25 PM

Hello,

Thank you for the opportunity to provide comments on SoCalGas' Angeles Link Phase One. I am providing comments on behalf of the Los Angeles Department of Water and Power (LADWP):

With respect to Angeles Link and one of its expressed goals to "enhance energy system reliability, resiliency, and flexibility," it is important that Phase 1 include assessments of the proposed infrastructure against chronic and acute events that may threaten its operation. As LADWP decarbonizes it's power system with variable energy resources like solar and wind, it will need green-hydrogen-fueled firm power generation to maintain system reliability and resiliency. It is critical that the green hydrogen supply is available when called upon. If not, this will directly threaten power system reliability and resiliency and result in load-shedding events. The path toward decarbonization will bring a growing reliance on electricity for end-use energy demand, which means disruptions to electricity will be more impactful to customers.

One definition of resilience is the ability to anticipate, prepare for, respond to, and recover from potentially disruptive events, ideally while maintaining an adequate level of system function with minimum damage or adverse impact.

One possible risk scenario, for example, threatens LADWP's transmission system infrastructure: during wildfires that encroach on LADWP's transmission system, it may result in reduced or the complete loss of electrical import capability. In such scenarios with concurrently high electrical load, it will become necessary to depend on local, firm generation to avoid widespread blackouts (e.g., hydrogen-fueled power generation at LADWP generating stations).

Future hydrogen pipelines may be exposed to the same risks moving forward, especially if they are to import green hydrogen from outside the LA Basin (while recognizing limited local, in-basin hydrogen storage solutions exist). Resiliency risk assessments are becoming increasingly important in the face of climate-driven threats and are requiring energy planners to think carefully about the associated impacts and mitigative solutions. Besides wildfires, other risks include protracted heat waves, heavy precipitation, storm surge, sea-level rise, and earthquakes. Considerations of these events and their impacts to system resiliency must be assessed and incorporated into Angeles Link studies.

From LADWP's review of PAG meeting documentation, the idea of *resiliency* is largely absent in PAG meetings to-date. LADWP expects to participate more in PAG meetings moving forward. Thank you again for the opportunity to provide comments and do not hesitate to reach out to me for any questions.

Warm Regards,

Jesse Vismonte, P.E.
Mechanical Engineer
Resource Planning & System Resiliency
Los Angeles Department of Water and Power
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The Utility Consumers' Action Network
(Angeles Link PAG Member)

Feedback for SoCalGas Regarding
16 Study Proposals

Date: July 31, 2023

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On June 28, July 18, and July 20, 2023, SoCalGas hosted Planning Advisory Group (PAG) meetings on its proposed studies. On July 6, 2023, SoCalGas released summaries of scopes of work for the 16 studies it anticipates completing.[1] At each meeting, SoCalGas asked for additional written feedback by July 31, 2023. The Utility Consumers' Action Network (UCAN) submits the following feedback on the information provided by SoCalGas over the last two months.

1. **SoCalGas's refusal to use transparent processes in Phase 1 violates the Commission's decision.**

In Q1 2023 feedback UCAN and other PAG members asked SoCalGas to share the scope of work for each of the studies. UCAN specifically asked for:

- proposed study inputs and assumptions
- the scope of work and work product that it plans to require of its contractors.
- data collected by itself and its consultants as those data become available.

At the June 28th meeting, SoCalGas stated that it would provide the scopes of work for the 16 proposed studies. The July 18th and July 20th meetings were scheduled to discuss scopes of work. Prior to the July PAG meetings, SoCalGas shared scope of work "descriptions" but did not distribute the scopes of work. During the July 20th meeting, PAG members again asked for the full scopes of work rather than the summaries that SoCalGas provided to the PAG. SoCalGas claimed that it could not release the contracts because "there is confidential business information in our contracts with our vendors." SoCalGas also attempted to bar the CPUC's Public Advocates Office (Cal Advocates) from viewing the contracts by stating that SoCalGas is completing Phase 1 outside a formal proceeding.

SoCalGas's decision to sign secret contracts conflicts with its transparency claims. SoCalGas asked to track the costs of Phase 1 so that it would have the opportunity to request cost recovery at some future point. The PAG and the public need to know what work SoCalGas has asked its contractors to complete in Phase 1. It is unreasonable for SoCalGas to ask future hydrogen ratepayers to pay for work with unknow conditions, scopes, and work products. SoCalGas should release the Phase 1 contracts to the PAG and the Commission.

The Angeles Link decision, D.22-12-055, stated that "The PAG is a useful vehicle for providing transparency into the Angeles Link planning process and providing feedback to SoCalGas on Project options and alternatives."[2] SoCalGas is failing to meet D.22-12-055's transparency requirements.

[1] SoCalGas, Angeles Link Scope of Work Descriptions for Phase One Studies (Angeles Link Study Descriptions) (July 6, 2023), available at https://files.constantcontact.com/0b5f0dbb001/651bad0b-3345-4378-b64b-35723bab762b.pdf.

[2] A.22-02-007, Decision Approving The Angeles Link Memorandum Account To Record Phase One Costs (D.22-12-055)(December 20, 2022), p. 46, available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M500/K167/500167327.PDF.

2. **SoCalGas should stop using the PAG for promotional purposes if it intends to request cost recovery for Phase 1.**

D.22-12-055 does not allow SoCalGas to track expenses of promotional work. The decision stated that "SoCalGas may not record any costs for outreach and public relations activities in the Angeles Link Memo Account in Phase One."[3]

SoCalGas continues to spend time and money on promotional events, materials, staff, and contractors. A short list of some of SoCalGas's promotional efforts include:

- Staffing Phase 1 with public relations employees and contractors.
- Encouraging PAG members to attend a promotional tour of its hydrogen home during SoCalGas's July 18, 2023, PAG meeting.
- Including promotional materials and language within documents distributed to the PAG and the CBOSG. For example, the Angeles Link Study Descriptions document included a long list of talking points promoting hydrogen. The list was labeled as "underlying purposes."[4]
- Including promotional materials for hydrogen on the Angeles Link page of the SoCalGas website.[5]
    - Press releases
    - Promotional materials labeled as newsletters.
    - Promotional materials labeled as fact sheets.
    - A media interview of a SoCalGas executive
    - Multiple videos advertising hydrogen and SoCalGas projects

3. **All Phase 1 studies must rely on independent data sources.**

Over multiple years, SoCalGas stands to make billions of dollars in profit on hydrogen infrastructure. Under some scenarios that SoCalGas reviewed in its pre-feasibility studies where hundreds of miles of hydrogen pipeline would be built.[6] This profit potential demonstrates that SoCalGas has a conflict of interest with regards to the outcome of the Angeles Link Phase 1 studies. For that reason, in its feedback provided for the SoCalGas's Q1 2023 report, UCAN proposed various options for minimizing the impact of the conflict of interest on the study's results. As of today, SoCalGas has not selected any of the recommendations that UCAN has proposed for minimizing SoCalGas's conflict of interest.

Because SoCalGas has not taken actions to reduce the effect of its conflict of interest on the Phase 1 studies, it should commit to only using source data for its inputs and assumptions that come from independent sources. The Phase 1 studies should not use source materials that were funded by the fossil fuel industry including Sempra Energy companies such as SoCalGas.

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[3] D.22-12-055, p. 38.
[4] Angeles Link Study Descriptions, pdf pp. 8-9.
[5] SoCalGas, Angeles Link page [last accessed July 27, 2023], available at https://www.socalgas.com/sustainability/hydrogen/angeles-link.
[6] SoCalGas Angeles Link Feasibility Studies, Appendix 6b: D. Edwards, Inc. and Rincon Consultants, Inc., Conceptual Pipeline Permit Assessment, Delta (September 2021), available at https://www.socalgas.com/sustainability/hydrogen/angeles-link/technical-documents/spec-reports.

4. SoCalGas should evaluate hydrogen alternatives, pipeline alternatives, and provider alternatives.

D.22-12-055 requires SoCalGas to complete "[e]valuation of the cost-effectiveness of the Project against alternatives, which should include a localized hydrogen hub or electrification option and determining the methodology to measure cost-effectiveness between the alternatives."[7]

The Alternatives study needs to evaluate three types of alternatives (1) hydrogen alternatives, (2) pipeline alternatives, and (3) provider alternatives. Some of the alternatives in each type are listed below. This list of alternatives is not exhaustive.

- Hydrogen alternatives
    - Renewable energy delivered directly to the electricity grid.
    - Battery storage
    - Thermal storage
    - Renewable energy generation built with high curtailment assumptions.

- Pipeline alternatives
    - Local hydrogen hub
    - Electricity delivery through existing electric transmission lines from distant hydrogen-fired generators or distant hydrogen-fed fuel cells
    - Electricity delivery through new electric transmission lines
    - Hydrogen production on-site by end users
    - Industrial users moving production facilities to the site of hydrogen production to reduce hydrogen transportation costs.
    - Floating refueling hubs outside of the LA Basin for marine shipping

- Provider alternatives
    - Regulated utility other than SoCalGas (e.g., Southern California Edison)
    - Municipal utilities (new or existing)
    - Unregulated hydrogen suppliers (non-utility)
    - Unregulated Sempra Energy companies

5. The Demand Study should include numerous inputs and outputs.

Each of the alternatives listed in the previous section should be analyzed as a component of the demand study. Hydrogen costs, alternatives to hydrogen, and hydrogen suppliers – other than regulated utilities – all impact customer demand for utility-supplied hydrogen. High hydrogen costs will reduce hydrogen demand. Hydrogen alternatives (e.g. electrification) will reduce hydrogen demand. Hydrogen suppliers other than SoCalGas will reduce hydrogen demand for SoCalGas-supplied hydrogen. Finally, unless the Legislature bans fossil fuels, then some end users may continue to use polluting forms of energy including natural gas, grey hydrogen, and petroleum-based fuels. This possibility should be incorporated

[7] D.22-12-055, p. 76.

in the demand study. One of the more interesting analyses will be utility-supplied hydrogen compared to customers producing their own hydrogen on site.

All analyses should include the effect of the Inflation Reduction Act (IRA) on renewable energy pricing, battery pricing, hydrogen production pricing, and other effects the IRA may have. The IRA subsidy inclusion should be explicitly labeled and should show the effect on the hydrogen market both during the years of IRA subsidies and after the expiration of the IRA subsidies.

Hydrogen demand forecasts by year should be provided. If the Angeles Link is built, hydrogen demand forecasts by year through 2050 will be a critical input for determining the optimal on-line date for the infrastructure. Hydrogen demand forecasts should include more than the total demand by year, it should also include demand by end use by year for at least 5 hydrogen cost levels. The hydrogen cost levels should be (1) current costs (2) the DOE's $1/kg cost goal (plus the cost of all delivery infrastructure required to get the hydrogen to the end customer, SoCalGas profits, financing costs, O&M costs and miscellaneous other costs) and (3) three cost points evenly distributed between the current green hydrogen cost and the DOE goal cost.

6. **SoCalGas should complete its hydrogen demand study, distribute the study, and receive PAG feedback on the study before determining if other studies should be completed.**

To some extent, SoCalGas continues to treat the 16 studies as independent and able to be completed by its consultants without the outcome of one study affecting another study. The 16 studies should be completed in a logical order with early studies determining the inputs and assumptions for later studies. The market assessment and alternatives (MAA) studies include the demand study (Demand), production planning and assessment study (Production), high level economic analysis and cost effectiveness study (Cost), and the project options and alternatives study (Alternatives). The MAA studies not only impact each other, they form the basis for inputs and assumptions for every other study. If SoCalGas finds a low demand for hydrogen, it would be reasonable to make significant changes to the scopes of each of the other studies or conceivably discontinue the rest of Phase 1.

Before launching any of these 4 studies, SoCalGas should ask the PAG to provide feedback on the initial inputs and assumptions. Once SoCalGas has concluded the first round of MAA studies, it should ask the PAG for input on the results and whether additional rounds of MAA studies should occur. SoCalGas should also gather feedback from the PAG on whether the MAA studies indicate such low demand that SoCalGas should discontinue further Phase 1 work.

7. **The Commission did not authorize SoCalGas to complete a franchise analysis.**

SoCalGas proposed a franchise analysis as one of its 16 studies. D.22-12-055 did not approve a franchise analysis. Such an analysis only benefits SoCalGas shareholders and should not be part of Phase 1.

If the Commission determines that some form of the Angeles Link should be built by some regulated entity, numerous companies may be interested in offering hydrogen under the Commission's regulatory

structure. Because hydrogen can be produced and delivered by such diverse means, there is no reason that Californians should be forced to take hydrogen delivery from SoCalGas.

Moreover, the Commission itself does not make franchise agreement decisions. Each city or county in which a utility proposes regulated hydrogen service will determine its interest in signing a franchise agreement. Individual cities or counties may agree to a franchise agreement with utilities other than SoCalGas. It would also be reasonable for local jurisdictions to decide that regulated hydrogen service is not in the interest of its citizens if a local jurisdiction contains very few or no hydrogen customers.

