Application of Southern California Gas Company for authority to update its gas revenue requirement and base rates effective on January 1, 2012. (U904G)

Application 10-12-___
Exhibit No.: (SCG-09)

PREPARED DIRECT TESTIMONY OF
GILLIAN A. WRIGHT
ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

DECEMBER 2010

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PREPARED DIRECT TESTIMONY OF
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ON BEHALF OF SOUTHERN CALIFORNIA GAS COMPANY
(CUSTOMER SERVICES – INFORMATION)

I. INTRODUCTION

A. Purpose of Testimony

The purpose of my testimony is to present shared and non-shared operation and maintenance ("O&M") expense estimates and to provide business justifications for three capital projects for Southern California Gas Company ("SCG") Customer Services and Information ("CS&I") activities for Test Year 2012 ("TY 2012"). CS&I provides account management services, collaborates on customer research, and performs outreach, communication, and education activities. Table GAW-1 summarizes SCG's TY 2012 request for CS&I.

Table GAW-1
Summary of TY 2012 Change
(Thousands of $2009)

Description	2009 Adjusted-Recorded	TY 2012 Estimated	Change	Testimony Reference
Total Non-Shared	24,769	34,806	10,037	**Section II**
Total Shared Services (Book Expense)	4,517	6,730	2,213	**Section III**
Total O&M	29,286	41,536	12,250	
Capital	N/A	12,059	12,059	**Section IV**

B. Overview of Operations

The CS&I function delivers important information to SCG customers, conducts customer research, manages electronic information and services delivery channels, maintains customer assistance and outreach programs, provides essential energy-related services to non-residential customers and residential developers, and manages the Research Development & Demonstration ("RD&D") program as well as the Natural Gas Vehicles ("NGV") program. CS&I also includes commercial biofuel development, which is working to commercialize

production of biomethane in SCG's territory.[1] The CS&I function, with one exception, reports to the Vice President ("VP") of Customer Solutions.[2] In addition to those activities described in this chapter, the VP of Customer Solutions also oversees energy efficiency and other programs separately funded outside of this General Rate Case ("GRC") proceeding. Those activities are not discussed in this chapter. The CS&I function consists of the following major activities:

- Customer Communications, Research and e-Services
- Customer Assistance
- Nonresidential Markets
- RD&D
- NGV
- Environmental Affairs
- Biofuel Market Development
- Emerging Technology

C. Challenges Facing Operations

The most significant challenges facing CS&I relate to meeting increasing customer expectations for communication and e-services, and supporting ambitious state and federal goals for low income customer assistance, improving local air quality, reducing greenhouse gas ("GHG") emissions and developing renewable energy sources. These broad challenges put demands on multiple CS&I functions, highlighted below. In addition, Commission-approved expansion of capacity and pipeline services to maximize the flexibility and value of SCG's extensive transportation and storage infrastructure require additional resources. SCG's TY 2012 forecast of expenses and planned capital projects supporting the CS&I functions applies valuable ratepayer resources to activities that customers expect and value, and that support driving policy priorities of the state and federal governments.

The adoption of the state and federal Climate Change Regulations together represent one of the most sweeping impacts facing CS&I. California's Global Warming Solutions Act of 2006, Assembly Bill 32 ("AB 32") requires the California Air Resources Board ("CARB") to establish a statewide GHG emissions cap for 2020 based on 1990 emissions. AB 32

[1] Biomethane refers to renewable biogas conditioned to meet pipeline quality.
[2] The Capacity Products and Planning function, one part of nonresidential markets, reports to the Vice President of Engineering and Operations Staff.

currently imposes Mandatory Reporting Requirements for between 600-800[3] facilities. CARB is currently considering whether to lower the applicability threshold in the proposed Cap and Trade Program, which would increase the number of affected facilities significantly.[4] The Cap and Trade program, expected to be implemented starting in 2012, will require affected sources to reduce their GHG emissions from a pre-established baseline level to a strict declining threshold for many years out. One mechanism to satisfy this reduction is through process improvement, resulting in efficient fuel usage. In addition, federal Climate Change Regulations currently affect 10,000 facilities[5] and with consideration to also lowering the applicability threshold, the number could be much greater. Starting in 2015, under AB 32, small natural gas customers will be added to the Cap and Trade Program. SCG likely will be responsible for compliance on these customers' behalf. AB 32 and federal Climate Change Regulation touch virtually every activity within CS&I, along with many other activities at SCG, with both impacts and opportunities.

Some of the key challenges facing CS&I activities follow:

- Customer Communications, Research and e-Services ("Customer Communications"): Reaching customers with important energy usage and bill management information and news on services and safety is necessary through both traditional channels and an ever-increasing number of newer online communication channels ("e-Channels"). Customers with Special Needs, such as visual or hearing impairments, need accessible options to receive this information, while certain customers can only be reached in their native languages. Customers are also expecting faster response times for online services, as well as more functionality and integration with newer e-Channels such as social media and mobile platforms.
- Customer Assistance: Focusing on Special Needs customers, residential customers with low or fixed incomes and persons with medical conditions which require gas for special environmental conditions, SCG's customer assistance activities aim to support the California Public Utilities Commission's ("Commission's") long-term vision of implementing Low Income Energy

[3] CARB Press Release Dec 2007 identifying number of affected sources for AB 32 Mandatory Reporting and Cap and Trade threshold.
[4] As indicated in CARB public workshops held on May 17, 2010 and June 16,2010.
[5] EPA Prevention of Significant Deterioration Fact Sheet page 3.

Efficiency ("LIEE") on 100% of all willing and eligible customers by 2020. This will require an almost three-fold increase[6] over the 2008 GRC activity level in the number of homes receiving natural gas appliance testing ("NGAT") every year from 2009 to 2020. Special Needs customers will require increased outreach and education efforts in order to increase their participation in the medical baseline ("MBL") program and to support the Commission's LIEE goal for customers with disabilities. Customers with limited English proficiency will require education and outreach in order to better understand their energy bills, payment arrangement options, as well as other programs and services available to them, such as California Alternate Rates for Energy ("CARE"), Gas Assistance Fund ("GAF"), and Low Income Home Energy Assistance Program.

- Nonresidential Markets: Customers are facing increasingly complex and numerous air quality regulations requiring more consultation activities. In addition, customers affected by AB 32 will require more consultation and support. SCG also plans to support AB 32's GHG reduction goals by advancing the market development of combined heat and power ("CHP") energy systems.
- RD&D: In order to support California's energy and environmental objectives of increasing energy efficiency and reducing GHG emissions, the RD&D program also aims to conduct new research in renewable solar thermal and bioenergy resources. Recent regulatory changes, as well as developments in the marketplace, result in an increased need to conduct research in NGV engine technology, also referred to as clean transportation technology.
- NGV: The number of customers that operate NGV's and NGV refueling stations in recent years has grown rapidly. This growth is accompanied by increasing numbers of government regulations and legislation which create new requirements and opportunities, as well as products and services offered to these customers. In response to this growth, SCG requires additional resources to support customers and to raise customer awareness and education that would help customers better understand the issues and benefits associated with NGV.
- Capacity Products and Planning: Implementation of the new Firm Access Rights program requires additional resources to handle service and

[6] This is based on a calculation of the average annual number of homes to be treated from 2009-2020.

administration of new contracts and the increased number of transactions. Additional expense will also be required to enhance the pricing capabilities of the existing storage analysis software.

- Environmental Affairs: With the addition of AB 32, as well as stricter air quality regulations from the local air quality agencies such as the South Coast Air Quality Management District ("SCAQMD"), permitting is becoming more complex, and inspection/compliance activities are increasing. An increased level of effort will be necessary to work with the various agencies to ensure that the utilities' customers and affected facilities comply in the most cost effective and timely manner, as well as to communicate the potential scenarios that could impact service to the utilities' ratepayers.
- Biofuel Market Development: Biogas represents a promising renewable energy source in California that has been relatively underdeveloped. SCG formed the Biofuel Market Development team to advance commercial production of biomethane, which refers to biogas that has been conditioned to meet pipeline quality standards. Biomethane is a highly flexible renewable energy source that can be blended with or substituted for natural gas, offering a renewable alternative for a wide variety of uses.

D. Summary of Request

This section summarizes SCG's CS&I expense forecasts needed to ensure safe, reliable and responsive service. Expense forecast discussions are divided into three categories – non-shared services, shared services, and capital. Non-shared services expenses are O&M expenses incurred only by SCG and are discussed in section II. Shared services expenses are O&M expenses incurred by SCG on behalf of both SCG and San Diego Gas and Electric ("SDG&E"), and are discussed in section III. Capital requirements are justified in section IV; however, capital forecasts are provided elsewhere in the SCG testimony.

The CS&I organization generally adopted a 5 year average forecast methodology to develop a "baseline" forecast, like most other areas within the Customer Services organization. This forecasting methodology was selected because it reduces anomalies in the basis for the forecast, for example from fluctuations in the business cycle, unusual operating conditions, or being at a particular point within a GRC cycle. There are three activity areas in CS&I that did not use the 5 year average forecast methodology: RD&D, NGV, and Biofuel Market

Development programs. For the RD&D program, the TY 2012 baseline forecast was estimated using a zero base forecast methodology. This is because costs for RD&D activities are primarily project driven. SCG expects that the current RD&D activities based on authorized funding in the TY 2008 GRC will continue in 2012. In addition, new projects will be added to accelerate the development, demonstration and commercialization of solar thermal systems and bioenergy renewable resources. The TY 2012 forecasts for NGV and Biofuel Market Development programs also did not adopt the five year forecast method and were derived using base year 2009 costs as the baseline, with additional adjustments for specific program growth. The 5 year average forecast methodology was not used for these programs because there were only 2 years of historical costs available. The NGV program was funded outside of GRC previously and was rolled into the GRC beginning in 2008. Therefore, the current NGV program's historical costs for GRC reflect only 2008 and 2009 data. The Biofuel Market Development is a new program with cost history going back to 2008. The baseline forecast was further adjusted, where needed, to account for specific program growth and other incremental costs not reflected in historical cost data. Furthermore, the baseline forecasts for all groups within CS&I were adjusted to reflect personnel movement resulting from a company reorganization. The changes are consistent with the goals of the 2010 reorganization, as described in the testimony of SCG witness Anne Smith (see Exh. SCG-1). The forecasted CS&I expense for TY 2012 is $41.536 million reflecting a $12.250 million increase relative to 2009 base year recorded expenses.

For non-shared services, SCG forecasts a TY 2012 expense of $34.806 million, a $10.037 million increase over 2009 recorded expenses of $24.769 million. The TY 2012 forecast reflects a $9.219 million increase over the 5 year average for Customer Communications, Customer Assistance, Nonresidential Markets and the 2008 GRC authorized funding for RD&D program, which total $25.587 million. The incremental expenses support the following activities:

- Customer Communications: Incremental expense of $2.264 million over the 5 year average of $5.655 million is requested for:
  - Enhancement of website usability and accessibility.
  - Increasing support activities and services for website and mobile devices.
  - Enhancement of social media and e-communication channels.

- Increasing support for online content editing and translation.
- Additional targeted customer research to determine the values and needs for availability and access to online services.
- Expanded natural gas safety communications.

- Customer Assistance: Incremental expense of $3.475 million over the 5 year average of $1.724 million is requested for:
  - Increased numbers of NGAT required by the LIEE program.
  - Outreach and education efforts to raise the awareness of SCG's MBL program.
  - A contract with Telecommunications Education and Assistance in Multiple Languages Collaboration ("TEAM") to educate customers with limited English proficiency to understand their gas bills, payment options, and available assistance programs.
- Nonresidential Markets: Incremental expense of $0.480 million over the 5 year average of $8.220 million is requested to educate and assist customers to analyze and assess the viability of CHP systems, and provide general customer support related to compliance with air quality regulations.
- RD&D – Incremental expense of $3.000 million over current authorized funding of $10 million is requested to conduct research, development, and demonstration projects in the areas of solar thermal and bioenergy renewable resources.

For shared services, the forecasted CS&I expense for TY 2012 is $6.73 million book expense, reflecting a $2.213 million increase relative to 2009 base year recorded book expenses, including an increase of $0.3 million for billed-in services from SDG&E. The TY 2012 forecast of incurred costs is $6.392 million. This reflects $1.728 million incremental incurred costs over the base year forecast for NGV and Biofuel Market Development and the 5 year average for all other shared services, which total $4.664 million. This is a $2.059 million increase over 2009 recorded incurred costs of $4.333 million. The incremental expenses support the following activities:

- NGV: Incremental request of $0.86 million incurred cost over base year 2009 adjusted-recorded cost of $1.396 million to:

- Increase account management to respond to accelerating customer growth.
- Education and outreach to raise customer awareness regarding the use of natural gas as a transportation fuel.
- Provide customer training and education on legislation and regulations related to NGV.

- Capacity Products: Incremental request of $0.488 million incurred cost over the 5 year average of $2.279 million to:
  - Handle increased administrative activities stemming from the implementation of FAR and changes to service offerings required by the Omnibus Settlement Decision ("D. 07-12-019").
  - Enhance existing storage analysis software to effectively price storage services to off-system customers.
- Biofuel Market Development: Incremental request of $0.120 million incurred cost over base year 2009 adjusted-recorded cost of $0.257 million for market assessments and feasibility studies required to understand the viability of the market.
- Environmental Affairs: Incremental request of $0.260 million incurred cost over the 5 year average of $0.216 million to address new GHG regulation, as well as anticipated new air quality regulations from the SCAQMD.

Capital projects are requested and business justifications are discussed in section IV of this testimony. However, funding requests are sponsored by other witnesses as identified and discussed in section IV.

- Sustainable SoCal Program: Installation of four biogas conditioning systems at customer facilities in order to advance the market development of producing pipeline quality gas from raw biogas at wastewater treatment plants.
- California Producer: D.07-08-029 granted California gas producers access to the SCG transmission system. This calls for unique balancing requirements that will necessitate modifications to SCG's contract system and customer billing system as well as its electronic bulletin board system.
- Next Generation Envoy®: User surveys have identified the need for major improvements to SCG's electronic bulletin board system. Improvements will

address improved usability as well as input and data retrieval from the existing system.

The information contained in this chapter will demonstrate that SCG's CS&I expense forecasts are reasonable and should be adopted by the Commission. Table GAW-2 summarizes SCG's 2009 adjusted-recorded O&M expenses and TY 2012 estimated O&M expenses for non-shared services. Table GAW-3 summarizes SCG's 2009 adjusted-recorded O&M expenses and TY 2012 estimated O&M expenses for shared services. The amounts shown in Change column may not match the incremental values described above, which are differences from the 5-year average forecast level.

Table GAW-2
O&M Non-Shared Services
Testimony Section II
(Thousands 2009 dollars)

Categories of Management	2009 Adjusted-Recorded	TY 2012 Estimated	Change
A. Customer Communications, Research and e-Services	5,817	7,919	2,102
B. Customer Assistance	2,159	5,199	3,040
C. Nonresidential Markets	7,337	8,502	1,165
D. Research Development & Demonstration (RD&D)	9,456	13,186	3,730
Total	24,769	34,806	10,037

Table GAW- 3
O&M Shared Services
Testimony Section III
(Thousands 2009 dollars)

Categories of Management	2009 Adjusted-Recorded	TY 2012 Estimated	Change
A. NGV Program	1,220	2,028	808
B. Capacity Products and Planning	1,855	2,600	745
C. Biofuel Market Development	181	364	183
D. Environmental Affairs	151	295	144
E. Emerging Technology	64	88	24
F. VP Customer Solutions	200	209	9
G. USS Billed Billed-in From SDG&E	846	1,146	300
SCG Book Expense	4,517	6,730	2,213

II. NON-SHARED SERVICES

A. Introduction

The CS&I area includes non-shared management and staff groups in the following activities:

- Customer Communications
- Customer Assistance
- Nonresidential Markets
- Research Development & Demonstration

Table GAW-4 summarizes SCG's 2009 adjusted-recorded O&M expenses and TY 2012 estimated O&M expenses for non-shared services.

Table GAW- 4
O&M Non-Shared Services
(Thousands of 2009 dollars)

Categories of Management	2009 Adjusted-Recorded	TY 2012 Estimated	Change
A. Customer Communications, Research and e-Services	5,817	7,919	2,102
B. Customer Assistance	2,159	5,199	3,040
C. Nonresidential Markets	7,337	8,502	1,165
D. Research Development & Demonstration (RD&D)	9,456	13,186	3,730
Total	24,769	34,806	10,037

B. Discussion of O&M Activities

1. Customer Communications, Research and e-Services

a. Overview

Customer Communications manages four primary areas:

- Customer Communications
- Design and Print Production
- Customer Research and Analysis
- Website and other electronic channels-based services and information delivery

The primary functions and objectives of this activity are to:

1) Proactively communicate to customers via mass and targeted channels to build awareness of and improve access to existing and new utility services, programs and resources;

2) Educate customers and stakeholders regarding general topics including managing gas use and bills, payment options, assistance and rebate programs, service offerings, and natural gas safety;

3) Conduct research and customer satisfaction analyses to measure, evaluate and anticipate customer information and service needs and preferences, supporting the development of new customer service options, targeted communications and delivery channels to satisfy those needs; and,

4) Leverage and expand e-Channels[7], including social media, to support customer education and awareness-building objectives, and to meet increasing customer needs and expectations to obtain information and services through various e-Channels.

For TY 2012, SCG is requesting a total of $7.919 million to for Customer Communications. This forecast is based on a 5 year average cost as described in Section I.D, with an incremental funding request of $2.264 million to accomplish the following:

a. Enhance and expand website usability and accessibility.

b. Improve and expand electronic communications, social media, and online content (including translation).

c. Support expanded services for website and mobile devices.

d. Conduct related customer research.

e. Expand natural gas safety communications.

Table GAW-5 summarizes Customer Communications' O&M expenses.

[7] e-Channels refer collectively to the variety of electronic communications and services-delivery platforms through which communications, transactions, interactions and/or collaboration between SCG and its customers may occur. These include, but are not limited to, self-service interactive voice response systems, website-based bill payment and self-service, e-mail, text/SMS, social media (e.g., Facebook, MySpace, Twitter) and mobile services. New and evolving technologies will lead to the creation of additional e-Channels in the future.

Table GAW-5
O&M Non-shared Services
(Thousands of 2009 dollars)

	2009 Adj. Recorded	5 Year Average	2012 Estimated	Change From 5 Year Average
Customer Communications, Research and e-Services	*5,817*	*5,655*	*7,919*	*2,264*

b. Description of activities

Following is further detail regarding the four areas managed by Customer Communications, as well as details regarding primary cost drivers within these areas.