If SoCalGas does end up with future hydrogen ratepayers, those future hydrogen ratepayers should not pay for a franchise study benefiting SoCalGas in its competition with other utilities. Completing this type of study in Phase 1 reduces the likelihood that the Commission will grant cost recovery for Phase 1 spending.

8. **SoCalGas should remove Aliso Canyon closure from Angeles Link documents because Aliso Canyon will likely close before any Angeles Link option would be operational.**

SoCalGas's documents highlight the "ultimate retirement" of Aliso Canyon as a benefit of the Angeles Link.[8] However, multiple studies note that Aliso Canyon can be closed soon without impacting gas or electric energy reliability. For example, the CPUC's Energy Division issued a staff proposal for the closure of Aliso Canyon by 2027.[9]

The current Angeles Link timelines appear to show hydrogen transportation will occur after the closure of Aliso Canyon. For that reason, Aliso Canyon should not be referenced in the Angeles Link planning. However, if SoCalGas continues to claim that Angeles Link will reduce the use of Aliso Canyon, it needs to include Aliso Canyon as a specific component of the Demand analysis and quantify the percentage reduction in natural gas storage for each demand forecast in the demand analysis.

9. **The regulatory, policy and environmental studies should be placed on hold until the market assessment and alternatives studies have been completed and reviewed by the PAG.**

Each of the regulatory, policy and environmental (RPE) studies depend on inputs from the MAA studies. Without the completed MAA studies, SoCalGas cannot accurately scope the work for the RPE studies. Any spending on the RPE studies prior to completion of the MAA studies could result in unrecoverable expenditures. PAG members are unable to provide comments on scope of the RPE studies at this time because the MAA studies have not been completed and the results have not been shared.

[8] Angeles Link Study Descriptions, pdf p. 2.
[9] I.17-02-002, Aliso Canyon I.17-02-002: Staff Proposal for Portfolio and Next Steps (September 23, 2022), available at https://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M497/K170/497170154.PDF.

10. **The engineering design studies should be placed on hold until all other Phase 1 studies have been completed and reviewed by the PAG.**

The engineering design studies depend on all the other studies in Phase 1. SoCalGas cannot study the project engineering for all the various options for hydrogen supply and hydrogen alternatives without the results from all other Phase 1 studies. PAG members are unable to provide complete comments on the scope of the engineering design studies at this time because the MAA studies and the RPE studies have not been completed and the results have not been shared.

11. **SoCalGas needs to evaluate each alternative to the Angeles Link with the same rigor it evaluates the Angeles Link option.**

D.22-12-055 requires SoCalGas to evaluate "the cost-effectiveness of the Project against alternatives, which should include a localized hydrogen hub or electrification option, and determining the methodology to measure cost-effectiveness between the alternatives."[10] Before SoCalGas moves forward with the cost effectiveness evaluation, it should provide the evaluation methodology to the PAG for review. If SoCalGas does not request feedback on the methodology, it risks applying a flawed methodology in its cost-effectiveness study. These methodologies should incorporate study of each of the alternatives proposed by PAG members and use the same rigor for studying the alternatives as it does for evaluating the Angeles Link.

This concludes UCAN's comments on the June and July PAG meetings.

[10] D.22-12-055, p. 76.

July 31, 2023

Angeles Link Project
Southern California Gas Company
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Submitted via email to ALP1_Study_PAG_Feedback@insigniaenv.com
ALP1_Study_CBO_Feedback@insigniaenv.com

Initial Feedback for Southern California Gas Company on Angeles Link Project Second Quarter Activities

Communities for a Better Environment (CBE) submit this letter to meet the deadline set by Southern California Gas Company (SoCalGas) for inclusion of feedback in their second quarterly report to the California Public Utilities Commission (the "Commission"). CBE will submit additional feedback at the soonest opportunity. That letter will discuss in greater detail feedback on the Angeles Link quarter two meetings, the July 18, 19, 20, and 21 supplemental meetings, and SoCalGas' Angeles Link phase one study descriptions.

The Angeles Link project's first phase is slated to take over 12 to 18 months. During that period, SoCalGas asked the Commission to focus on "preliminary engineering, design, and environmental studies to study supply, demand, possible end users, pipeline configuration and storage solutions and to analyze project alternatives."[1] As of this letter's submission, "Phase One" has been ongoing for over 7 months, between one third and one half of the allotted time. In this time, SoCalGas has shared little concrete information about the above focus areas beyond vague study descriptions and information already discussed in their Commission filings. SoCalGas must share full study descriptions rather than sanitized summaries which do not discuss specific study scopes or inputs necessary to evaluate the work SoCalGas will conduct.

The lack of transparency present in quarter one continues to plague Angeles Link. CBE as SoCalGas to provide all meeting materials in advance of public meetings and provide recordings promptly after each meeting. Despite asking participants to attend between 10 and 20 hours of meetings during the week of July 17th, SoCalGas has not made meeting recordings available to Angeles Link participants. SoCalGas still has a long way to go to meet the transparency and collaboration standards set for it by the Commission.[2]

Communities for a Better Environment look forward to sharing additional feedback as soon as possible.

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[1] D.22-12-055, Application of Southern California Gas Company (U-904 G) for Authority to Establish a Memorandum Account for the Angeles Link Project, p.4 (Dec. 15, 2022), available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M500/K167/500167327.PDF (hereinafter "Decision").
[2] Decision at 69-71, 77.

Sincerely,

Theo Caretto
Communities for a Better Environment

CC:
Emily Grant, SoCalGas
Chester Britt, Arellano Associates
Alma Marquez, Lee Andrews Group
Angeles Link PAG service list

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July 31, 2023

VIA EMAIL TO
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Emily Grant
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Re: Angeles Link Planning Advisory Group (PAG) Feedback of Air Products and Chemicals Inc. for SoCalGas Second Quarterly Report

Air Products and Chemicals, Inc. ("Air Products") submits the following feedback concerning the scopes of work for the Phase One studies, and the workshops on those scopes of work held on July 18 and July 20, 2023. Air Products expects that the below feedback will be included in Southern California Gas Company's ("SoCalGas") second quarterly report to the California Public Utilities Commission, as required by Decision ("D.") 22-12-055, Ordering Paragraph 3. Air Products also welcomes any response that SoCalGas may wish to provide to the comments below.

General Comments

Air Products has the following general comments concerning the summary Scopes of Work that SoCalGas has provided to PAG members.

SoCalGas's Limited Summaries Are Insufficient to Allow for Meaningful Feedback

Air Products has carefully reviewed the *Angeles Link Scope of Work Descriptions for Phase One Studies*, circulated by SoCalGas on July 6, and attended the workshop on technical studies related to Safety, Engineering and Market Assessment on July 18, and the July 20 workshop focused on Regulatory, Policy, and Environmental Studies.

Air Products is concerned that the information being provided by SoCalGas in both the *Scope of Work Descriptions*, and in the July 18 and July 20 workshops, consists only of very cursory summaries of the proposed scopes of work for the Phase One studies, and lacks much of the specific detail that would typically be required to be included in any scope of work being provided to a third party consultant. SoCalGas proposes to conduct sixteen separate studies in Phase One, to comply with the obligations set forth in D.22-12-005, including making findings

required before SoCalGas can proceed with Phase Two. Yet the *Scope of Work Descriptions* for all sixteen studies consist only of twenty-nine pages of text, averaging less than two pages per study.

As a number of parties noted in the July 18 and July 20 workshops, the summary and cursory nature of the summaries significantly limits PAG members' ability to provide substantive and meaningful feedback. The workshops were described as an opportunity for PAG members to "roll-up-your-sleeves" and engage in substantive discussions concerning the various scopes of work. But the lack of detail significantly limited the ability to engage.

In order to allow PAG members to meaningfully participate in the development of the scopes of work, Air Products strongly urges SoCalGas to provide the actual scopes that will or have been provided to its consultants. Only then will PAG members be able to meaningfully engage on the substance of the Phase One studies. There is no reason for SoCalGas not to provide the same level of detail to the PAG as it is providing to the consultants that will conduct the required Phase One studies. At a minimum, Air Products urges SoCalGas to post the final Scopes of Work, in their entirety, at the same time those Scopes are provided to the consultants conducting the work.

SoCalGas Must Consider Private Sector Investment

As D.22-12-055 recognizes, there is an existing and rapidly growing hydrogen industry in California. The Alliance for Renewable Energy Clean Hydrogen Energy Systems (ARCHES), California's public-private hydrogen consortium, is also working to accelerate the development and deployment of clean, renewable hydrogen projects and infrastructure. Because of the importance of these efforts, D.22-12-055 directed SoCalGas to join with ARCHES members to support the State of California's application for federal funding.

A number of PAG members have raised concerns about how SoCalGas's efforts related to the Angeles Link could impede private sector investment, and stifle innovation. In addition to potentially undermining market competition, SoCalGas's efforts pose a risk that ratepayers fund efforts that could be more quickly and cost-effectively developed by the private sector. Significant questions remain concerning the appropriate role of SoCalGas, and other public utilities, in development of hydrogen infrastructure.

The Angeles Link is not being developed in a vacuum. Ongoing private sector investment will likely impact the need for, and the purpose of an Angeles Link trunkline, and will impact the extent to which ratepayer funding is needed or appropriate to advance access to clean hydrogen. For example, private sector investment in on-site production and/or local distribution systems may obviate the need for trunkline service in some areas. SoCalGas's Phase One studies must therefore explicitly evaluate and consider the private sector's ongoing and planned investment in hydrogen projects and infrastructure, and private sector alternatives to a trunkline.

Comments on Specific Study Scopes of Work

Air Products provides the following comments on several of the individual scopes of work provided by SoCalGas on July 6. As noted above, the lack of detail makes it difficult to provide meaningful feedback.

Demand Study

D.22-12-055 restricts the Angeles Link Project to transportation of "clean hydrogen." Any evaluation of the potential for "clean renewable hydrogen demand" must distinguish between demand for "clean hydrogen" as defined by D.22-12-055, and hydrogen demand generally. Potential demand for hydrogen generally is not necessarily reflective of demand for clean hydrogen.

The Demand Study also states that assumptions will be validated through interviews with potential end users, industry participants across the value chain, and key industry and subject matter advisories. The Demand Study should identify how interviewees were selected, the criteria used to select the interviewees, as well as a detailed list of those interviewed. The Demand Study should also specifically identify all sources of information used to establish demand, including both direct communications with potential users, and third-party studies or other data.

The Demand Study should also set forth the criteria used to determine what constitutes demand, where demand would be located, and the timing of any demand.

Production Planning and Assessment

This study is intended to include an evaluation of "potential sources of clean renewable hydrogen production from renewable energy resources such as solar and wind, the input requirements, the estimated cost of production, and policies, procedures, and other methods to meet clean renewable hydrogen standards."

However, as explained in some detail in recent decisions in the Commission's Integrated Resource Plan proceeding (R.20-05-003) and Resource Adequacy proceeding (R.21-10-002), electric load-serving entities are currently struggling to meet mid-term reliability procurement requirements, and development challenges, including interconnection delays, supply chain disruptions, and permitting delays have further exacerbated the challenges faced by load-serving entities in procuring required capacity. These challenges will only increase as load increases as a result of increasing electrification.

In determining what renewable energy resources might be available for hydrogen production, this Study should distinguish between generation sources needed by load-serving entities to meet current and future demand, and those renewable generation sources that are available for hydrogen production. Hydrogen production should not be competing for resources with load-serving entities seeking to procure electric capacity necessary to ensure reliability.

For the production capacity modeling included in this Study, the Study also should specify the assumptions used concerning production capacity for various technologies and projects, and how those assumptions were determined.

The Production Planning and Assessment should also set forth the criteria used to determine the locations of potential hydrogen and renewable energy production, and when those projects would come online.

Project Options and Alternatives

As explained in the General Comments above, SoCalGas should weigh private sector current and future infrastructure investments as compared to the cost of ratepayer-funded infrastructure developed by investor-owned utilities. In particular, the Project Alternatives contemplated in the current Scope of Work should include private sector projects, products and services, to be compared to the costs and timing of ratepayer-funded efforts.

The current Scope of Work also proposes to develop a methodology to evaluate the cost effectiveness of Project Alternatives. Developing an appropriate methodology will be critical to accurately evaluating the various Project Alternatives—errors or omissions in the cost-effectiveness methodology can obviously improperly skew the evaluation of Project Alternatives. Air Products therefore suggests that SoCalGas share a draft of its cost-effectiveness methodology, and provide for PAG member input, prior to conducting the Project Alternatives evaluation. SoCalGas should also identify the specific sources of all data used in conducting the cost-effectiveness evaluation.

Air Products also requests that SoCalGas identify the criteria by which it choses the specific Project Alternatives to study, and that it also identify any Project Alternatives that it chooses not to study, and reasons why those Alternatives were omitted.

Finally, any evaluation of Project Alternatives should evaluate the environmental impacts of each Alternative. The Scope of Work outlined in the Environmental & Social Justice Analysis seems to imply that this will be done, but Air Products requests that SoCalGas confirm its intent to include environmental impact analysis as part of its evaluation of Project Alternatives.

Water Resource Evaluation

The purpose of this study is to "identify potential sources clean renewable hydrogen generation and water and estimate the costs of the hydrogen for the Project." To the extent the identified potential sources are not collocated with the production sites, SoCalGas should evaluate energy needs associated with water pre-treatment, and how those energy needs would be met, as well as evaluating how the water will be transported to the production site, and the energy sources and emissions associated with that transportation.

As with the renewable energy resources needed for production, any water sources for production may be subject to competing demands for the resource. SoCalGas should also evaluate

competing demands for the resource, and the potential impacts, including cost impacts, associated with using the water resource for hydrogen impacts rather than the competing alternate use or uses.

Nitrogen Oxide and other Air Emissions Assessment

The "Study Approach" for this Scope of Work states that a consultant "will estimate NOx" and, "[w]here applicable, the consultant will rely on specific technical information (about facilities, equipment, processes, throughputs, etc.) that is available." This broad description fails to provide any clarity on the methodology or methodologies that will be employed to calculate potential NOx emissions, or the sources of data that will be relied upon in developing that calculation. Nor does the Scope of Work provide any specificity regarding how the "consultant will develop estimates based on availability of related data or documented assumptions." A revised and much more detailed Scope of Work should be developed and circulated to PAG members for input on methodology, data sources, and development of estimates in the absence of data sources.

Hydrogen Leakage Assessment

Similar to the Scope of Work for *Nitrogen Oxide and other Air Emissions Assessment*, the current scope of work, under "Study Approach," simply states that the "consultant will evaluate potential sources of hydrogen leakage," and "will rely on specific technical information that is available…" A revised and much more detailed Scope of Work should be developed and circulated to the PAG members for input on methodology and data sources.

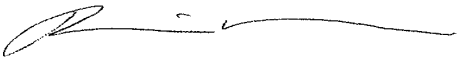
Greenhouse Gas Emissions Assessment

Similar to the Scopes of Work for *Nitrogen Oxide and other Air Emissions Assessment* and *Hydrogen Leakage Assessment*, the Scope of Work for Greenhouse Gas Emissions Assessment fails to provide any details concerning methodology, data sources, or the development of estimates in the absence of data sources. A revised and much more detailed Scope of Work should be developed and circulated to PAG members for input on methodology, data sources, and development of estimates in the absence of data sources.

Conclusion

Air Products appreciates the opportunity to provide this input on the general Scopes of Work provided by SoCalGas on July 6. Air Products urges SoCalGas to provide more detailed Scopes of Work to the PAG to allow adequate feedback on those Scopes prior to the commencement of any work by consultants. Failing to fully vet the proposed Scopes of Work with PAG members may result in faulty studies that fail to provide analyses suitable to meet the requirements of D.22-12-055.

Respectfully,



Miles Heller
Director, Greenhouse Gas Government Policy

From: Aaron Katzenstein
To: ALP1 Study PAG Feedback
Cc: Vasileios Papapostolou; Sam Cao; Maryam Hajbabaei
Subject: Comments on the Scope of Work Descriptions for Phase One Studies
Date: Tuesday, August 1, 2023 7:59:56 AM

Below are comments on the Scope of Work Descriptions for Phase One Studies for the Angles Link, based on the review conducted by the South Coast Air Quality Management District (South Coast AQMD) staff. We appreciate the opportunity to contribute our insights to ensure the economic and environmental soundness of the project, improve air quality in the South Coast Air Basin, and protect public health. Below are comments for sections of the outlined study, however, many of the comments in each section cross other sections and should be incorporated in other sections were appropriate.

Integration and Collaboration:

- If awarded by the Department of Energy (DOE), how a localized hydrogen hub will work in conjunction with the Angeles Link along with efforts to produce and store hydrogen at the Intermountain Power Project (IPP).
- The potential to combine efforts with the state H2 Hub along with the IPP efforts are needed to ensure duplicative efforts are not being undertaken.

Project Definitions and Terminology:

- Clear definitions for the localized H2 Hub and project alternatives should be provided to ensure transparency and understanding.
- It is recommended to clarify the terminology for "project alternative" for clarity and consistency.

Project Goals and Public Health:

- The project goals should be more specific, and particular emphasis on public health considerations should be addressed.

Project Alternative Analysis:

- The analysis of project alternatives should incorporate current Natural Gas (NG) consumption from the residential sector.
- Mobility (vehicles) usage is currently a substantial demand for Renewable Natural Gas (RNG), and its inclusion in the analysis will be crucial.

Innovative Alternatives:

- In addition to hydrogen pipeline delivery, SoCalGas should explore the feasibility of localized microgrids along with local hydrogen hubs as potential alternatives.
- Anticipate the potential demand for hydrogen demand in transportation for both Heavy-Duty (HD) and Light-Duty (LD) vehicles by 2027 along with incorporating hydrogen demand for fuel cell locomotives along with

other uses for hydrogen such as cargo handling equipment, back-up generators, and power generation in microgrids for charging battery electric trucks and vehicles.

Cost-Effectiveness and Environmental Analysis:

- Cost analysis for hydrogen production should provide delivered pipeline cost on a per kg basis for hydrogen compared to other delivery methods such as a local hub or transport by trucks and/or rail.
- Current electricity market rates reflect periods of time when renewables are curtailed due to overgeneration. Renewable overgeneration periods result in inexpensive electricity that can be used for electrolyzes. However, other efforts like the IPP and local hydrogen hub may also be focused on using these periods of inexpensive electricity for hydrogen production and the resulting cost benefit for hydrogen production is no longer valid. Analysis needs to be conducted to ensure the electricity prices used in future scenarios account for other hydrogen production from other projects.
- The analysis should take into consideration the Low Carbon Fuel Standard (LCFS) credits to determine cost-effectiveness.
- Environmental considerations related to air quality impacts should be explicitly addressed.
- Estimate of jobs created with living wages should be provided along with an assessment of the available versus needed workforce capacity to support hydrogen production and transport with a pipeline.

Technical Assessments and Collaborations:

- The technical approach for the demand study should clarify collaborative efforts with regulatory agencies such as the air districts and California Air Resources Board (CARB), as well as Original Equipment Manufacturers (OEMs) involved in the hydrogen production.
- Alignment with the DOE H2 roadmap and any national plans related to hydrogen pipelines should be part of the market validation.
- It is imperative to assess the demand not only for prime power generation but also for clean backup power generation and the support of microgrids.
- The analysis of demand should consider the potential future demand created by federal/state hydrogen hub efforts to ensure the project's long-term viability.
- Reference to South Coast AQMD's latest 2022 Air Quality Management Plan (AQMP), which outlines air quality goals and Zero Emission (ZE) technology adoption rates in the project region, should be an integral part of the project evaluation.
- The demand study should explore new sectors that were not previously served by Compressed Natural Gas (CNG), as hydrogen can serve both combustion and electricity generation purposes.

Renewable Energy and Clean Hydrogen Generation Technologies:

- The reliability of Renewable Energy and Clean Renewable Hydrogen Generation Technologies should be assessed in the overview.

NOx Emission Mitigation:

- Calculation approaches and methodologies should account for direct emissions as well as any potential air quality impact analysis.
- The analysis of NOx emissions from combusting hydrogen in mobility applications should be considered.

Hydrogen Leakage Assessment:

- The overview of the hydrogen leakage assessment should clarify whether it will primarily involve modeling or also include assessments of leakage detection methods.
- Different leakage rates for liquid and gaseous storage should be considered when assessing potential environmental impacts.

Greenhouse Gas (GHG) Emissions Evaluation:

- The technical assessment of GHG emissions should specify whether it focuses on direct emissions or considers the entire life cycle analysis.
- GHG evaluation needs to consider the Carbon Intensity (CI) of hydrogen in this project and its alternatives, incorporating Life Cycle Assessment (LCA).
- Delivered pipeline hydrogen should have a carbon intensity associated with it based on production and transport scenarios.
- It should be clarified if the tools used for GHG emissions evaluation or other tools developed during this project will be made accessible to the public.

Environmental and Social Justice Analysis:

- The overview should indicate what outreach to Disadvantaged Communities (DACs) is planned as part of the analysis.
- The analysis of NOx and GHG emissions, as well as leakage, should consider the specific locations and timings of emissions/leaks to assess their impact on Disadvantaged Communities (DAC) or other sensitive populations. Utilizing census tract-level data available from CARB EMFAC will enhance the precision of the assessment.

Preliminary Routing/Configuration Analysis:

- Consideration should be given to potential work with refineries or ports regarding existing pipelines.
- The evaluation criteria should encompass material comparability studies for using existing pipelines and the assessment of relevant standards.

We believe that addressing these comments will lead to a more comprehensive and robust analysis of the project, ensuring environmental sustainability, and aligning with the region's air quality goals and emission reduction targets. We appreciate your attention to these matters and look forward to SoCalGas's

response and any updates made to the project's Scope of Work Descriptions. If you have any questions or require further clarification on our comments, please do not hesitate to contact us.

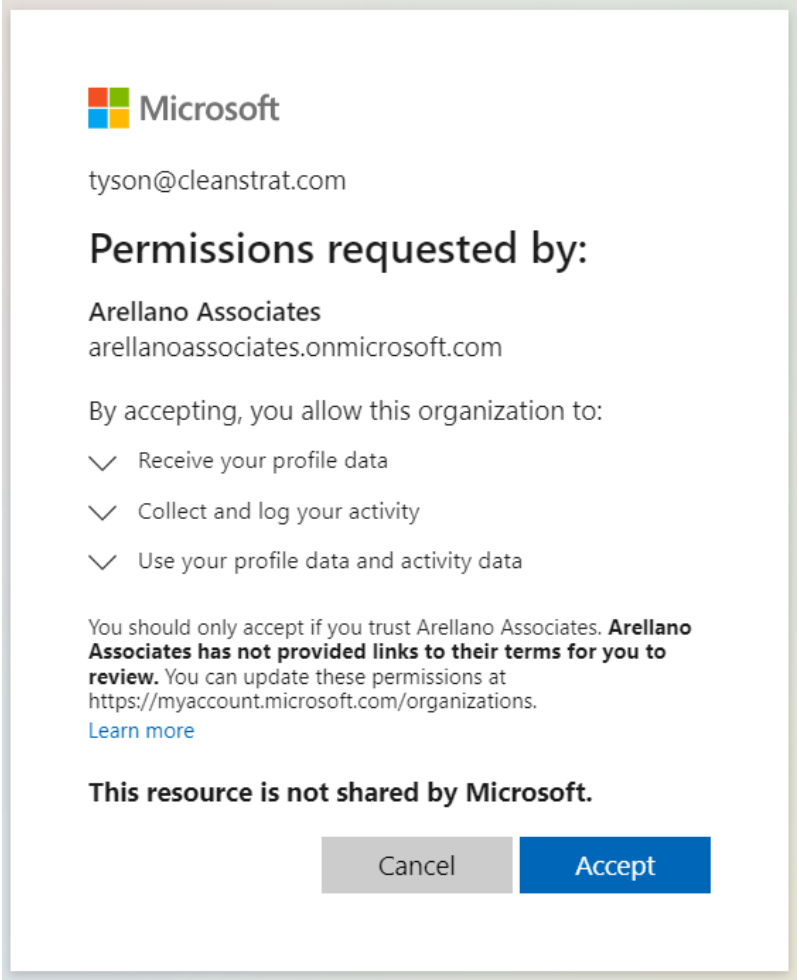
Aaron Katzenstein, PhD
Deputy Executive Officer
Technology Advancement Office
South Coast AQMD
(909) 396-2219

From:	Tyson Siegele
To:	Angeles Link Outreach; Chester Britt; Emily Grant; ALP1 Study PAG Feedback; alpag
Cc:	Arroyo, Christopher; Zanjani, Nick
Subject:	Re: SoCalGas Angeles Link - Quarterly Meeting #3 Details & Living Library Update
Date:	Sunday, September 10, 2023 8:36:04 AM
Attachments:	image001.png image.png image001.png

Hello Chester and Emily,
This is feedback on the Phase 1 process regarding transparency and a renewed request for public posting of Angeles Link Phase 1 documents.

I tried accessing the "living library" referenced in the email below. Microsoft is says that the "Living Library" link is a portal that requires participants to allow Arellano Associates to collect data on people who log in (see screenshot below). Microsoft recommends against accepting the permissions request because " Arellano Associates has not provided links to their terms for you to review."

Additionally, the "Living Library" appears to limit access to the information.



Instead of a restricted-access links page that collects data on PAG/CBOSG members, UCAN requests that SoCalGas post the following links on a public webpage so that the Phase 1 work proceeds in a public and transparent manner in alignment with SoCalGas's commitments during

the ALMA proceeding.