Customer Communications

Customer Communications develops, implements, manages and oversees all paid communications to SCG customers. Communications are delivered to customers through a variety of channels, including print advertisements, broadcast media, website content, e-mails and e-newsletters, social and interactive media, direct mail, point-of-sale and event displays, brochures, flyers, and bill enclosures. The team works with various internal SCG program managers to develop overall communications strategies supporting key customer education and awareness-building objectives and performs the planning of paid communications in support of those strategies and objectives. Customer Communications ensures messages conveyed to customers are integrated and efficiently targeted across various communications channels. Through accurate and consistent management by Customer Communications of all messages in all delivery formats, customers receive valuable information related to gas use, safety issues and services available, with reduced chance of ambiguity or confusion. For example, through consistent management of information on CARE enrollment guidelines, customers can easily determine if they qualify for this crucial program regardless of how they receive the program information.

The creation and placement of advertisements, mailers and other materials is accomplished using both internal resources and external vendors. Customer Communications also oversees external suppliers, such as traditional, multi-cultural and interactive advertising agencies, language translation vendors, and SCG's e-mail service provider.

Communications to customers cover general topics such as customer services offered by SCG, bill management, payment options and critical natural gas safety information, as well as more targeted programs and/or services-specific communications. General messages are often delivered in English, Spanish, Chinese (Mandarin and Cantonese), Vietnamese and Korean. Targeted messages may depend on the audience as well as program goals and objectives. In addition, SCG buys African-American and Filipino media, with culturally-relevant communications. Generally, costs associated with programs and/or services-specific communications are paid by the requesting organizations within SCG. The Customer Communications budget funds an annual appliance safety campaign, a "winter prep" campaign that helps customers manage their winter gas bills, and ongoing campaigns to build awareness of newer, electronically-based customer services and information.

Design and Print Production

The Design and Print Production team manages day-to-day activities associated with the graphic design, scheduling and production for bill enclosures, various printed and electronic materials, such as brochures, flyers, posters and newsletters, and vendor management. These materials support numerous SCG programs and services-related education and outreach efforts and many of the bill enclosures are mandated by the Commission. Additionally, the Design and Print Production team oversees the use of the SCG logos and names, and associated compliance with various copyright, trademark and creative usage rights requirements. SCG's identities are trademarked and require oversight to ensure proper and legal usage by both internal departments and outside entities. Design and Print Production ensures that legal and mandated affiliate disclaimers appear on all company (e.g., energy efficiency and low income programs) and third party materials. This protects customers by ensuring information provided with the SCG name or logo legitimately comes from SCG, and reduces customer confusion and/or misperception when the SCG name or logo appears on others' printed or electronic materials. The costs for this area are for labor and associated non-labor only. Costs for the designing and printing of various materials are paid by the requesting organizations.

Customer Research and Analysis

The Customer Research and Analysis area conducts and facilitates research using qualitative, quantitative and secondary methods to guide SCG customer program and service offerings and report on customer satisfaction performance. This includes managing external vendors which provide associated research and benchmarking services, analyses and tools. The team works cross-functionally across numerous areas within SCG to disseminate and communicate research and customer satisfaction findings – guiding the development, operation and enhancement of services and

programs to meet customer needs and optimize the benefits customers derive from SCG's services. In recent years, to reach SCG's increasingly "wired" customer base, it has become imperative to employ a variety of newer, online research techniques and tools in addition to more traditional approaches. For example, in 2008 SCG established its first "online panel" to facilitate customer surveys, feedback and website usability optimization. Better understanding of customer needs and wants allows SCG to improve its array of services and communications while focusing on those things of most value to its customers.

The group also supports data analysis projects for various departments within SCG, such as monitoring and analyzing website utilization, evaluating energy usage and other characteristics by customer segment and producing ad-hoc regulatory reports (e.g., Commission and intervener data requests, and California Energy Commission ("CEC") reports, among others)..

Costs for ongoing research projects, such as customer satisfaction measurement, are included within this area, as well as costs associated with research related to services and program valuation and awareness. Other company research projects are coordinated by this group but are paid for by the requesting organization within SCG.

Website/e-Channel Services and Information Delivery

SCG website and e-Channel support staffs develop, implement, maintain and support internet, intranet, e-mail, mobile web, and other electronic customer communications and service-delivery channels. This includes providing day-to-day management and oversight for www.socalgas.com, for the SCG "My Account" online personal account management portal, and for associated online customer self-service options. In addition, this area supports e-Channel strategic planning and project management, new website and electronic communications platform development, website analytics, search engine and Content Management System ("CMS") administration, web user interface development and optimization, web technical standards and accessibility oversight, and interactive and streaming media. Currently, over 1.3 million customers are registered and actively using SCG's My Account online services, with over 15,000 new users registering on average each month. In 2009, visits to SCG's www.socalgas.com and My Account websites totaled approximately 23 million.

The costs for this area include employee labor and expenses as well as related external contractor and vendor support.

c. Explanation of Key Changes

Customer Communications recorded total adjusted expenditures of $5.817 million in 2009, of which $1.757 million was labor costs and $4.060 million was non-labor costs. The major non-labor expenditures incurred were in the following areas:

- Customer Communications: Appliance, General Safety and Winter Prep Communications. Also for customer communications to build awareness of new, electronically-based customer services and information;
- Design and Print Production: SCG Newsletter, Proposition 65 and For Your Information bill inserts; and
- Customer Research and Analysis: Customer Satisfaction Studies and services and program valuation and awareness.

Collectively, these expenditures provided a foundational level of critical general customer communications, research and customer satisfaction studies, and website support. Non-labor costs do not include media purchases, agency or printing costs, which are billed directly to the SCG organization requiring the communications activity, unless otherwise noted.

SCG's TY 2012 forecast reflects a $2.264 million increase in funding within Customer Communications above the 5 year average of historical spending. As previously discussed in section I.D, the 5 year average is used as the basis for TY 2012 forecast plus adjustments to account for specific program growth. Table GAW-6 summarizes the TY 2012 proposed incremental program expenditures for Customer Communications.

Table GAW-6
Customer Communications, Research and e-Services
TY 2012 Incremental Program Expenditures
(Thousands of 2009 dollars)

Program	Labor	Non-Labor	Explanation	Total
Enhanced Website Usability/Accessibility	**87**	**544**	1 FTE: Website analysis, project and vendor management. NL: Consultant costs and agency fees for website accessibility/ usability optimization, search optimization and web analytics.	**631**
Website/Mobile E-Services	**187**	**43**	2 FTEs: Project and operations management, vendor management. NL: Vendor costs for customer research, usability evaluations.	**$230**
Social Media/e-Communications Channels	**198**	**233**	2 FTEs: Project and operations management, vendor management. NL: Electronic messaging and interactive agency fees.	**$431**
Online Content/Editing/ Translation	**170**	**206**	1.67[8] FTEs: Project management, vendor management, content editing. NL: Translation vendor software and services.	**$376**
Research – Online Panels	**87**	**41**	1 FTE: Project and vendor management. NL: Incremental cost for online panel service vendor	**128**
Safety Communications	**160**	**308**	2 FTEs: Project management, vendor management. NL: Media purchases, translation services.	**$468**
Total Incremental Request	**889**	**1375**	**9.67 FTEs**	**$2,264**

The increased funding is primarily associated with the need to provide expanded support in two key areas:

1. Costs associated with the additional maintenance and further growth of customer information and services delivery via e-Channels; and
2. Costs towards the enhancement of natural gas safety-related customer communications.

<u>Expanded e-Channels Support</u>

Increased funding for expanded e-Channels support is required in the following areas:

- enhanced website usability and accessibility;
- website and mobile device-based e-Services;
- enhanced social media and electronic communication channels;
- online content editing and translation; and

[8] 0.67 FTE reflects adjustment to annualize labor cost of new hire employee in 2009.

- customer research online panel.

Currently, SCG provides the following basic online self-service options:

- electronic billing and payment;
- online/home banking ("e-Bills");
- account management features;
- move-related start and stop gas service requests;
- payment arrangements; and
- appliance service appointments.

Over the last five years, SCG has invested significantly in website-based services. Many of these new or completely revamped, automated online self-service options (e-Services) have been built out over this timeframe. The initial focus and priority has been on addressing SCG online customers' most utilized and valued service interactions and transactions, putting the foundation for basic online services in place. Additional capital investments are required to expand upon, build out, and increase access to the current slate of basic online services – delivering more customer-focused, convenient, time-saving and environmentally-friendly online service options and communication channels in response to customer needs and expectations. As referenced in the testimony of SDG&E witness Kathleen H. Cordova, Exhibit SDG&E-15, significant capital investments are proposed for further development and expansion of web infrastructure supporting both SCG and SDG&E, to expand e-Channel offerings over the next several years. Additional O&M funding is also required to provide staffing to support the day-to-day operations, ongoing evaluation, and continuous customer experience optimization for both recently built e-Services and e-Channels, as well as for those slated to be built out in the coming years.

Increased funding in these areas is critical. One of the most significant and dominant changes affecting how SCG delivers its basic services and information continues to be the exponential growth in customers' utilization of electronic service delivery and communication channels. SCG customers expect and demand access to information and services via an ever-growing variety of electronic channels, with customer expectations continually being raised by major online entities and service providers, such as Google, Apple, Twitter and the major financial and telecommunications industries[9]. Once customers experience the online services of other entities that meet their on-demand need for

[9] "The Future of Online Customer Experience." Moira Dorsey, Forrester, January 2010.

information or service, they expect others, including SCG, to provide a similar experience on their own websites.[10]

Evidence of this increased demand and the growing customer preference for e-Channel offerings can be seen by the dramatic increases in utilization of SCG's current e-Channel offerings. In a five year period, total visits to SCG's websites have increased four-fold, from under six million visits in 2005 to over 23 million visits in 2009. Customers registered for SCG's secured online, personal account management services, "My Account," have also increased four-fold, from under six percent to over 22% during the same time period. At the end of the first quarter of 2010, 45% of SCG customers pay their bills through various electronic payment channels (including My Account, auto debit, and home banking). Lastly, customers registered to receive SCG informational e-mails and newsletters at the end of 2009 included nearly one million customers, up from roughly 8,500 in the third quarter of 2005.

While SCG customers are increasingly adopting the now more "mature" channels of the Web and e-mail, they are also quickly embracing other rapidly growing e-Channels, such as social media (e.g., Facebook, Twitter) and mobile channels (e.g., text/SMS[11], mobile websites and "apps"). It is becoming common for public service organizations to embrace providing essential public services using these newer channels to deliver time-sensitive information to their customers. For example, the Bay Area Rapid Transit ("BART") district utilizes Twitter to deliver train delay alerts and other news, and numerous cities and counties leverage Twitter to provide emergency-related alerts[12]. SCG envisions these newer e-Channels as more ways to communicate with our customers. For example, SCG would use Twitter to alert customers to emergencies, outage and repair updates and to remind them about service options.

These newer e-Channels have been touted by many studies to be the imperative channels of the millennial generation[13]. Numerous sources indicate that customers want to find information electronically and via mobile platforms. According to surveys by the Centers for Disease Control and Prevention[14] in the first half of 2008, 30.8% of U.S. households could essentially be reached only by a cell phone; by the second half of 2009, this percentage had grown to 39.4%. Over the last five years,

[10] "Utility Web Site Expectations: Keeping an Eye on the Horizon." Florence Connally, eSource. January 20, 2010.
[11] SMS = Short messaging service.
[12] See www.twitter.com/ReadyOC, www.twitter.com/SFBART, and www.twitter.com/LAFD for examples.
[13] The millennial generation is defined as those people born between 1977 and 1998.
[14] Blumberg, SJ, Luke JV. Wireless substitution: Early release of estimates from National Health interview Survey, January-June 2008. National Center for Health Statistics, December 17, 2008, and Blumberg, SJ, Luke JV. Wireless substitution: Early release of estimates from National Health interview Survey, July-December 2009. National Center for Health Statistics, May 2010. Both available from http://www.cdc.gov/nchs/nhis.htm.

annual text/SMS messages within the U.S. grew from 81 billion to 1.56 trillion, an approximately 1,800% increase[15]. Sixty percent of Americans use social media[16] – with the growth in registered Twitter accounts being 1,500% in one year[17]. And in March 2010, market research firm Nielsen projected that SmartPhone (e.g., iPhone, Blackberry) penetration in the U.S. would exceed 50% by the end of 2011[18].

SCG's "Voice of the Residential Customer" and "Voice of the Business Customer" customer research studies were completed in May 2010[19]. These studies illustrate customers' needs and expectations for electronically-based services and information. The residential study found that over half of the 889 residential customers surveyed visit the SCG website at least once a year and that the website is the most preferred and utilized method for obtaining information regarding utility services. The business study found that, of the 707 business customers surveyed, while some business customers use current online services, many respondents indicate they would prefer better electronic communications to obtain critical service and emergency information. Customers with Special Needs, such as visual or auditory impairments or mobility limitations, have also become increasingly reliant on websites to access services and information. A study commissioned by Microsoft Corporation and conducted by Forrester Research, Inc. in 2003[20] found that among adult computer users in the United States, one in four has a vision difficulty and one in five has a hearing difficulty. One of the factors driving this trend is the aging of the U.S. population.

To keep pace with the growth in electronic services and information delivery, increased funding is required to adequately support the day-to-day operations and maintenance of existing, more mature e-Channels, such as the www.socalgas.com and My Account websites and associated e-mail communications. As with more traditional program and service delivery offerings, each of the new electronic services rolled out in recent years requires staff to ensure the services are kept up-to-date, analyzed and measured for effectiveness, and optimized for customer usability and maximized transaction success. This funding is also required to support the development and maintenance of newer e-Channels, such as those leveraging interactive and social media, as well as mobile-based communications and services.

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[15] CTIA-The Wireless Association®, *Wireless Quick Facts Year-End Figures,* http://www.ctia.org/media/industry_info/index.cfm/AID/10323.
[16] Cone LLC, *2008 Cone Business in Social Media Study*, http://www.coneinc.com/content1182, (September 25, 2008).
[17] Biz Stone, Co-founder, *Twitter, Inc., Twitter Newsletter 2010 - Edition #1*, March 3, 2010.
[18] "Smartphones to Overtake Feature Phones in U.S. by 2011," Roger Entner, NielsenWire, March 26, 2010.
[19] Conducted by Vision Critical Research for SCG.
[20] The Wide Range of Abilities and Its Impact on Computer Technology, Forrester Research, Inc. 2003.

Following is a more detailed explanation of the various areas requiring expanded e-Channels funding:

- **Enhanced website usability and accessibility**: Supports additional internal and external resources required to continuously optimize the web user experience for www.socalgas.com and an ever-growing variety of associated internally-developed or vendor-hosted online tools and applications, ensuring that customers can quickly and easily access the information and services they require. This includes resources to support: adherence to web usability best practices and international standards for accessibility, enhanced website analytics, search engine optimization, and internet browser compatibility. The multitude of internet browsers utilized by SCG customers across multiple platforms continues to grow. In addition, as noted above, customers with Special Needs, such as visual and hearing impairments, depend on accessible websites and associated assistive technologies and techniques, such as "screen readers" and font enlargement, to access utility services. SCG is making steady progress meeting its commitments to website accessibility as outlined in its TY 2008 GRC Memorandum of Understanding with the Disability Rights Advocates. In compliance with Section 4.5 of the MOU, The Center for Accessible Technology performed an accessibility review of www.socalgas.com stating "During the assessments, pages were reviewed for Section 508 compliance as well as the Web Content Accessibility Guidelines 2.0 and [Center for Accessible Technology] recommendations for web accessibility. Additional effort was made to provide feedback on changes that might improve overall usability for all users."[21] Additional resources are required to address all of the provisions outlined, as well as further improvements being identified through ongoing training, consultation and evaluation. SCG's website support team continues to collaborate with the Disability Rights Advocates, as well as other internal and external website accessibility and usability resources, to provide increasing focus on these areas.
- **Website and mobile device-based e-Services:** Supports incremental staff and external vendor and other resources to operate, improve, and expand www.socalgas.com and My Account self-service features. This funding also supports customer e-Services usability evaluations as well as support for new and expanded mobile-based e-Services offerings.

[21] Letter from Eric Smith, Associate Director, Center for Accessible Technology, dated July 19, 2010.

- **Enhanced social media and electronic communication channels:** Supports incremental staff and non-labor funding to support expanded proactive and targeted outbound communications to residential and business customer segments via various electronic communication channels, including e-mail, Twitter, Facebook, and text/SMS. These channels often represent the most efficient and preferred methods by which to provide timely information regarding money-saving programs and important service-related information to many of our customer segments. Non-labor costs include agency fees, as well as set-up, delivery, reporting, and operating fees for electronic messaging vendor services.
- **Online content editing and translation**: Supports incremental internal and/or agency- or vendor-provided online content editing and translation for www.socalgas.com and other SCG electronic communications platforms. The www.socalgas.com and My Account websites together include almost 1,200 web pages and another 5,400 documents, as well as dozens of online tools, services and videos. Additionally, in 2009, more than 90 customer e-mail campaigns were deployed. With over 6,000 pages of content currently, staffing is needed to improve readability, to translate additional pages, to create more targeted content, to create more interactive content, and to create content for new programs and services. Additional editorial support is required to ensure electronically-based information is up-to-date and accurate, and to streamline copy and style to make it easy for customers to find and understand. Incremental resources in this area will also support the expanded availability of web content and navigation in Spanish and potentially other languages. Currently about 5% of www.socalgas.com is provided in Spanish, and the goal is to provide a more comprehensive Spanish-language site for the 37% of SCG's Hispanic customer base that prefers to read Spanish-language communications.[22] For example, as existing web pages on safety, billing and payment, self-service options, and mandated programs such as CARE and LIEE are revised or new pages created, this content will be made available in Spanish. Additionally, SCG plans to translate into Spanish the most visited pages of www.socalgas.com that are currently not offered in Spanish.

[22] The Asian Segment (PowerPoint presentation), Intertrend , June 1, 2010 (based on U.S. Census Bureau, American Community Survey 2007 data).