UCAN requests that SoCalGas post the following links on a public webpage:

- SoCalGas Phase 1 documents distributed to PAG and/or CBOSG
- SoCalGas Phase 1 documents distributed to CPUC staff (e.g., the quarterly reports and appendices)
- PAG and CBOSG meeting recordings
- PAG and CBOSG meeting transcripts - (while transcripts are an unnecessary duplication of the meeting recording, if a transcript is created, please post)
- PAG and CBOSG members' written feedback to SoCalGas

Thank you,

Tyson Siegele
Principal Consultant, Clean Energy Strategies
917-771-2222

On Thu, Sep 7, 2023 at 7:30 PM Angeles Link Outreach <angeleslinkoutreach@arellanoassociates.com> wrote:

Dear PAG Member,

Thank you for joining our Planning Advisory Group EJ/Demand Deep Dive Meeting that was held on Tuesday, August 29, 2023.

As a quick reminder, our upcoming Q3 Meeting will be held on September 28th from 9AM – 1PM at the ERC (9240 Firestone Blvd., Downey) with continental breakfast starting at 8:30AM. Additional communication with the meeting agenda will be provided separately.

As mentioned during the August 29th meeting, we are pleased to launch our living library ready for your use now. To that end, this email is to communicate several documents for your attention, now available on our **living library**:

1. Work Study Descriptions: Redline cover sheet
2. Work Study Descriptions with redlines incorporating PAG/Community Based Organization Stakeholder Group (CBOSG) feedback for the 16 studies being conducted under Phase One of the Angeles Link Project
3. Technical Approach document for studies being conducted under Phase One of the Angeles Link Project
4. Roster for PAG members

Additionally, attached is a distribution list of PAG members. We are also kindly requesting you take this **Angeles Link October Workshop Survey** to help us plan our next meeting. Once we have these survey results, we will get our next meeting date to you as soon as possible.

We are requesting feedback from PAG members for the Technical Approach by October 13th, 2023. Note that there will be a future opportunity for feedback on the studies' preliminary outputs and data and draft reports.

In addition, we also want to remind members that we are still taking feedback on the Demand Study Technical Approach/Data & Preliminary Findings (from our Tuesday, 29th meeting) until Monday, September 25th.

Please send comments to **ALP1_Study_PAG_Feedback@insigniaenv.com**

We look forward to hearing from you!

If you have any questions, please feel free to reach out to Emily Grant, SoCalGas Angeles Link Senior Public Affairs representative at 714.388.4889 or alstakeholder@socalgas.com. You can also reach me at 909.263.9280 or cbritt@arellanoassociates.com.

Sincerely,

Chester Britt

Planning Advisory Group Facilitator

The Utility Consumers' Action Network
(Angeles Link PAG Member)

Feedback for SoCalGas Regarding Demand Study Technical Approach/Data & Preliminary Findings

Date: September 25, 2023

Tyson Siegele
Energy Analyst
Clean Energy Strategies LLC
11750 W 135th St., #1080,
Overland Park, KS 66062
Email: tyson@cleanstrat.com

Consultant for the
Utility Consumers' Action Network

Edward Lopez
Executive Director
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1. Background

On August 29, 2023, SoCalGas hosted a Planning Advisory Group (PAG) meeting that included a presentation on the Demand Study Analysis Technical Approach and Preliminary Outputs ("Preliminary Outputs"). At that meeting, SoCalGas offered to provide additional time to brief the PAG members who were unable to ask all their questions during the PAG meeting.

The Utility Consumers' Action Network ("UCAN") representative and a Public Utilities Commission's Public Advocates Office ("Cal Advocates") representative requested an additional meeting. SoCalGas met with UCAN and Cal Advocates on September 7, 2023, for one hour. SoCalGas committed to providing UCAN and Cal Advocates with the numerous data points requested during the meeting.

On September 18, 2023, SoCalGas provide 10 slides by email. The data on the slides were presented as "additional information" in response to UCAN and Cal Advocate's requests during the September 7th meeting. Several of the slides were identical to slides in the slide deck that SoCalGas presented during the August 29, 2023, PAG meeting. The only new information in the slides was emissions-specific calculation methodologies used to calculate emissions per diesel vehicle. That data was not requested during the September 7, 2023, meeting.

In response to receiving the additional slides, UCAN's consultant requested specific information by email on September 19, 2023. In that email UCAN also requested that SoCalGas move back the deadline for PAG members to provide feedback on the Preliminary Outputs until SoCalGas could provide the information that UCAN had been attempting to obtain since the August 29, 2023, presentation.

The information that UCAN has requested includes the:

- Demand Study computer model.
- Transcripts or recordings of the interviews referenced in the demand study slides:
    i. August 29, 2023, slides
    ii. September 18, 2023, slides
- Page and quote from each report used as the basis for each assumption in the modeling calculations.
- Calculation determining the "% of ZE vehicles that are FCEV (vs Alternatives)." Quote from:
    i. August 29, 2023, slides (page 14)
    ii. September 18, 2023 ,slides (page 10)
- Primary factor or factors that resulted in such limited adoption of the BEV vehicles.
- Data source used to assume that 32 natural gas-fired power plants would be converted to hydrogen-fired power plants.
- Basis for the 10%, 20%, 30% capacity factors assumed for hydrogen-fired generators the power generation sector.
- Basis for the 10%, 20%, 30% capacity factors assumed for hydrogen-fired cogeneration units in the power generation sector.

As of the due date of these comments, UCAN has not received the requested data, nor has UCAN received any response to its September 19, 2023, email. Until SoCalGas releases the data and information as required by D.22-12-055,[1] UCAN will be unable to provide comprehensive feedback.

2. General Feedback on Preliminary Demand Modeling and Outputs

Area of demand evaluated: D.22-12-055 states that Phase 1 studies should identify "the demand and end uses for the Angeles Link Project."[2] According to SoCalGas's demand study presentation, "this analysis focuses on evaluating the potential hydrogen demand across select sectors in SoCalGas' service territory from 2025 – 2045."[3] Thus, SoCalGas's Preliminary Outputs report SoCalGas's assertions for a much larger geographic area than ordered in D.22-12-055. SoCalGas should revise its study parameters to align with the Commission's orders.

Cost of hydrogen: A key component of any demand study is the cost of the supplied product and the comparison between the cost of the product and the alternative to the product. The Preliminary Outputs do not qualify the cost of the green hydrogen supplied by the Angeles Link or the cost of the alternative energy options available to the market. The demand study must include cost forecasts for each product at the point of sale (e.g., the meter, the behind the meter production, etc.). The cost forecasts should be specified by the years 2025-2045 just as the Preliminary Outputs showed stack graphs of claimed hydrogen demand by year.

Hydrogen supplied by the Angeles Link: The Preliminary Outputs include hydrogen demand regardless of whether SoCalGas or other entities will provide the hydrogen. Again, because the Commission ordered that SoCalGas review just the demand served by the Angeles Link, the parameters of the outputs should be narrowed.

Basis for assumptions: In each sector (i.e., mobility, power, industrials), key assumptions for SoCalGas's demand model appear to have no factual basis. Key assumptions have been selected that contradict the best available data and some of the reports referenced by SoCalGas in its Preliminary Outputs. Thus far, SoCalGas has refused to provide the basis for many of the assumptions used in the demand study. SoCalGas should release the basis for its assumptions so that PAG members are able to provide feedback.

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[1] D.22-12-055, Decision Approving the Angeles Link Memorandum Account to Record Phase One Costs (December 15, 2022), Ordering Paragraph 7, p. 77, ("that "Southern California Gas Company (SoCalGas) shall make the data, findings, and results of its Phase One feasibility studies and quarterly reports to the Commission's Deputy Executive Director for Energy and Climate Policy available to the public and not redacted, unless SoCalGas is granted confidentiality of the data in accordance with General Order 66-D.") available at https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M500/K167/500167327.PDF.

[2] D.22-12-055, Ordering Paragraph 6(a), p. 76.

[3] PAG Presentation, Demand Study Analysis Technical Approach and Preliminary Outputs ("Preliminary Outputs") (August 29, 2023), ("this analysis focuses on evaluating the potential hydrogen demand across select sectors in SoCalGas' service territory from 2025 – 2045."), p. 3.

3. Mobility Sector: The preliminary demand modeling lacks bases for critical inputs.

Fuel Costs: When UCAN met with SoCalGas on September 7, 2023, SoCalGas stated that the total cost of ownership ("TCO") in the demand study does not include fuel costs. Reliable demand studies must include fuel costs in TCO. The costs of the fuel sources must be included because fuel costs represent the largest percentage of costs for most trucking companies.[4] In 2021 fuel costs for trucking companies represented 22% of total costs and 39% of vehicle-based costs.[5] Failure to include the cost of fuel is an error that must be corrected.

The U.S. Department of Energy publishes a quarterly report, Clean Cities Alternative Fuel Price Report, on the price of alternative fuels. The most recent publication reported that the average cost of hydrogen at fueling stations was $27.18/gallon of gasoline equivalent.[6] UCAN recommends that SoCalGas use the hydrogen price reported by the Clean Cities Alternative Fuel Price Report for hydrogen in the mobility sector. The price of retail hydrogen at fueling stations should be held constant until a reliable, third-party, data source forecasting the cost of hydrogen becomes available.

A 2022 UC Davis review of TCO studies comparing diesel, battery electric vehicles (BEV), and hydrogen fuel cell vehicles (HFCV) stated that "a direct comparison of overall TCO estimates between studies will show a wide range and should be considered cautiously."[7] Even though hydrogen is such a nascent technology that forecasts should be discounted, another 2022 UC Davis study found that, "The 15-year TCO ($/mi) of the fuel cell trucks is higher than those of the corresponding battery-electric vehicles primarily because the cost of hydrogen was assumed to be $7.5 /kg in the calculations."[8]

Thus, even though the Davis study assumed a hydrogen cost that is 63% lower than today's hydrogen costs at fueling stations, hydrogen still could not compete with electric vehicles through 2030.

Comparison vehicles: SoCalGas's Preliminary Outputs compare the cost effectiveness of diesel vehicles to hydrogen fuel cell vehicles according to SoCalGas's statements on Sept 7, 2023.[9] That is not the correct comparison because (1) SoCalGas assumes a 100% ZEV adoption rate by 2045[10] and, (2) battery

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[4] American Transportation Research Institute, An Analysis of the Operational Costs of Trucking: 2022 Update (August 2022), Table 10, page 20, https://truckingresearch.org/wp-content/uploads/2022/08/ATRI-Operational-Cost-of-Trucking-2022.pdf.

[5] American Transportation Research Institute, An Analysis of the Operational Costs of Trucking: 2022 Update (August 2022), Table 10, page 20, https://truckingresearch.org/wp-content/uploads/2022/08/ATRI-Operational-Cost-of-Trucking-2022.pdf.

[6] DOE, Clean Cities Alternative Fuel Price Report (July 2023), available at https://afdc.energy.gov/files/u/publication/alternative_fuel_price_report_july_2023.pdf?1aa8dba9c3.

[7] National Center for Sustainable Transportation - UC Davis, The Current and Future Performance and Costs of Battery Electric Trucks: Review of Key Studies and A Detailed Comparison of Their Cost Modeling Scope and Coverage (June 2022), P. 41, available at https://escholarship.org/uc/item/8zj9462h.

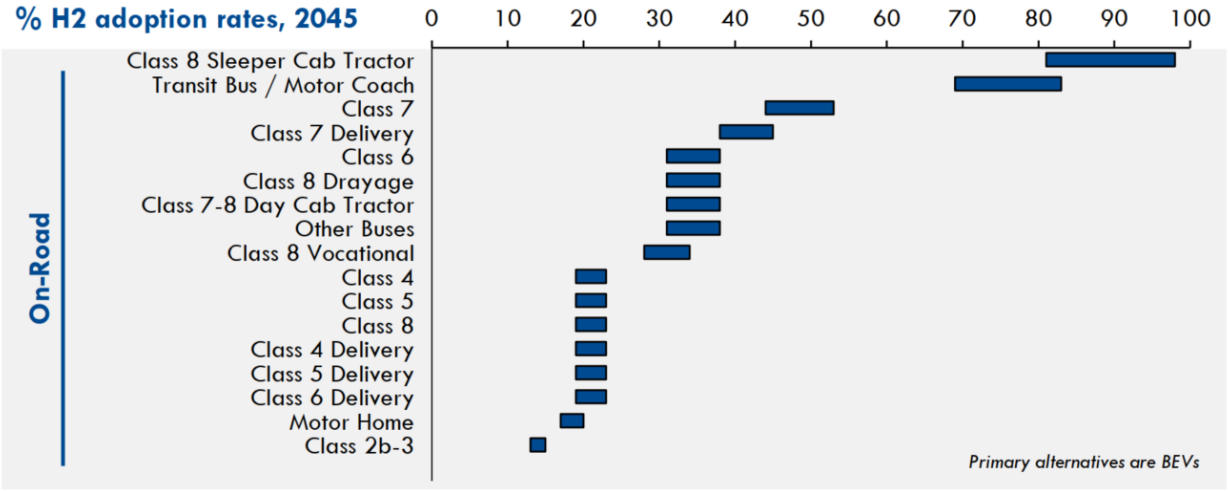
[8] UC Davis, Evaluation of the Economics of Battery-Electric and Fuel Cell Trucks and Buses: Methods, Issues, and Result (August 4, 2023), p. 55, available at https://escholarship.org/uc/item/1g89p8dn.