- **Customer research online panel:** Supports additional targeted customer research using online communities to determine what customers need and value as it relates to availability of and access to online services. As noted earlier, this is an imperative to ensure that SCG reaches its customers who predominantly interact through electronic channels. The initial tool supporting online research was rolled out in 2008 providing the foundational platform for this research technique, and further staffing and non-labor funding are required to build-out its utilization and reach out to more customers on a go-forward basis. This research method allows for quick and timely feedback from customers on potential services and clarity of informational messages. Support for additional panels would allow for incremental research with different target audiences, research on additional new concepts and faster results evaluation to match the pace of technological change.

Expanded Customer/ Stakeholder Natural Gas Safety Communications

Increased labor and non-labor funding is requested within Communications to support enhanced natural gas safety communications**.** The objective of these enhanced communications is to generate higher awareness and recall levels amongst several key customer segments of basic natural gas appliance and general safety information, including greater awareness of prudent safety actions customers can take. For example, safety information would explain indicators of a potential gas leak (e.g., odorant smell) or a potential carbon monoxide issue (e.g., list of CO symptoms). Improved and targeted messaging on safety tips, guidance and prudent actions customers should take will raise awareness among those customer segments that report lower awareness and recall of this critical, potential life-saving information.

Expanded communications will be focused on both English and Spanish-speaking audiences, as well as natural gas plumbing and pipeline contractors. Approximately 45% of the residents in SCG's service territory speak a language other than English at home and nearly 30% are immigrant residents.[23] For example, research has shown that the Hispanic immigrant population can specifically benefit from safety communications.[24]

Increased awareness will be accomplished by expanding the SCG safety communications campaign from three to six weeks in duration, and by communicating it more widely in multiple languages in targeted media channels. A variety of more traditional as well as newer, electronic

[23] Census Bureau data (www.quickfacts.census.gov).
[24] Pipeline Awareness Evaluation Program Research. Travis Research, December 2008.

messaging channels will be utilized as appropriate to reach targeted customer segments. In addition, expanded safety outreach may include video production for media to reach younger and more web-savvy segments, inclusive of alternative accessible formats (e.g., HTML content that meets accessibility standards so it can be read by screen readers, video content with closed captions or open captions, video content with transcript, or video with audio) to ensure online access for individuals with visual or hearing impairments.

2. Customer Assistance

a. Overview

SCG's Customer Assistance organization delivers programs and services to Special Needs customers who benefit from assistance beyond traditional customer services. Special Needs customers are those residential customers with low or fixed incomes, and persons with medical conditions which require gas for special environmental conditions. Given that many Special Needs customers may have limited English proficiency, Customer Assistance provides program information in multiple languages. Although state mandated LIEE and California Alternate Rates for Energy ("CARE") Programs are managed by Customer Assistance, those program budgets are addressed in a separate application process[25] and are funded through the Public Purpose Surcharge and not through base rates. This testimony only covers costs incurred for programs and services not specifically funded through LIEE and CARE programs, and to educate and inform Special Needs customers of available programs and services including LIEE and CARE. According to the Commission, providing information to customers about services in which they are likely to qualify is a utility cost to be allocated in general rates.[26] Customer Assistance programs are vital to its Special Needs customers, and the base rate funded O&M activities are described in the Description of Services section below.

For TY 2012, SCG is requesting a total of $5.199 million for Customer Assistance non-shared services. This forecast is based on a 5 year average cost,

[25] Through the Commission's Low Income Proceeding, SCG's (U904G) Application (A.) 08-05-025 for approval of LIEE and CARE programs and budgets for Program Years (PY) 2009-2011 was filed May 15, 2008 and approved in D. 08-11-031.
[26] D.08-11-031 Conclusion of Law 39 page 219.

as described in Section I.D, with an incremental funding request of $3.475 million for the following:

- Natural Gas Appliance Testing
- Medical Baseline Program Outreach
- Bill Education for customers with limited English proficiency

Table GAW-7 summarizes O&M expenses for Customer Assistance.

Table GAW-7
O&M Non-shared Services
(Thousands of 2009 dollars)

	2009 Adj. Recorded	5 Year Average	2012 Estimated	Change From 5 Year Average
Customer Assistance	*2,159*	*1,724*	5,199	*3,475*

b. Description of Services

Low Income Energy Efficiency Related Natural Gas Appliance Testing

The home weatherization activities that SCG performs in the LIEE programs authorized and funded in the Low Income Proceeding, have an associated level of required carbon monoxide testing known as NGAT. The most recent Low Income Proceeding decision, D.08-11-031, ordered SCG to charge NGATs to base rates rather than to the Public Purpose Program funds.[27]

Medical Baseline Program

The Medical Baseline ("MBL") Program is a Commission mandated program, with the costs recovered in base rates.[28] This program provides additional baseline allowances to customers that have increased natural gas needs related to heating due to certain medical conditions.[29] SCG MBL activities include outreach, enrollment and application processing, customer support, and participant recertification. Participants are recertified either annually or bi-annually depending on their medical

[27] D. 08-11-031 Ordering Paragraph 65 page 231.
[28] California Public Utilities Code 739 (c) (1) The commission shall establish a standard limited allowance which shall be in addition to the baseline quantity of gas and electricity for residential customers dependent on life-support equipment, including, but not limited to, emphysema and pulmonary patients. A residential customer dependent on life-support equipment shall be allocated a higher energy allocation than the average residential customer.
[29] Medical Baseline is available to paraplegics and quadriplegics, multiple sclerosis patients, scleroderma patients, and people being treated for a life threatening illness or who have a compromised immune system. See http://www.socalgas.com/assistance/medallowance.

condition. As of April 2010, approximately 25,500 customers are enrolled in SCG's MBL program, which SCG estimates to be approximately 36% of the eligible population.[30] Increasing MBL enrollments is a continuing objective for SCG, consistent with Commission policy directives, and SCG seeks to raise MBL Program awareness and participation. Therefore, SCG intends to increase program coordination and outreach efforts to generate greater awareness and participation in the program, discussed in more detail in the next section.

Gas Assistance Fund

The Gas Assistance Fund ("GAF")[31] program provides SCG bill payment assistance of up to $100 per year to customers experiencing financial hardship. SCG's shareholders, employees, and customers contribute to the GAF fund. In October/November, SCG solicits customers for contributions to the GAF, and SCG shareholders match those contributions, generally on a dollar-for-dollar basis, up to $250,000. In 2009, shareholder funds totaled $300,000 and SCG shareholders contributed an additional $50,000 to increase assistance to income-qualified customers. In 2009, GAF disbursed over $513,000 and helped more than 6,200 customers pay their gas bill. Customer Assistance promotes the program and works with the United Way of Greater Los Angeles to coordinate over 100 local agencies that identify customers in need of assistance to distribute funds accordingly.

Low Income Home Energy Assistance Program

The Low Income Home Energy Assistance Program ("LIHEAP")[32] is a federally funded assistance program administered by the state that provides bill payment assistance and home weatherization services to qualified customers. Customer Assistance works with LIHEAP agencies to ensure that payments are received from the California Department of Community Services and Development ("CSD")[33] and are applied correctly to customers' bills.

2-1-1/3-1-1

The 2-1-1 nationwide telephone service provides callers with information on community, health and disaster services. In 2009, twelve 2-1-1 county-based agencies and a city-based 3-1-1

[30] Estimated penetration rates are based on a report from Athens Research, issued June 20, 2010, which estimates SCG's Medical Baseline eligible population as approximately 70,910. This is a rough estimate, and additional research would be needed to define the eligible Medical Baseline population more precisely.
[31] http://www.socalgas.com/assistance/gaf/
[32] http://www.socalgas.com/assistance/liheap/
[33] The state Department of Community Services & Development administers the federally funded Low-Income Home Energy Assistance Program (LIHEAP) in California.

agency were provided with SCG's Customer Assistance and general utility information.[34] SCG works closely with 2-1-1/3-1-1 agencies so that callers receive the most up-to-date information on Customer Assistance programs and services. Customer Assistance also worked with 2-1-1 county agencies to include links for SCG program information on local 2-1-1 websites, for example the Los Angeles County 2-1-1 site www.infoline-la.org.

c. Explanation of Key Changes

Customer Assistance is requesting $3.475 million of incremental O&M labor and non-labor expenses for TY 2012 over the 5 year average forecast of $1.724 million. The incremental funding requested will allow SCG to expand programs and services to meet Commission directives and support identified Commission goals for serving Special Needs customers. Table GAW-8 provides details of the proposed incremental labor and non-labor expenses.

Table GAW-8
Customer Assistance
TY 2012 Incremental Program Expenditures
(Thousands of 2009 dollars)

Program	Labor	Non-Labor	Explanation	Total
Natural Gas Appliance Testing		**2,800**	Incremental non-labor costs associated higher forecast volume for number of homes to be treated	**2,800**
Medical Baseline	**150**	**400**	2 FTEs and $400 non-labor incremental costs to support additional outreach efforts (see workpaper for additional non-labor cost details)	**$550**
Bill Education		**125**	SCG's share of the annual contract cost to participate in TEAM Collaborative Program	**$125**
Total Incremental Request	**150**	**3,325**		**$3,475**

LIEE Natural Gas Appliance Testing

SCG requests an additional $2.800 million in TY 2012 to cover the costs of LIEE NGATs and contractor fees associated with conducting those tests. This increase is required to support the current and ongoing number of tests required on LIEE serviced homes. In its last GRC Application (A. 06-

[34] Fresno, Imperial (Sure Helpline), Kern, Kings, Los Angeles, Orange, Riverside, San Bernardino, Santa Barbara, San Luis Obispo, Ventura, and Tulare Counties, and City of L.A. 311 Program.

12-010) for TY 2008, SCG projected that annually 45,500 of its LIEE serviced homes would require NGATs.[35] In 2007, Commission D.07-12-051 set a programmatic initiative "[t]o provide all eligible customers the opportunity to participate in the LIEE programs and offer those who wish to participate all cost effective Low Income Energy Efficiency measures by 2020."[36] To meet the Commission's 100% programmatic initiative, the 2009-2011 Low Income Energy Efficiency ("LIEE") and California Alternate Rates for Energy ("CARE") Decision ("D. 08-11-031") directed in ordering paragraph 48 for SCG to treat an average of 133,426 LIEE eligible homes per year.[37] In base year 2009, the first year of the program cycle approved in D.08-11-031, SCG's contractors completed 66,897 NGATs on homes served by the LIEE program, reflecting a 47% increase over previous projections of TY 2008 testing.[38] SCG conducted these additional NGATs without a mechanism to recover the additional costs. SCG and SDG&E filed Advice Letters ("AL") 4004 and 1876-G respectively, requesting to establish NGAT Memorandum Accounts to track incremental costs associated with implementing D. 08-11-031. Resolution G-3441 denied this request, stating "[t]he Commission's 2008 GRC decision does not adopt a particular expense amount for NGAT or the number of homes assumed to be subject to NGAT in the Settlement Agreement." On May 14, 2010, SCG and SDG&E jointly submitted a Petition for Modification ("PFM") of D.08-11-031, which includes a proposed revision to Ordering Paragraph 65 that would "allow IOUs to track the unanticipated and unforeseeable NGAT incurred costs, as a result of compliance with the Decision, that are in excess of the implied authorized level of NGAT funding from those settlements as approved by the Commission in prior utility GRC decisions." At the time of the filing of the Notice of Intent in this proceeding, the PFM was still pending. However, the requested balancing account is only intended to track costs incurred during the 2008 GRC cycle.

For TY 2012, to comply with Commission directives, SCG requests an incremental increase to the 5 year average forecast of $2.800 million annually to support this initiative. For TY 2012 SCG forecasts annual costs for 120,083 NGATs at $35 per test, which amounts to the annual program

[35] SCG TY 2008 GRC Customer Services Team work papers, see Attachment "2" of SDG&E and SCG Petition for Modification (PFM) of D. 08-11-031, filed May 14, 2010.
[36] D. 07-12-051, Summary of Order, page 4.
[37] For a total of 400,279 homes for the program cycle.
[38] This number was retrieved from Home Energy Assistance Tracking (HEAT) system.

funding of $4.200 million. The forecast NGAT volume is estimated based on testing 90% of 133,426 LIEE homes to be weatherized, as adopted in D.08-11-031.[39] NGAT costs will continue to be incurred in TY 2012 and beyond, as SCG anticipates that in the next low-income proceeding, the Commission will continue to direct the utility to weatherize an average of 133,426 homes per year through the GRC period. In the event the forecast volume increases significantly due to changes in the LIEE program, for instance if there is a revision in state mandated eligibility criteria for LIEE programs, SCG should be allowed to seek cost recovery for incremental expenses incurred for NGAT activities exceeding the forecast volume.

Medical Baseline Customer Outreach

The Customer Assistance organization has set an internal goal to increase the number of MBL customers it serves to 30,000 customers or approximately 42% of the eligible population by 2015. This would be an 18% increase in participation over the current level for this hard to reach population. SCG requests an incremental $0.550 million to support this goal for the MBL program. The funding will provide for 2 FTEs who will manage and develop new outreach efforts to raise awareness of SCG's MBL Program, and $0.400 million in non-labor costs for outreach and education. In particular, SCG plans to conduct outreach through medical and health industry related channels, notifying professionals and patients about the program. Examples of non-labor outreach costs include:

- Running MBL infomercial television programming in waiting rooms of medical facilities;
- Direct mail campaigns targeted at health workers;
- Point of purchase program information stands at pharmacies, and/or doctors' offices; and
- Program promotion in health/lifestyle related magazines.

The two FTEs assigned to MBL outreach will act as "cultural ambassadors", meaning that they will represent the company in cross-cultural communication with customers and community partners from many different backgrounds. The cultural ambassadors are expected to increase program awareness and participation, and collect input to bring back to the company to develop improved understanding of MBL-eligible customer needs and preferences. The two FTEs will work on

[39] Not all homes treated by the LIEE program require NGATs. However, based on the California Conventional Home Weatherization Installation Standards Section 24, Part 1(2), which states that: "in homes receiving infiltration measures, NGAT shall be conducted when the home is heated with natural gas, or has one or more other natural gas appliances affecting the living space," 90% is a reasonable estimate. In 2008, approximately 87% of homes treated through the LIEE Program required NGATs.

customer outreach efforts including: promoting accessible communication,[40] bridging dialog with outside organizations representing customers with disabilities, and program development.

SCG plans to have the new cultural ambassadors drive an innovative outreach approach geared towards engaging health industry professionals and the patients they serve. Education to doctors, nurses, patients, and advocates will teach important parties how the MBL program can help SCG customers manage their medical conditions by allowing indoor temperature regulation at the more affordable rate. In addition, SCG will coordinate its program outreach with community based organizations ("CBO") focused on persons with qualifying medical conditions and Special Needs.[41] By educating and involving health professionals in MBL program outreach, SCG will be able to gain more MBL participants through their referrals and streamline the application process including doctor verifications of medical conditions.[42] Gaining MBL participants through medical field referrals and making the application process more efficient will save time and money for SCG, and MBL qualified customers.

Expanding MBL outreach will also support SCG in meeting the Commission's goal that 15% of LIEE enrollments are made up of customers with disabilities.[43] In D. 08-11-031, the Commission emphasized the importance of reaching out to customers with disabilities, and included MBL participants in this segment.[44] According to Disability Rights Advocates, to improve outreach to Californians with disabilities, it is recommended that companies, "Increase… cultural competence regarding disability issues. Become experts in accessible formats, technology and practice. Train customer service staff on disability, accessibility issues, and technology and incorporate this information into company policies and practices."[45] A key focus of outreach and training efforts will be to simplify the process of enrolling in MBL for customers with disabilities.

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[40] This may include new technological advancements and tools to communicate with customers who have disabilities, which will involve the support of Customer Communications.

[41] The doctor-lawyer partnership practice between Children's National Medical Center and Children's Law Center, is a model case where patients are referred to non-medical services as a way to manage social and health related issues. See Sun, Lena H., "Widening a Safety Net; From rats to heaters, Doctor-Lawyer Alliance Battles Obstacles to Family Health Care," The Washington Post (Suburban Edition), May 26th, 2010.

[42] The Medical Baseline application includes fields for patient information and doctor certification of medical conditions, and the enrollment process can be streamlined when cognizant doctors are able to offer program information and their verification of known medical conditions at either the point of diagnosis or a regularly scheduled appointment rather than making separate appointments to complete the Medical Baseline application.

[43] PU Code 382(e) states, "The Commission and electrical corporations and gas corporations shall make all reasonable efforts to coordinate ratepayer-funded programs with other energy conservation and efficiency programs".

[44] D. 08-11-031 Ordering Paragraph 31, page 225.

[45] "Effective Outreach To Persons With Disabilities," Prepared by Disability Rights Advocates for California Utility Companies February 2006/Updated June 2007.

Bill Education to Customers with Limited English Proficiency

SCG requests an incremental $0.125 million to fund new bill management and education services to customers with limited English proficiency.[46] SCG's Customer Assistance plans to contract with the Commission's Communications Division's Telecommunications Education and Assistance in Multiple-languages ("TEAM") Collaborative[47], at an estimated cost of $0.125 million. The economy has negatively impacted SCG customers and bill payments have become more difficult for many customers. From January 2009 to January 2010, unemployment rates in the Los Angeles metropolitan area increased significantly from 10.6% to 13.1%.[48] The early January 2010 unemployment rate of 13.1% equates to 632,000 unemployed persons in the Los Angeles metropolitan area.[49] Customer Assistance has proactively developed approaches to respond to increasing customer challenges related to the recessionary climate and high unemployment rates. Acting on its commitment to support its Special Needs customers, SCG reached out to newly unemployed customers, and expanded its bill payment assistance program ("GAF"). In February 2010, the Commission issued an Order Instituting Rulemaking[50] ("OIR") R.10-02-005 to establish ways to increase customer notification and education to decrease the number of gas and electric utility service disconnections. SCG's recent efforts and the Commission's action reveal an ongoing need for bill management and education services, particularly for the large population of customers with limited English proficiency.