[9] This remark was in response to the "commercial availability" evaluation on page 15 of the Preliminary Outputs, which states that class 8 drayage vehicles would be "Close to parity 2025-2035 by scenario (never achieves cost parity with alternatives)."

[10] Preliminary Outputs, p. 16, ("Vehicles subject to ACF will buy 100% ZEVs starting 2024 (per regulation, assuming no exceptions). Other vehicles will buy 100% ZEV starting 2035 ramped linearly from ~0% today, to 25% by 2030, to 100% by 2035.").

electric vehicles are already less expensive than diesel vehicles in many cases and are forecast to be less expensive than all diesel vehicles between 2025 and 2040.[11] In all cases SoCalGas should compare the TCO for hydrogen vehicles to the TCO for battery electric vehicles.

Adoption Rates vs Alternatives: SoCalGas appears to have qualitatively chosen adoption rates of hydrogen fuel cell vehicles. The image below is a reprint of part the Preliminary Outputs.[12]



Despite the numerous on-road vehicle types, each with different usage patterns and requirements, most of the vehicle types are grouped into an adoption range that is identical to other vehicles' adoption ranges. This demonstrates that the adoption rates are qualitatively determined instead of quantitatively determined. In other words, SoCalGas chose adoption rates. It did not calculate adoption rates.

More concerning than the groupings and determinations of adoption rates, is that SoCalGas noted that it has data that conflicts with the adoption rates it chose. SoCalGas stated that the Class 8 Drayage truck costs "never achieves cost parity with alternatives."[13] Despite hydrogen fuel cell vehicles costing more than alternatives, SoCalGas states that its demand study assumes "31-38%" of new Class 8 Drayage vehicle sales will be hydrogen fuel cell in 2045.[14] There is no explanation for why at least 31% of those vehicles would be hydrogen fuel cell vehicles when those vehicles will be more expensive than alternatives.

At the September 7, 2023, meeting, UCAN asked for SoCalGas's evaluations of each vehicle class that it provided in the Preliminary Outputs for Class 8 Drayage trucks and Class 8 Sleeper Cab Tractors. SoCalGas has not provided that information.

The data SoCalGas has released calls into question all assumptions that SoCalGas made for the mobility sector. UCAN requests that SoCalGas release the data, assumptions, and basis for the assumptions that it made for the mobility sector.

[11] UC Davis, Evaluation of the Economics of Battery-Electric and Fuel Cell Trucks and Buses: Methods, Issues, and Result (August 4, 2023), table 17-18, p. 48, available at https://escholarship.org/uc/item/1g89p8dn.
[12] Preliminary Outputs, page 17, (partial graphic).
[13] Preliminary Outputs, partial page 15.
[14] Preliminary Outputs, partial page 15.

4. Power Sector: The preliminary demand modeling lacks bases for critical inputs.

The power sector modeling appears to assume that hydrogen will be used much like natural gas to power combustion turbines. Many of the current natural gas fleet of generators have already paid off their initial capital cost outlays. The ongoing costs will be operations and maintenance (O&M) and fuel costs. Meanwhile hydrogen-fired turbines will have cap ex costs, O&M costs, and the cost of a new pipeline infrastructure to deliver hydrogen to those turbines.

UCAN has reviewed multiple reports that indicate a likelihood of low single digit capacity factors for hydrogen turbines – possibly for some of the reasons listed above. One of the reports listed in the Preliminary Outputs is the LADWP 2022 Strategic Long-Term Resource Plan (SLTRP), which states that "in-basin green hydrogen achieves a low-capacity factor, averaging less than 2%" unless LADWP decides to forego a new transmission expansion.[15] LADWP's analysis found that the transmission expansion would save LADWP "approximately $7 billion between 2028 and 2045 on a net present value basis."[16]

The source material listed in the Preliminary Outputs (i.e., the LADWP SLTRP) contradicts the capacity factor assumptions made by SoCalGas. UCAN recommends that SoCalGas revise its capacity factors in the Power sector to 0% for its conservative scenario, 1.5% for its moderate scenario, and 3% for its ambitious scenario. These revised capacity factors would more closely align with SoCalGas's source materials and other available data.

5. Industrials Sector: The preliminary demand modeling lacks bases for critical inputs.

UCAN was unable to find any support for SoCalGas's assumptions for the industrial sector related to fuel switching or co-generation.

The capacity factors used in the power sector demand study appear to be copied into the industrial sector demand study for SoCalGas's co-generation assumptions. There does not appear to be any basis for SoCalGas's capacity factors in the co-gen demand, just as there was no basis for it in the power demand.[17]

Until SoCalGas presents data that supports its assertions that industrial customers will use green hydrogen, SoCalGas should assume zero demand for green hydrogen from the industrial sector.

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[15] LADWP, 2022 SLTRP, p. 4-29, available at https://www.ladwp.com/cs/idcplg?IdcService=GET_FILE&dDocName=OPLADWPCCB794970&RevisionSelectionMethod=LatestReleased.

[16] LADWP, 2022 SLTRP, p. 4-28, available at https://www.ladwp.com/cs/idcplg?IdcService=GET_FILE&dDocName=OPLADWPCCB794970&RevisionSelectionMethod=LatestReleased.

[17] Preliminary Outputs, p. 32, 36. Page 32 claims that SoCalGas took the capacity factor from LADWP's 2022 SLTRP and made adjustments. It is not clear why SoCalGas assumes power assumptions and co-gen assumptions would be the same. However, on page 36 SoCalGas states that it used capacity factors of 10%, 20%, and 30% which is identical to the capacity factors SoCalGas assumed for the power sector.

6. UCAN's prior feedback remains relevant regarding data sources, Angeles Link alternatives, and the order of Phase 1 studies' completion.

SoCalGas has not incorporated most of UCAN's recommendations from UCAN's July 31, 2023, written feedback. UCAN requests that SoCalGas review and incorporate recommendations that were supplied in UCAN's prior feedback. The following are headings from prior feedback that are particularly relevant. The sub-bullets highlight some of UCAN's concern regarding the Preliminary Outputs.

- **All Phase 1 studies must rely on independent data sources.**
    - The Preliminary Outputs include multiple references to studies partially funded by SoCalGas or another Sempra Energy company.

- **SoCalGas should evaluate hydrogen alternatives, pipeline alternatives, and provider alternatives…**
    - SoCalGas does not appear to have completed even the preliminary analysis of alternatives needed for a preliminary demand study. While there is a separate study to focus on "project options and alternatives" SoCalGas needs to complete a robust analysis of alternatives to hydrogen (including costs) that could serve customers' energy needs. Without that analysis, SoCalGas's demand study will remain incomplete and inaccurate.

- **The Demand Study should include numerous inputs and outputs.**
    - A key component of the demand study is the cost of hydrogen. SoCalGas does not appear to have included hydrogen costs in the Preliminary outputs. Demand is highly dependent on cost. Preliminary outputs for a demand study should have considered the cost of hydrogen compared to the cost of hydrogen alternatives.

- ***SoCalGas should complete its hydrogen demand study, distribute the study, and receive PAG feedback on the study before determining if other studies should be completed.***
    - SoCalGas should revise its demand study based on PAG members' input and release the revised demand study methodology for another round of input.

7. SoCalGas's preliminary demand study results include numerous inaccuracies and should be corrected before SoCalGas proceeds with other Phase 1 work.

SoCalGas presented three scenarios of possible future green hydrogen demand. The scenario with the lowest demand is the "conservative" scenario. Because of inaccurate inputs selected by SoCalGas, UCAN believes SoCalGas's "conservative" scenario over-estimates demand by at least a factor of ten. UCAN looks forward to an updated demand study that accurately represents likely future green hydrogen demand.

This concludes UCAN's feedback on the Demand Study Technical Approach/Data & Preliminary Findings.

CBOSG MEMBER COMMENTS

From: Lydia Ponce
To: ALP1 Study CBO Feedback; Almarquez@leeandrewsgroup.com
Subject: Fwd: SoCal Gas: Process & Procedures for Hydrogen Workshops
Date: Thursday, July 27, 2023 4:41:14 PM

---------- Forwarded message ---------
From: **Lydia Ponce** <venicelydia@gmail.com>
Date: Thu, Jul 27, 2023 at 4:34 PM
Subject: SoCal Gas: Process & Procedures for Hydrogen Workshops
To: <Karin.Sung@cpuc.ca.gov>, <Kenneth.Holbrook@cpuc.ca.gov>

Lydia Poncé
837 Milwood Ave
Venice,Ca., 90291
Lydia@societyofnativenations.org
310-488-0850
7/27/2024

California Public Utility Commission
505 Van Ness Avenue
San Francisco, CA 94102

Subject: Complaint Regarding Botched Community Outreach and Tribal Consultation by Alma Marquez and SoCalGas

Dear Commissioners,

I am writing to express my deep dissatisfaction and grave concerns regarding the severely flawed community outreach and tribal consultation process undertaken by Alma Marquez and SoCalGas. As a concerned stakeholder I am deeply invested in the welfare of local Indigenous communities, I find it imperative to bring to your attention the significant issues that have arisen during this engagement.

In May 2023, Alma Marquez and SoCalGas pledged to reach out to me offline to facilitate contact with local tribal leaders and elders. However, regrettably, this promise was never fulfilled, leaving me without any opportunity to liaise with these essential stakeholders.

Furthermore, I was repeatedly denied invitations to participate in the meetings until a third party finally provided me with the necessary information. This exclusionary approach is unacceptable and undermines the principles of inclusivity and genuine community engagement.

Recently, I received a formal invitation to participate in the meetings, but to my dismay, it did not include any opportunity for me to act as a liaison with tribal leaders. This is especially concerning as to my knowledge, no tribal leaders, including but not limited to the Chumash, Gabrielino, Tonvga, and Ajachamen tribes, have been invited to participate in these discussions.
I asked for an update at the last meeting and they noted my question. No one from SoCal Gas or Lee Andrews Group could provide an answer.

To assure equity and access, on my part for the local tribal people, to the meetings provided by SoCal Gas. I felt it legally necessary to communicate during the meeting and in the chat with everyone. It is imperative that my participation does not count for Indigenous consultation and Indigenous Consent. I wrote this message in the chat during our meeting and shared verbally during the recorded zoom meeting, serving as a public record.

Of additional concern is the fact that SoCalGas and the Lee Andrews Group are allegedly considering the Oaxacan immigrant community as part of their tribal outreach efforts. Yes, they are, however, it is essential to recognize that the historic stewards of the land are the local tribes, and they must be accorded the utmost priority and respect in such consultations.

Equally troubling is the abrupt change in remuneration policy. Initially, it was communicated that individuals could be compensated for their time attending the meetings, considering that many community-based organizations (CBOs) are not registered as 501-c-3s. However, after a few meetings, we were informed that only organizations would be eligible for payment. This sudden change in policy reflects a lack of consistency and transparency, which is deeply disconcerting. At this juncture, I am not concerned about any honorarium, nor am I interested. As a matter of fact, my participation is to support the local tribal people and a proper consultation and consent process to be fulfilled.

Moreover, the scheduling of these meetings has been chaotic and inconsiderate of participants' time constraints. Instead of adhering to the agreed-upon

quarterly meetings, three meetings were scheduled in this quarter, with two of them even occurring within a single week. This not only hampers our ability to attend the meetings but also puts undue pressure on us to balance work and other commitments.

Additionally, during the last meeting, we were promised a roster of all participants, recordings, and transcriptions of the discussions. However, to date, we have received none of these crucial resources, which only serves to further undermine the already questionable legitimacy of this outreach process.

The entire outreach process undertaken by SoCalGas seems nothing more than a mere formality to 'check the box' that they have completed it, without any genuine community engagement or consideration for the concerns and rights of indigenous communities. It appears that the corporation is merely seeking to greenwash their image without taking concrete actions to address the real issues at hand.

Lastly, it is distressing to note that the commencement of these meetings is routinely wasted with trivial icebreakers and discussions of topics irrelevant to the core concerns at hand. Our time is invaluable, and SoCalGas's blatant disregard for this fact raises serious doubts about their commitment to meaningful dialogue.

In light of these severe shortcomings and failures to uphold ethical community engagement and tribal consultation, I urge the California Public Utility Commission to conduct a thorough investigation into this matter. The local Indigenous communities and concerned stakeholders deserve a transparent and accountable process, free from the influence of corporate interests.

I trust that the Commission will take appropriate action to rectify this situation promptly and ensure that future engagements are conducted with the respect and sensitivity that local tribes and communities rightfully deserve.

Thank you for your attention to this matter, and I look forward to your swift response and resolution to this pressing issue.

Sincerely,
Lydia Poncé
Earth Justice Coordinator

Society of Native Nations

From: Andrea Williams
To: ALP1 Study CBO Feedback
Subject: Angeles Link Phase 1 study CBO Feedback
Date: Monday, July 31, 2023 11:25:45 AM

Hello Insignia,

In regards to providing feedback, I really did not see anything wrong with the Scope of Work Descriptions. I have a Bachelor's degree in Biological Sciences and started my career in the sciences doing research at USC and City of Hope and I worked as a Scientific Writer for the Children's Oncology Group working on clinical trial protocols for children with cancer so I am very familiar with the protocols and research studies. The information presented is the basics of how the study is going to be carried out. Since I am not an expert in this type of research, I can't assess whether the approach is sound or not but they seem like they are all feasible studies to conduct.

I think if there were something like potential adverse events that could occur from doing the studies or impacts to the community from the actual research that I could have expressed an opinion but since that was not included I really didn't have anything to say. I think once the results are completed and we are able to see potential impacts that will be able to provide feedback on whether the studies should move forward.

Andrea Williams, MPA
Executive Director
Southside Coalition of Community Health Centers
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CBO Stakeholder Group Feedback on the Phase One Study Topics
SoCalGas Angles Link Project_Protect Playa Now_07.30.23

As of this point in the stakeholder advisory process I think SoCalGas has failed what the CPUC has asked of them. Even though many of the employees and facilitators involved have good intentions and have put in the work, it is clear to me that SoCalGas as a company is not honestly engaging in a process aimed at accountability to the public and environmental justice. I am going to list these failings below:

According to CPUC's Order Number (3) Letter (e) in (REV. 1) A.22-02-007 Decision Approving the Angeles Link 12/13/2022, SoCalGas is required: "to conduct quarterly stakeholder engagement meetings, including quarterly meetings with Planning Advisory Group members. SoCalGas shall also identify and invite participation from community-based organizations that may potentially be impacted by the Project, including disadvantaged communities and environmental social justice groups, in either the quarterly Planning Advisory Group meetings or some other stakeholder engagement process."

1) Though SOCalGas is conducting these meetings quarterly thus far, They are not covering all the necessary information at these quarterly meetings resulting in the necessity of CBO stakeholders needing to attend additional workshops to cover the essential information in the 'Phase 1 Study Description'. This has resulted in CBOs that do attend these extra workshops being overburdened with having to give more time than originally committed in order to fully represent their community, and other representatives not being able to attend these additional workshops and not being able to fully represent their community. Though I appreciate that SoCalGas and their facilitating partners put together these workshops when they received feedback that CBO stakeholders did not feel like they got enough information, I do not think that was sufficient for properly adhering to environmental justice principles or conducting robust stakeholder engagement meetings. I feel strongly the answer is extending our next deadline 'Phase 1 Study Study Technical Approach' and covering all the information over two quarterly meetings. This will lessen the unexpected burden on CBO Stakeholders while still allowing us to fully represent our communities and give necessary feedback. Considering how large a project it is, and the impact it will have on communities, energy infrastructure, climate goals, and public funds, we need to take the proper time. I asked about the length of the process to two SoCalGas employees at the last minute workshop on July 19, 2023 and they implied the short timeline was coming from the CPUC. I have since emailed asking for confirmation on if it is the CPUC or SoCalGas who is insisting on the short timeline and have not yet received a response. On February 17, 2022 SoCalGas estimated to the CPUC that Phase 1 would take approximately 12-18 months. At the moment it is on a schedule of 13 months which is clearly not enough time. I do not believe this rushed process is indicative of responsible engagement.

According to CPUC's Order Number (8) Letter (b) in (REV. 1) A.22-02-007 Decision Approving the Angeles Link 12/13/2022, SoCalGas is required to: 'proactively identify and invite the

involvement from CBOs, including ESJ and DAC groups, that are equipped to serve the communities that will be impacted by the Angeles Link Project.'

1) It has become very clear that most of the local tribes are not represented in the process. Environmental Justice requires they be represented in this process. Stakeholders have raised these concerns on multiple occasions. The answer we keep hearing is, "we will work on it" but thus far that has not happened.

According to CPUC's Order Number (8) Letter (a) in (REV. 1) A.22-02-007 Decision Approving the Angeles Link 12/13/2022 SoCalGas is required to: "provide compensation to CBOs for their participation which may include a per-diem stipend for participation at quarterly stakeholder meetings."

1) I am a part of a CBO that is grassroots and unincorporated. All of our members are volunteers and already give what little time they have serving and raising the voices of our community. However, we have been told that in the absence of incorporation they can not pay individuals. The only solution they have offered is fiscal sponsorship with an incorporated organization. This has proven to be difficult as now I am having to take more time that I as a volunteer don't have to try and find an organization that 1) shares most of our CBOs values and 2) is willing to take a check from a fossil fuel company (not something most environmental justice groups are willing to do understandably.) This puts an unnecessary burden on participating CBO Stakeholders. I just received an email from Emily Grant letting me know they are going to try and approach the CPUC and discuss options for compensating individual stakeholders. I hope that the CPUC works with her in resolving this obstacle.

It is clear the CPUC required these engagement meetings to create transparencies and gather valuable stakeholder feedback. I have concerns that SoCalGas is not being honest in this process.

1) At the quarterly meeting on June 22, 2023 SoCalGas employee, Neil Navin, responded to a question stating that there are 2,000 miles of Hydrogen pipelines currently in the United States. At the workshop on July 19, 2023 SoCalGas employee, Amy Kitson, responded to a question stating that there are 1,600 miles of Hydrogen pipelines currently in the United states. The lack of consistent numbers concerns me greatly. This either implies that their senior employee on the project does not understand the current use of Hydrogen for energy in the United States or they use what number best suits them.
2) At the workshop on July 22, 2023 SoCalGas employee, Darrell Johnson, stated in his presentation that Hydrogen is not a greenhouse gas. Hydrogen is an indirect greenhouse gas. I feel his answer was purposely misleading. He also said that the IPCC report did not find that Hydrogen has a greenhouse gas impact on the planet. The IPCC report, in fact, did not study Hydrogen's indirect greenhouse gas impact on the planet and it won't address it until the next report in 2026. This is a serious manipulation of the facts to benefit the bottomline of SoCalGas.
3) At the workshop on July 19, 2023 SoCalGas employee, Katrina Regan, stated: "So simply stated, to become a fire hazard, hydrogen must first be confined." This entire

project revolves around confining and containing Hydrogen. This alone makes me concerned.

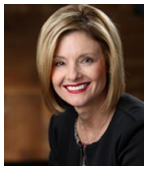
4) At the workshop on July 19, 2023 SoCalGas The news broke that there was a Hydrogen explosion in Kern County at a bus fueling station. (This was while we were discussing safety at the workshop). A CBO Stakeholder shared this information in the zoom chat. SoCalGas did not address the comment. A CBO Stakeholder who was attending in person raised their hand and shared this information. SoCalGas stated that they did not want to speculate on the event and moved on. The CBO Stakeholder group has still not gotten any response from SoCalGas on this current and relevant event.
5) It has come to my attention that several of the CBO Stakeholder organizations take regular donations from SoCalGas. Though I don't believe this should exclude them from participating in this important process, I do believe it should be transparent to the other CBO Stakeholders and the CPUC.

From: jillbuck@gogreeninitiative.org
To: ALP1 Study CBO Feedback
Subject: CBO Stakeholder Group - Feedback
Date: Monday, July 31, 2023 2:53:01 PM
Attachments: image002.png
image003.png

Thank you for allowing me the opportunity to provide feedback.

I think each presenter did an excellent job with their sections of the presentation. Each one made the audience comfortable enough to interact with them and their fellow stakeholder members.

My one suggestion would be to consider adding a vocabulary/glossary slide at the beginning of each session. There are stakeholders with varying degrees of understanding, and it might be good to do some level setting in the beginning so they feel more confident with the subject matter.



Jill Buck, M.S., Ed.
Founder & CEO, Go Green Initiative
Host, Go Green Radio

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4307A Valley Avenue, Suite 2
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www.gogreeninitiative.org

From: Reimagine LA
To: ALP1 Study CBO Feedback
Subject: Feedback
Date: Monday, July 31, 2023 4:46:20 PM

Hello

I really appreciate the presentation and being a part of this. I will admit that was a very complex and sometimes hard to follow. How do we simplify that so the organization when the time comes down explains to the community without losing them? Maybe more visuals

From:	Sydney Rogers
To:	ALP1 Study CBO Feedback
Subject:	Feedback of Phase 1
Date:	Monday, July 31, 2023 6:39:13 PM

Hello there,

After a debrief with my supervisor I must say I was very impressed with the intention SoCalGas mde with including people and organizations with the development of the hydrogen pipeline and the explanation of the phases.

With that being said, there is still some technical things, fear and stigma that the public will still have when it comes to a big company and a conglomerate that will be hard to to wash off off and it will take a lot more outreach, forums and understanding on your part than ours to build that trust that has been diminished due to land ownership, land taken, misuse and people not having opportunities like others for decades.

From sitting for just two days, people are still seething from years of mistreatment that I know that most of us have nothing to do with, but will have to deal with the consequences for sure.

It was eye opening and from a macro social work perspective gave me such an insight on what environmental justice looks like and what kind of impact I could really do once I finish my MSW and get out into the world.

As you may have noticed, I have been known to be inquisitive. I speak my mind, but I will always want to know the truth, the good and the bad and find an equal footing. That is the only way we can really find the true path I feel and I think SoCalGas is on its way to something real. But (yes there is but) my time is valuable, and sitting there for hours takes a lot and coming back will take a lot more. My internship is over and I am finishing school at the end of the year. But I want to stay involved. The good and the bad right?

Let me know how I can be involved in some way.

Thanks - SydneyRogersLA@gmail.com

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Sydney Rogers (they/she)
MSW Intern, PESA
Google Voice: (562) 740-5228
Office: (800) 894-7201
Fax: (818) 781-8180
Website | Facebook

July 31, 2023

Via email to:
alstakeholder@socalgas.com
ALP1_Study_CBO_Feedback@insigniaenv.com

Subject: SoCalGas Angeles Link hydrogen project does not address environmental justice concerns

To whom it may concern,

Climate Action Campaign is a nonprofit climate policy watchdog whose mission is to create a zero carbon future through equitable, effective policy action in Southern California. We participated in the SoCalGas Angeles Link CBOSG stakeholder meeting on June 22, 2023, and observed that the information presented raised numerous environmental justice concerns that were not addressed.

Below please find our feedback regarding the proposed project. As a small, community based organization, Climate Action Campaign did not have capacity to attend all Angeles Link meetings, which included additional 6-hour and 5.5 hour meetings, but we have reviewed the presentation decks from the July 20 and 21, 2023 CBO workshops, and the materials presented did not adequately address the concerns below.

Proposal ignores hydrogen costs and energy insecurity

> Low income families pay a disproportionate percent of their income on energy. The largest survey of people experiencing homelessness in California in decades was published in June 2023, and it found that as little as $300 per month in income, about the same cost as an average California utility bill ($243 per month according to PG&E) would have kept up to 70% of them in housing.
>
> It is well known that hydrogen is expensive – approximately $16 per gallon equivalent when compared to gasoline – underscoring the importance of hydrogen costs as an equity issue. Utility bills can make or break a family economically, so when we consider energy policy decisions, these realities must be considered first.

In light of this, it is concerning that the question I asked during the meeting regarding ratepayer impacts was not answered – "Will the economic analysis for the Angeles Link proposal include impacts on ratepayers?"

This question must be answered before the project is allowed to move forward. Costs from the Angeles Link proposal could force California families into homelessness, and **pretending that the costs of the project are not material to the proposal is a reckless denial of the needs and economic realities of California families – particularly those in communities of concern.**

Proposal to allow fossil fuel-based hydrogen ignores climate realities and could increase climate impacts

It was also troubling to hear that **SoCalGas intends for Angeles Link to carry hydrogen created from both fossil fuels and renewable sources. SoCalGas representative Neil Navin said during the meeting that Angeles Link would be an "open access pipeline" for all sources of hydrogen. However, the sources of hydrogen are of the utmost importance.**

SoCalGas representatives stated during the meeting that their intention is to provide clean hydrogen, but if Angeles Link transports hydrogen sourced from methane gas, dirty grid electricity or other fossil sources, it would facilitate increased GHG intensity in our energy supply.

As NRDC explained in their recent analysis on clean hydrogen deployment:

> *"A new study by Evolved Energy Research casts compelling insight into the heated debate around the IRA 45V clean hydrogen tax credits. The study finds that the three pillars of 1) new clean supply, 2) hourly matching and 3) deliverability will support substantial deployment of clean hydrogen in this decade. The study also concludes that all three pillars are the minimum guardrails against large carbon emissions increases from hydrogen production and derailing U.S. climate progress. The study – which can be added to the pile of evidence in favor of the three pillars—further crumbles unsubstantiated claims by proponents of looser rules that the three pillars will hobble industry growth. Those unsubstantiated claims are, yet again, proven to be resoundingly FALSE."*

NRDC's statements are also supported by recent reports from Energy Innovation and Princeton University's ZERO Lab, which found that the three pillars of clean hydrogen are necessary to prevent significant emissions increases and a grim reversal in clean energy progress for the power sector and our economy.

Based on the information presented at the June 22, 2023 CBOSG stakeholder meeting, SoCalGas is not developing the Angeles Link project with the three pillars of clean

hydrogen in mind and is ignoring the Princeton University, Energy Innovation and Evolved Energy Research studies mentioned above.