The TEAM Collaborative Program[51] was implemented in 2008, and offers services to limited English proficient telecommunication customers in three areas: program outreach, consumer education, and complaint resolution. SCG intends to support the expansion of the program to include energy customers. SCG will provide assistance to limited English proficient customers through the TEAM Collaborative's network of community based organizations ("CBO's") located within its service territory. The TEAM Program will be a prominent partner in community outreach, and its CBOs may conduct campaigns via community television, radio, newspapers, or through participation

[46] According to linguistic demographics for SCG' service territory that are based on U.S. Census Data from 2000, approximately 45% of the population over 5 speaks a language other than English.
[47] SCG intends to partially fund a contract with TEAM; however, this plan is contingent on the Commission's direction on the program, and joint participation and funding of other outside IOUs' (PG&E, SCE, and SDG&E).
[48] Source: U.S. Bureau of Labor Statistics, data retrieved July 19, 2010 from http://data.bls.gov/PDQ/servlet/SurveyOutputServlet?series_id=LAUDV06310803&data_tool=XGtable [website].
[49] Source: U.S. Bureau of Labor Statistics, data retrieved July 19, 2010 from http://data.bls.gov/PDQ/servlet/SurveyOutputServlet?series_id=LAUDV06310803&data_tool=XGtable.
[50] Rulemaking 10-02-005
[51] TEAM was developed to address issues identified in the Commission's limited English proficiency decision (D.07.07.043).

in community events. According to the TEAM Program 2008-2009 Annual Report, 28 CBO's statewide, "potentially reached nearly 14 million telecommunications consumers in 18 different languages."[52] SCG's objective is to help educate customers with limited English proficiency to better understand their energy bills, payment arrangement options, and inform them about other assistance programs and services offered by Customer Assistance.

3. Nonresidential Markets

a. Overview

This section summarizes activities and costs incurred by the organizations that together serve the Nonresidential Markets segments. This group manages customer accounts, develops education and communication materials on gas rates, tariffs, contracts, safety, and provides regulatory information for nonresidential customers. The activities in this section are organized under two subgroups:

1. Commercial, Industrial, and Government Services provides account management and other customer services including education and training to medium and large commercial, industrial and government customers;

2. Capacity Products and Planning ("Capacity Products") handles account management for very large customers including enhanced oil recovery, electric generation, and wholesale customers; manages the business relationship with interconnected gas producers and pipelines; and markets unbundled storage capacity and the California Energy Hub, as well as purchases natural gas to maintain system integrity. The costs related to shared services activities in this organization that support both SCG and SDG&E are discussed separately in Section III of this testimony.

For TY 2012, SCG is requesting a total of $8.502 million to for Nonresidential Markets. This forecast is based on a 5 year average cost, as referenced in Section I.D, with an incremental funding request of $0.480 million to accomplish the following:

- Provide support for increased air quality compliance regulations and activities.
- Provide support for increased CHP activities.

Table GAW-9 summarizes O&M expenses for non-shared services by the Nonresidential Markets group.

[52] TEAM 2008-2009 Annual Report, page 10.

Table GAW-9
O&M Non-shared Services
(Thousands of 2009 dollars)

Nonresidential Markets	**2009 Adj. Recorded**	**5 Years Average**	**2012 Estimated**	**Change From 5 Years Average**
1. Capacity Products and Planning	*974*	*884*	*884*	*0*
2. Commercial, Industrial, and Government Segments	*6,363*	*7,138*	*7,618*	*480*
Total	*7,337*	*8,022*	*8,502*	*480*

b. Description of Services

Nonresidential Markets includes four major functions which are described in more detail below: account management, providing personalized attention to large and complex accounts; commercial and industrial staff support; storage and hub services, which sells available unbundled storage capacity; and customer programs, providing staff support for large scale residential development customers.

Account Management

To effectively meet the customer needs of many different businesses, equipment and levels of technical expertise, SCG delivers individualized account management services through highly trained and specialized customer contact personnel - Account Representatives ("ARs"). Customer interactions with ARs are critical to safe and reliable service delivery, regulatory compliance, and customer satisfaction. ARs provide the single point of contact for commercial and industrial ("C&I") business customers. Topics often discussed include:

- Safe use of natural gas
- Bill explanations
- Bill issues resolution
- Rate options
- Credit and collections support services
- New business project management
- Gas service changes
- Emergency preparedness and business resumption planning

- Air quality regulation permitting and compliance
- Technical information
- Economic development
- Ownership changes

In addition, ARs also engage in various activities to promote refundable programs. The trusting relationships and customer knowledge developed by ARs is highly valuable to facilitate refundable program activities. However, the refundable programs are outside the scope of this testimony, and will not be discussed further here. Table GAW-10 shows the types of customers that are served by ARs.

Table GAW-10
Account Management Matrix

Customer Base	Industries
Capacity Products	Large electric generators, wholesale, international, and enhanced oil recovery and California gas suppliers,
Natural gas vehicles	Transit buses, school buses, waste haulers, street sweepers, airport fleets, goods movement fleets, commuter vehicles
Select Industry	Large manufacturers, large hospitals, petroleum refineries Los Angeles City and County, State and Federal Accounts
Geographically Assigned - Core commercial and industrial customers including home builders and developers	Hotels, restaurant chains, small hospitals, school districts, small manufacturers, grocery chains, colleges, builders, developers, energy consultants, title 24 companies, rating inspection firms

Capacity Products ARs manage services and communications between SCG and its electric generation, wholesale customers and Enhanced Oil Recovery customers. These customers are noncore and represent most of the largest customers on the SCG system, representing 154 meters and accounting for 44% of 2009 SCG's system throughput. Typical customers are large cogeneration facilities greater than 20 megawatts ("MW"), wholesale customers, electric generation, enhanced oil recovery, wholesale customers and California gas producers. ARs for the Capacity Products market typically handle a smaller number of accounts, on average, than other ARs mentioned in this section. Capacity Products customers are inherently more complex to serve. A Capacity Products customer is likely to have multiple accounts served by multiple meters involving more complex measurement technology. For this reason Capacity Products ARs must maintain industry specific expertise, have

frequent contact with their customer base, and rely on knowledgeable support from the staff organization.

Capacity Products ARs also manage services, communications, and contract administration for approximately 43 active California gas producer meters representing 55 access arrangements. In addition, these representatives are responsible for responding to capacity access inquiries from new California gas producers and biogas producers, and to manage the interconnection process including facilities upgrades and gas quality enforcement.

Select Industry ARs provide a single point of contact for managing services and communications between SCG and larger commercial and industrial customers in select market segments such as food processing, government, textiles, metals, stone/clay/glass, paper, petroleum refining and chemicals. These large customers are primarily noncore with highly technical processes and energy intensive operations require specialized attention. Also included in this group are the government ARs who manage federal and state government accounts and must be familiar with both the Federal Acquisition Regulations and State of California procurement practices. These ARs can also be involved with requests to privatize an energy distribution infrastructure which requires detailed analysis and calculations.

Natural Gas Vehicle ARs support customers with vehicles which get natural gas from specialized compressed natural gas service stations located throughout the service territories of both SCG and SDG&E. These ARs must have specialized knowledge involving both the special regulatory and safety issues surrounding the use of compressed natural gas as a vehicle fuel. As a shared service, NGV activities are discussed in more detail in Section III.

Geographically assigned ARs serve the remaining commercial and industrial business accounts that generally consume in excess of 50,000 therms/year as well as some smaller accounts that require more services and attention. These customers may not have in-house technical expertise and require help with permitting, process improvement equipment selection and safety considerations.

Geographically assigned ARs also work with homebuilders and developers within the service territory. They support new home builders and developers by providing services and information about safety, energy code updates, title 24, line extension, meter sets, service, etc. related to the safe and efficient use of natural gas.

Storage Products and Hub Services

Capacity Products and Planning also provides natural gas storage services, operates the California Energy Hub and procures natural gas to maintain system integrity with its specialized Storage Products and Hub Services group. This group manages the sale of storage products and Hub services through sales campaigns, open seasons, and bi-lateral negotiations, to meet customer needs and to maximize value for SCG and its ratepayers. In 2009, this group generated a $38.9 million benefit to ratepayers. In order to meet their objectives this group cultivates and builds trusting, long-term and productive working relationships with both established storage products and Hub services customers and other market participants. This group negotiates and executes storage and Hub transactions with their customers, and manages open seasons for storage capacity. They also manage requests for proposals for reliability supply needs, storage expansions, and related new services, from development, to providing information and support for potential respondents, through the bidding and selection process. This group also directs the focus of special studies to uncover sales opportunities for storage and Hub services. The studies are generally conducted by the shared services staff groups in Capacity Products, discussed in Section III B.2.

Commercial, Industrial and Government Staff Support

While ARs have direct contact with customers, the commercial, industrial and government staff works behind the scenes to support customers, regulating agencies and the ARs. Staff is the liaison between ARs, customers and other departments within SCG. For example, Staff provides technical materials, assesses customer needs and coordinates the development of communication materials. Staff will also work with the operations groups to calculate and reconcile line extensions for new gas service. Typical staff support includes:

- Creating Communication materials, training and safety material – Staff develops letters and bill inserts for ARs and Commercial, Industrial and Government customers regarding rate changes, regulatory changes, and safety issues. Educational brochures developed for customers regard a wide range of topics including air quality in the various air districts, boiler regulations, natural gas engine water pumping and self generation. These materials are developed with support from Customer Communications.
- Contract analysis, and negotiations – Staff develops communication for open seasons in potentially constrained areas of SCG's distribution system, to ensure all customers

receive accurate and timely notices. This includes bidding procedures and on-line support for the open seasons, and the analysis of customer bids and available capacity to determine if pro-rating is required. Staff also provides negotiation guidelines and support for negotiated customer contracts, for instance when a customer is considering an alternative gas transportation provider. Staff also works with new construction field personnel to calculate accurate line extension allowances.