The recent Intergovernmental Panel on Climate Change (IPCC) report says continued dependence on fossil fuels is not consistent with a livable future, with communities of concern feeling the impacts first and the worst. We do not have time for hydrogen sourced from fossil fuels.

Misinformation presented regarding SoCalGas "culture of safety"

During the meeting, SoCalGas representative Emily Grant said, "SoCalGas has a culture of safety," but in 2015, SoCalGas was responsible for the largest methane gas leak in U.S. history, which dumped 100,000 tons of toxic chemicals into the air north of Los Angeles for months, forcing more than 8,000 families to flee their homes. Last year, SoCalGas and Sempra paid $1.8 billion to settle with thousands of residents sickened by the blowout at Aliso Canyon.

During the Angeles Link meeting, SoCalGas representatives did not discuss their failures at Aliso Canyon or explain how SoCalGas would ensure the company would guarantee the public would not be harmed by the Angeles Link project or other operations in the future. SoCalGas has demonstrated that it cannot be trusted to safeguard community health or safety, and their decision to misrepresent their record of harm to the community during the Angeles Link meeting should prompt closer review of their proposal.

Though the presentation decks from the July 20 and 21 CBO workshops mention safety, they did not address these concerns.

SoCalGas lacks credibility due to ongoing proposal to blend hydrogen and methane gas in buildings

In September 2022, SoCalGas proposed to blend to spend $13 million in ratepayer dollars to pipe, blend and burn a dangerous, experimental, and toxic mix of hydrogen and methane gas in ovens, furnaces, water heaters, dryers, and boilers in a 2,500-student UC Irvine freshman dormitory and numerous other student and faculty buildings on campus.

UC Irvine administrators rejected the proposal in March 2023 based on safety and environmental justice concerns from the UC Irvine community, including the fact that SoCalGas planned to locate the project in a freshman dorm, thereby ensuring students would have no knowledge of or ability to consent to the project before matriculation. None of the dozens of students or faculty we spoke to about the project had heard of it, even though the SoCalGas' project timeline stated that community engagement had been ongoing for several months.

SoCalGas' decision to design the proposed UC Irvine project to ensure impacted communities would have no knowledge of or ability to consent to it demonstrates an ongoing practice of ignoring community safety, consent and participation in order to advance SoCalGas interests.

SoCalGas continues to pursue a hydrogen/methane blending pilot at UC Irvine, despite broad consensus that there is no need to incur all the uncertainty, costs, health, and safety risks that come with hydrogen blending experiments when electrification is an available, safe, pollution-free option for decarbonizing buildings today.

SoCalGas' approach in the UC Irvine pilot project demonstrates that the company continues to act in bad faith and that their stated intent to pursue clean hydrogen through Angeles Link lacks credibility, particularly when considered with the other issues mentioned in this letter.

Summary

As a small, community based organization, Climate Action Campaign did not have capacity to attend all Angeles Link meetings, which included additional 6-hour and 5.5 hour meetings, but we have reviewed the presentation decks from the July 20 and 21 CBO workshops, and the materials presented did not address these concerns.

Clean hydrogen is a precious, costly and extremely scarce resource that will play a necessary role in the clean energy transition. Based on the information presented during the meeting and facts stated above, we have serious concerns regarding this project and caution that ratepayers should not be asked to subsidize any projects that would increase their energy bills, increase environmental injustice and safety risks while also increasing climate pollution. **The proposal should not move forward until these issues are addressed to ensure that the project meets the state's climate and environmental justice goals.**

Thank you for safeguarding the community's interests with regard to the Angeles Link proposal.

Sincerely,

Ayn Craciun
Orange County Policy Director
Climate Action Campaign
949-400-9682
ayn@climateactioncampaign.org

BALLONA WETLANDS INSTITUTE
Participant on behalf of the organization:
Marcia Hanscom

Angeles Link
CBO Stakeholder Feedback on the Phase 1 Study Topics

July 31, 2023

To Whom It May Concern:

While I have been asked to provide feedback on the Phase 1 Study Topics for the Angeles Link, I'm not exactly clear on the purpose of this feedback. Is it to provide information on what should be included when an environmental review, as required by CEQA (California Environmental Quality Act) and NEPA (National Environmental Policy Act) are undertaken? I'm presuming there will still be a scoping session when these reviews are officially underway. So, I will provide whoever the reader is of some initial comments, but please realize these are not meant to be exhaustive nor complete.

1. Missing from the list of the "Scope of Work Descriptions for Phase One Studies" is **an analysis of the impacts of this proposed project on the biodiversity of the State of California** – which is part of the California Floristic Province and is one of the world's biodiversity hotspots.

Governor Newsom has declared - as a matter of policy – that we must preserve 30% of the land and water in this state in order to contribute in any meaningful way toward relieving some of the worst of climate change impacts. Scientists who have researched this issue have calculated that it is more like 50% of the land and water that must be preserved to make this policy realistic.

While it may not seem clear to the lay person why this is so important, to those who have taken a hard look at what our industrial society has contributed to our changing climate, the soils, the trees, the bushes, the grasslands, the wetlands – they all are storing and./or sequestering carbon – and the more these natural methods of storing and sequestering carbon can take on, the better.

2. The second glaring omission in the list of the "Scope of Work Descriptions for Phase One Studies" is **a serious comparison of the renewable energy resources we are using now (the ones we KNOW work and are contributing to the change in our energy grid NOW), vs. the highly experimental and many years-away ability to use Hydrogen WITHOUT mixing it with the highly dangerous greenhouse gas of methane that would need to be used in order to change over to Hydrogen.**

It has become clear to me and others through the meetings and workshops I've attended to date that the continued use of methane gas combined with Hydrogen will be necessary for years to come – and that – while there are those who are predicting that might change in the future, there is no research or verifiable data that supports such an unrealistic outcome.

While I and others can be sympathetic to SoCalGas' desire to use it existing rights of way for another use besides transporting methane gas (i.e., Hydrogen) – the idea – and it appears to be merely an "idea" of replacing methane gas with hydrogen is not feasible. **A third party feasibility study** should be undertaken related to this topic.

3. The third thing that jumps out at me after attending these initial meetings in terms of something missing from the list of the "Scope of Work Descriptions for Phase One Studies" is a commitment to closing the Aliso Canyon methane gas storage facility and the Playa del Rey methane gas storage facility. Both of these facilities have been shown to be dangerous, and are too close to surrounding communities to continue to be operated.

If indeed SoCalGas is convinced we eventually will need less and less methane gas in the conversion plans to Hydrogen, then ***these two facilities need to be***

studied for decommissioning needs as soon as possible – with a goal of closing both of them within the next 3 to 5 years.

Additional feedback – CBO compensation:

When I was informed about the mandate from the CPUC to SoCalGas to form a group of Community Based Organizations to learn about and review plans for the Hydrogen Link, I was under the impression that participants would be receiving individual stipends directly for the time and effort we would be making. That was the understanding I brought to the leadership of Ballona Wetlands Institute. After I completed compensation forms, I was told differently, and have, thus, still been left not compensated as promised.

I've been told that SoCalGas may be appealing to the CPUC make allowances for this individual compensation, and I'd like to add my voice to get that change to happen quickly.

Besides my own situation, there are others participating who I know are affiliated with community based organizations that do not have bank accounts. After 9-11, banks do not easily open accounts – in fact, I'm not sure they do at all – if a group is not incorporated, which many community based organizations, are not.

Thank you for your time and attention to these comments.

Sincerely,

Marcia Hanscom /s/

Marcia Hanscom
for
Ballona Wetlands Institute
322 Culver Blvd. #317,
Playa del Rey, CA 90293
Phone: (310) 877-2634

Participant on behalf of:
Defend Ballona Wetlands
Robert Jan "Roy" van de Hoek

SoCalGas - Angeles Link for Hydrogen
CBO Stakeholder Feedback on the Phase 1 Study Topics

July 31, 2023

Dear CPUC and SoCalGas:

As an environmental scientist, wildlife biologist and botanist, trained also in Geology, Hydrology and Anthropology, I am concerned about the Scope of Work Descriptions for Phase One Studies. In that spirit I would like to offer that the following topics must be added and addressed:

A. Study and Consideration of Sacred Sites locations and a much greater involvement with the Indigenous Tribal Leaders of our region

B. Study of whether or not existing pipeline rights of way are the best locations for the Angeles Link. (considering current knowledge of seismic issues not known or understood when the original rights of way for methane gas pipelines were approved.)

C. Study of Flora and Fauna that will be impacted by the Angeles Link.

D. Study of EXACTLY how long it will take to remove Methane Gas from the Hydrogen/Methane Gas mix

CBO compensation:

When I was informed about the mandate from the CPUC to SoCalGas to form a group of Community Based Organizations to learn about and review plans for the Hydrogen Link, I was informed that participants would be receiving individual stipends directly for the time and effort we would be making.

After I completed compensation forms, I was told differently, and have, thus, still been left not compensated as promised.

The CPUC and SoCalGas may not be aware, but after 9-11, banks made the decision to not open accounts unless a group is incorporated – this was a huge change. Defend Ballona Wetlands is a community coalition, and we do not have a bank account. I hope that you can fix this situation and pay directly, as we have been told that would happen and have been patiently waiting payment for 4 meetings now.

Thank you for considering my comments.

Sincerely,

Robert Jan "Roy" van de Hoek

Robert Jan "Roy" van de Hoek
Defend Ballona Wetlands
13172 Sayre Street
Sylmar, CA 90293
Phone: (818) 367-3319

To: ALP1 Study CBO Feedback

From: Marcia Hanscom <wetlandact@earthlink.net>
Sent: Wednesday, August 16, 2023 4:39 PM
To: Angeles Link CBO <angeleslinkcbo@leeandrewsgroup.com>
Cc: Alma Marquez <almarquez@leeandrewsgroup.com>; alstakeholder@socalgas.com
Subject: Re: SoCalGas Angeles Link August Workshop Details, Q2 Report Now Available & September Q3 Meeting: Save-the-Date!

Dear Alma and Emily ~

Thank you for sending this notice. It's somewhat of a surprise since I (and I think others) thought it was communicated to us at the last meeting that the next meeting would be in the fall. (Note: it's still summer ! ;-))

Is there any word from the CPUC about payment options? It makes no sense that community based organizations that would rather have their representatives involved with this project could not receive individual stipends, as SoCalGas provides to other independent contractors. (Or some CBOs are even unable to otherwise receive such funds because they don't have bank accounts.)

Without funding, it's challenging to justify the time commitment to these meetings, including meetings we were not originally envisioning or planning for. I believe that the reason the CPUC required the funding was because they were aware that it's a hardship for smaller CBOs to take time to attend and properly prepare for these meetings.

By the way, I was informed by one of you that I ought to speak with one of the SoCalGas employees who I'd met before - but when I did - at the last time I attended an in-person meeting, she responded to me in a very unprofessional manner. She said to me, "you know, Marcia, you are the only one even raising this issue about the payments." I felt she was saying this in a bullying manner. Afterwards, I was so upset about how she spoke to me - especially because prior to that interaction, I'd thought she was a person I could trust speaking with. I decided to ask around to some of the others who have been attending, and they confirmed I am NOT the only one raising this issue.

1. Could we please get an answer on this topic? (I was told you all were going to seek a change in the conditions from CPUC so you could pay stipends directly to those requesting that - what is the status?)

2. Is there a person at CPUC you could direct us to speak with? (would it help for us to support your request?)

Thank you.

Marcia

Marcia Hanscom
Ballona Wetlands Institute
The Voice for Nature on the Los Angeles Coast

~~~~~~~~
Writer, Community Organizer

Coastal Protection, Wildlife, Wetlands & Public Lands Advocate
(310) 877-2634
~~~~~~~~

On Aug 16, 2023, at 1:48 PM, Angeles Link CBO <angeleslinkcbo@leeandrewsgroup.com> wrote:

Dear CBO Stakeholder Group member,

We would like to announce the date of our next interim virtual workshop, which will focus on the Environmental Justice Analysis and Demand Studies. We recognize we have asked stakeholders to attend numerous stakeholder meetings and want to thank you for your engagement to date. The discussions we had in July reiterated the importance and complexity of these two topics in particular and we believe additional focused meetings are warranted as your feedback is critical to the Phase One process. We look forward to your feedback and participation.

Please be informed that invitations and links for all meetings are non-transferable. Only official CBO Stakeholder Group members who have applied may attend. We will be sending you additional information soon!

CBO Stakeholder Group Virtual Workshop

Monday, August 28, 2023

10:00am-12:00pm

Virtually via Zoom

CBOSG Register Here

If you would like to add to your calendar, please click on the Outlook attachment

CBOSG Agenda

10:00AM – Demand Study Review

10:45AM – Review change in approach to Environmental Justice Study

Q2 Quarterly Report Out Now

Pursuant to Ordering Paragraph (OP) 3 h of D. 22-12-055, SoCalGas has submitted to the CPUC's Deputy Executive Director for Energy and Climate Policy its Angeles Link Project (Project) quarterly report covering activity from April 1 to June 30. The quarterly report was served on the CPUC Angeles Link service list on August 8, 2023, and is available to view here.

Save-the-Date!

Our 3rd Quarterly Meeting date has been secured for Tuesday, September 26 at the Energy Resource Center in Downey. While a hybrid option will be available, we hope to see you in-person. Details and meeting materials to come.

If you have any questions, please feel free to reach out to Emily Grant, SoCalGas Angeles Link Senior Public Affairs representative at 714.388.4889 or alstakeholder@socalgas.com. You can also reach me at 562.922.3564 oralmarquez@leeandrewsgroup.com.

Sincerely,

Alma Marquez

CBO Stakeholder Group Facilitator

Lee Andrews Group

For more information about Angeles Link, visit socalgas.com/angeleslink.

Lee Andrews Group | 700 S. Flower Street, Suite 1275

Los Angeles, CA 90017

<Angeles Link CBO Stakeholder Group August Virtual Workshop.ics>

To whom it may concern,

Below are my comments, written on behalf of Physicians for Social Responsibility - Los Angeles in response to the Scope of Work document, the Technical Approach to Phase One document, and some general feedback about the process overall.

Scope of Work

We remain concerned about the lifecycle impacts of hydrogen and the wisdom of pursuing such a massive project, particularly knowing that many of the end uses that are currently being considered in the Los Angeles Basin do not fall under the "difficult to electrify" classification. We believe that a better use of time would be to figure out how to specifically support the sectors with no direct electrification alternatives, rather than creating a large supply of hydrogen for end uses where there might be better options. We are also concerned about the many ways that the potential pathways laid out in this study will increase pollution in already overburdened communities, an example being the potential of using trucks to move hydrogen around our communities, which poses safety and environmental justice risks, and will contribute to traffic. We also find some of the arguments laid out to be disingenuous, knowing that SoCalGas is actively working against them, an example being the supposed desire to reduce natural gas storage at Aliso Canyon. If this project is going to be held up as an energy solution, it needs to ensure that it is not supplanting better alternatives like direct electrification.

Technical Approach to Phase One

Our concerns for this document stem from some of the specific inclusions that we, and many in the environmental justice space, find to be unacceptable. Major examples are the repurposing of existing methane pipelines to transport hydrogen, the potential of using steam methane reformation instead of electrolysis, and the inclusion of biomass and biogas in the definitions of "clean, renewable" hydrogen. We are concerned that even the conservative estimate assumes hydrogen will be used for baseload generation, as we know that the direct electrification of the grid is the most efficient pathway to 100% clean energy, and are opposed to hydrogen combustion for electricity generation. We're also curious about the modeling used to predict risks associated with climate change, and what metrics SoCalGas is using to determine the indirect warming potential of leaked hydrogen. Also, when considering impacts, it's important to note that many communities are already disproportionately burdened by pollution, so it's important to include cumulative impacts studies, particularly for NOx, if for example hydrogen trucks were used in close proximity to methane-hydrogen blend combustion plants.

General Process

The process thus far has been challenging, largely because there has been way too much information being shared without appropriate formats for feedback (individual meetings with CBO member groups, plenty of time for discussion at meetings, etc…). I was only able to skim both documents, and was not able to provide adequate feedback, and because there is no way

to influence when meetings are happening, I won't be able to join for the whole meeting tomorrow due to an existing scheduling conflict. Going forward I would recommend reaching out to participants ahead of time to find a time that works for everyone, as most of us have standing meetings and often don't have several hours free on any given day. If the purpose of this group is to provide meaningful feedback about the proposed plans and project, we still have a long way to go.

Thank you for your consideration of this feedback, and I look forward to sharing more at the meeting tomorrow.

All the best,

Alex Jasset
Energy Justice Director, Physicians for Social Responsibility - LA

September 25, 2023

Re: CBO Stakeholder Group Feedback on Demand Study Technical Approach/Data & Preliminary Findings

Phase One of the SoCalGas Angeles Link Project once again failed to provide substantial answers to the concerns of the Community Based Organizations Stakeholder Group (CBOSG) during meetings and workshops. As a member of the CBOSG, Food & Water Watch remains doubtful of the feasibility, utility, reliability, and safety of the proposed Angeles Link Project. We are not confident that SoCalGas prepared for an energy infrastructure project of this scope. There has yet to be a strong argument for the necessity of this project and there is still a lack of transparency from SoCalGas to the Community Based Organization (CBO) members.

We also want to reiterate our previous concern regarding the insufficient notice on upcoming workshops and quarterly meetings, as well as the insufficient time to present feedback on the materials presented. It is clear that this process is being rushed and SoCalGas has little interest in substantial feedback from the CBOSG.

Concerns relating to the Demand Study Technical Approach and Data and Preliminary Findings as presented in the meetings, workshops, and materials provided are as follows:

Market Assessment & Alternatives

When looking at non-hydrogen alternatives, electrification should be at the forefront. SoCalGas must also consider any legislative or policy mandates that demand or accelerate a transition to electrification across any sectors related to the Project.

Any evaluation of hydrogen delivery alternatives must also examine the health and safety risks associated with such alternatives. If SoCalGas is considering having hydrogen delivered by trucks, the members of the CBOSG should be provided with a list of potential truck models, along with any history of hydrogen leaks and/or explosions associated with those models. For in-basin hydrogen production, SoCalGas should examine what hazards frontline communities would face in such a scenario. Furthermore, given that in-basin hydrogen production is an alternative which contradicts what SoCalGas representatives have promised CBO members repeatedly during meetings (that such production would not be explored whatsoever given that the Project would solely be about the transportation of hydrogen), it is deeply concerning that this is being considered as an alternative.

Regulatory, Policy, & Environmental

Given California's finite water resources during this ongoing, historic drought, it is crucial that any water resources availability analysis also provide an estimate of how much water is needed annually for the project including the cooling, treatment, disposal, powering, and

sourcing of hydrogen, as well as projected water usage for the first ten years of operation. An analysis of annual water usage for alternatives, such as solar and wind, should be included as well so that the CBOSG can provide an informed response.

When looking at the potential water sources for the Project, the analysis should also include how drought conditions are affecting the area where those sources are located, not just how it would affect the Project but how those conditions are and could continue to impact local communities.

The study done on NOx emissions and greenhouse gas (GHG) emissions should evaluate the climate and public health risks of those emissions, and whether those possible NOx and GHG emission levels resulting from the Project would contradict California's climate goals. The study must also examine the existing emission levels in the local communities where the Angeles Link Project pipelines would be going through, where the compressors would be located, as well as where the power generation units would be located.

A comprehensive plan must be presented to the CBOSG regarding SoCalGas's emergency response in the event of a hydrogen leak, and the protocol for how SoCalGas would report and work with local and state government entities in the event of a leak.

Engineering Design

When assessing repurposing existing gas pipelines for the Project, it is crucial for the CBOSG to be informed of leakage rates and risks for repurposed pipelines. When evaluating the storage of hydrogen, there must also be transparency on the risks associated with both underground and aboveground storage.

SoCalGas needs to provide a list of potential pipeline routes, as well as a list of manufacturers and suppliers for the Angeles Link Project to the CBOSG.

We hope that all of these concerns will be taken into consideration and the necessary changes will be made.

Andrea Vega
Southern California Senior Organizer, Food & Water Watch

September 25th, 2023
California Public Utilities Commission (CPUC)
505 Van Ness
Avenue San Francisco, CA 94102

RE: Demand Study Technical Approach/Data & Preliminary Findings for the Angeles Link Project CBOSG

To Members of the California Public Utilities Commission,

I am writing to provide feedback on the SoCalGas Angeles Link Project Phase One, specifically focusing on the Demand Study Technical Approach/Data & Preliminary Findings. As a concerned stakeholder and member of the community, I have reviewed the Demand Study Analysis and related documents. I believe it is essential to share my observations and concerns regarding this project.

Technical Approach and Data Analysis:
The technical approach taken in the study needs further consideration. Instead of focusing on alternatives that genuinely reduce emissions throughout their lifecycle, it appears to prioritize hydrogen without adequately exploring cleaner alternatives. The study should place greater emphasis on electrification, which can minimize emissions and environmental impact.

Concerns have been raised about the use of hydrogen-methane blends and the potential impact on local air quality. Transparency is needed regarding the blending of hydrogen with methane and its implications for reducing fossil fuel usage.

The inclusion of both renewable natural gas (RNG) and natural gas with carbon management within the category of Non-Hydrogen Alternatives is highly objectionable. It is essential to recognize that this project's purpose is to align with the objective of achieving 100% renewable energy by 2035, not to provide a means for SoCalGas to continue profiting from methane gas while engaging in greenwashing practices associated with renewable energy. Furthermore, it is alarming that such a stance is being advocated when California Attorney General Rob Bonta recently announced a settlement against Southern California Gas Company (SoCalGas) due to numerous environmental marketing claims made in 2019 regarding natural gas being labeled as "renewable." Such claims are fundamentally misleading and warrant a critical reevaluation of the project's objectives and alignment with California's clean energy goals.

Market Assessment & Alternatives:
The analysis should give higher priority to electrification as an alternative to hydrogen, considering legislative and policy mandates that promote electrification across relevant sectors. Detailed information on potential truck models for hydrogen delivery, including safety records, should be provided. Transparency is crucial in assessing in-basin hydrogen production, as it appears to contradict prior assurances.

Regulatory, Policy, & Environmental:
The study must include a comprehensive assessment of water resources required for the project and compare water usage with alternative energy sources like solar and wind. Given California's ongoing drought, it is essential to consider how drought conditions may impact local communities and water sources.

The analysis of NOx and GHG emissions should encompass an assessment of their climate and public health implications, with a steadfast commitment to aligning with California's climate objectives. It is imperative to conduct a comprehensive examination of emission levels within the communities impacted by the Angeles Link Project. Regrettably, the responses received from SoCalGas have often revolved around the notion that NOx levels have decreased and might continue to decrease in the future. However, this response falls short of addressing the genuine concerns at hand. Consequently, there is a pressing need for the development of a well-defined and all-encompassing emergency response strategy for hydrogen leaks. Such a plan should delineate reporting protocols and establish robust collaboration mechanisms with both local and state government entities to ensure effective handling of any potential emergencies.

Engineering Design:
The assessment of repurposing existing gas pipelines for the Project should include disclosure of leakage rates and risks associated with repurposed pipelines. Transparency regarding risks related to underground and aboveground hydrogen storage is crucial. Providing a list of potential pipeline routes, manufacturers, and suppliers will enhance transparency and stakeholder understanding.

Communication and Process:
There have been recurring concerns about the responsiveness of SoCalGas representatives to stakeholder questions. Simple and straightforward inquiries have often been met with vague or incomplete responses, hindering our ability to fully understand the project. This lack of clarity in communication has raised questions about the transparency and openness of the project. It is imperative that SoCalGas representatives provide clear and accurate information to stakeholders to ensure transparency and foster trust within the decision-making process.

I have concerns about the transparency, notification of workshops and meetings, and opportunities for feedback. Addressing these concerns and providing a stronger argument for the necessity of the Angeles Link Project is vital to build trust with the Community Based Organizations Stakeholder Group (CBOSG) and other concerned stakeholders.

CBO Stakeholder Group:
I have serious concerns about the necessity of the Angeles Link Project and its potential to reduce our climate impact. The process involving the CBOSG has raised serious questions about SoCalGas's understanding of Environmental Justice and its intentions related to this project.

I have not received adequate compensation for my involvement as an individual in a volunteer grassroots CBO, as opposed to those who are employees of CBOs. The only solution offered to me was fiscal sponsorship, which, in practice, is not sufficient. To secure fiscal sponsorship, I would need to identify an organization that my fellow members trust, and one that is willing to accept funding from SoCalGas, a fossil fuel company that many organizations are actively working to hold accountable. Given that numerous CBOs operate as grassroots entities, the absence of a mechanism for compensating grassroots members during their involvement poses a significant barrier to their participation. This compensation limitation not only impacts the inclusivity of this process but also places an unwarranted burden on the very CBOs that SoCalGas and the CPUC have expressed a desire to collaborate with on this project.

Access to critical project documents has been challenging and has not been adequately addressed. Transparency is essential, and it is inappropriate for these documents to be behind a login, given the commitment to a transparent process.

The quantity of information provided with limited review time and insufficient opportunities for meaningful dialogue during meetings and workshops is a significant concern. The process appears rushed, and SoCalGas seems to be pushing through this step without allowing adequate time for stakeholder engagement.

Even for stakeholder members who are getting paid, the compensation is inadequate to cover the time required for meaningful engagement in such a short timeline.

In conclusion, I urge the CPUC to carefully consider the concerns and observations raised in this feedback letter. It is crucial to prioritize transparency, thorough analysis, and inclusive stakeholder engagement in the decision-making process related to the Angeles Link Project Phase One. Your commitment to addressing these concerns will contribute to a more informed and balanced evaluation of this project.

Thank you for your attention to this matter. I look forward to seeing these concerns addressed by the CPUC to ensure a sustainable and environmentally responsible energy future for California.

Sincerely,
Faith Myhra
Member
Protect Playa Now