- Analysis – Staff provides expert analysis of CHP systems, customer bills, engine water pumping, and gas air conditioning economics to help customers select utility rates and technology that best suit their facility needs. Staff maintains a bill estimator tool allowing ARs to correctly educate customers of their rate options and the costs associated with each rate. For CHP, staff performs detailed rate evaluations, economics and efficiency analysis, assist with equipment selection and permitting and determine if any self generation incentive program incentives apply.
- Economic Development – Together with its ARs, staff works with at-risk customers as well as economic development agencies by providing energy assessments, information on various incentives, knowledge on how to streamline manufacturing operations, and how to utilize cleaner fuel options.
- Outreach – Staff maintains relationships with numerous industry and customer organizations.[53] These relationships provide valuable opportunities to distribute and receive information on customer needs, technology development, regulatory trends and safety standards. Customers, trade organizations and community groups often request SCG personnel to speak at conferences on safe, efficient and reliable distribution and consumption of natural gas.[54]

[53] U. S. Department of Energy, California Energy Commission, American Society of Heating Refrigeration, Air Conditioning Engineers Standard 90.1, Building Energy Standards Committee, ASHRAE, American Flame Research Organization, Association of Energy Engineers, California Metals Association, Southern California Water Committee, Association of California Water Agencies, Gas Technology Institute, American Gas Cooling Center (Member of the AGCC Advisory Board), Energy Solutions Center, California Air Resources Board, South Coast Air Quality Management District, San Joaquin Valley Air Quality Management District.

[54] American Institute of Architects (AIA), Institute of Ammonia Refrigeration (IIAR), West Coast Energy Management Congress (AEE WCEMC), Building Owners and Managers Association Conference (BOMA), Contractors, Educators and State Officials, Association of California Water Agencies (ACWA), National Association of Energy Service Companies (NAESCO) and World Agricultural Exposition.

- Training – Staff trains all new SCG ARs, as well as non-AR newcomers to the commercial & industrial organization, and has an ongoing program that addresses technical as well as non-technical matters tailored to needs of ARs.

Staff must stay abreast of impending regulations and tariff changes, and provide the education, training material and support the rollout of new programs. Regulatory compliance and support includes technical contributions to major proceedings, advice letters, compliance filings, data requests, applications, market forecasts, and the preparation and submission of reports to regulatory agencies. All of these activities either directly or indirectly affect nonresidential customers by setting or affecting customer rates, customer programs, and customer regulatory compliance either individually or for specific customer classes. Activity examples include:

- Major Regulatory Proceedings – The Biennial Cost Allocation Proceeding ("BCAP"), FAR Update, Line Extension Proceeding, and GRC. These proceedings normally have numerous phases and occur over many months or years. They require gathering and analyzing customer and cost data, performing impact analysis for all stakeholders, establishing policies and procedures to be proposed, preparing testimony and exhibits, preparing rebuttal for parties with opposing views, responding to data requests, participating in hearings before the Commission, settlement meetings, and attending Commission workshops.
- Advice Letters and Applications – Periodic changes in regulatory, legislative or market conditions necessitate the support for regular filings of advice letters or applications.
- Regulatory Reporting – There are numerous reports that are required by regulatory agencies including the Commission, CEC, air quality management districts, Energy Information Agency, the FERC and others. These reports require data analysis and preparations, work papers, and responses to follow-up inquiries. Examples include the Quarterly Fuel and Energy Report ("QFER"), the California Gas Report ("CGR"), and the Gas Utility Monthly Survey Report.
- Internal Regulatory Compliance - Staff maintains regulatory compliance for curtailments, by maintaining curtailment blocks, and for business controls compliance related to the Sarbanes Oxley Act, through internal audits to assure all noncore contracts are properly executed. The Staff Managed Capacity Team keeps track of available capacity, assigns firm capacity for new customers and determines the areas

that are potentially capacity constrained. Finally the Major Account Activity Team approves all new requests for noncore service to assure that the customers were fully informed of their rate options and understand the conditions of their rate elections, and assures that all new contracts are compliant with internal requirements pursuant to the Sarbanes Oxley Act.

Customer Programs

This group helps educate customers about equipment, design, and building technologies that conserve resources and maintain healthful air quality, and provides staff support for the Geographically-based ARs serving homebuilders and residential developers described above. It provides information on safety, codes, standards, efficient equipment and new gas technologies. It is also involved with trade organizations and outside agencies to enhance customer outreach and serve as liaisons to SCG. The following are programs and services provided by Customer Programs:

- New Construction services -- This group assists Geographically-based ARs in identifying requirements for utility distribution main and service line extensions; provides information on regulations and permit requirements; identifies building codes and standards for natural gas equipment; and provides information on new and existing technologies, materials, and methodologies which are available to optimize the performance and cost effectiveness of the customers' new construction projects.

- Energy Resource Center Seminars -- The Energy Resource Center demonstration facility helps educate customers about equipment, design techniques, and building technologies. Customer Programs develops and conducts technical seminars, and provides training and materials for energy managers and engineers. In 2009, 232 food-service equipment demonstrations, 163 technical and food-service seminars, 28 Customer Outreach events and 63 technical training sessions were conducted at the Energy Resource Center, along with 1145 meetings for business/industry associations, customers, and internal and external utility personnel.

Explanation of Key Changes

SCG is requesting that the Commission adopt its 2012 forecast of $8.502 million to deliver the services and informational needs required by its nonresidential customers. This forecast includes a proposed incremental expense of $0.480 million above the 5 year average baseline spending level of $8.022 million. The incremental funding is necessary in order to deliver additional services in support

of large nonresidential customers to address increasingly complex air quality regulations, reduce GHG emissions, and improve operational efficiency. Table GAW-11 provides details on the proposed incremental expenses.

Table GAW-11

Proposed Incremental Services and Information Programs

(Thousands of $2009)

Program	Labor	Non Labor	Explanation	Total
CHP Assistance	200	65	2 FTEs to work with ARs and customers to determine the viability of new CHP systems. Work includes technical viability analysis, economic analysis, etc.	265
Air Quality Support	0	215	Hire consultants to assist customers in a broad range of activities to help customers reduce GHG and air quality emissions.	215
Totals	200	280		480

CHP Assistance

SCG is requesting additional O&M funding in the amount of $0.265 million to educate and assist customers in the installation and usage of combined heat and power ("CHP") systems. This includes funding for 2 FTE's (2 market advisors) plus $65,000 for non-labor. With the approval of this incremental funding SCG would aggressively work with customers to identify attractive opportunities for CHP systems. As described below, using more CHP systems is a critical element to help California meet its 2020 greenhouse gas reduction goals as required under AB 32, while supporting California's commercial and industrial economic base.

According to CARB's AB 32 scoping plan, meeting California's 2020 greenhouse gas reduction goals will require installation of 4,000 MW of new CHP capacity.[55] The CEC's 2009 Integrated Energy Policy Report[56] provided an assessment of the future technical potential for more CHP in California. Regarding current CHP capacity, the report points out that systems smaller then 5 MW currently represent only 5.5% of the current CHP capacity. However the report further states that the greatest future technical potential, 65% of the new market penetration, is for these smaller CHP

[55] ARB Climate Change Scoping Plan, December 2008, pgs. 43-44.
[56] 2009 Integrated Energy Policy Report, pgs. 96-101.

systems under 5 MW. CEC's Combined Heat and Power Market Assessment report, published in October 2009, projects that by 2014 almost 300 MW of new CHP capacity will be added in the electric utility territories that overlap SCG's territory, of which 223 MW is projected to be units 20MW or less, and about 98 MW is projected to be in 1 – 5 MW systems.[57] This translates to 20 – 100 new CHP installations for the 1 -5 MW system size, and represents a substantial increase in activity level for CHP support. In SCG's experience, the majority of potential projects evaluated do not go forward. So a result of 20 new small CHP systems would represent evaluations and responding to customer inquiries for easily 4 or 5 times that number. This is also consistent with the findings of market research sponsored by the CEC described in the same report, which showed that the majority of the California business customers surveyed would require a payback of less than 2 years to install a CHP system, implying a high perceived risk.[58] With additional support resources, SCG will be better able to reduce customers' concerns and help persuade customers to install projects with longer but still economic payback periods.

With the additional funding SCG would develop CHP educational materials, and add more 2 FTE's with CHP expertise to work with a wide variety of customers having potential CHP applications. These efforts would be concentrated toward new CHP systems mostly under 5 MW, targeting the greatest untapped potential according to CEC. Many of these smaller customers have limited technical expertise and experience in being able to accurately assess the viability for new CHP. Evaluating a facility to see if a CHP system will reduce greenhouse gas production and be economically attractive for the customer is a complex analysis, requiring detailed examination of the electric and thermal load characteristics, electric and gas rate structures, site layout, air quality permitting requirements, and CHP equipment characteristics. Non-labor funding will be used to hire external consultants to assist SCG personnel to perform this type of analysis, when using consultants is more cost effective than using SCG personnel, or when consultants have specialized expertise. Particularly important for CHP to meet greenhouse gas reduction goals is the productive use of waste heat, a subject area where SCG has significant knowledge. Quality evaluation and support increases the chances of successful projects that meet customer needs and expectations.

[57] Combined Heat and Power Market Assessment. California Energy Commission, PIER Program, CEC-500-2009-094-D., October 2009, Appendix C, Table C-1 Base Case: Detailed Cumulative Market Penetration by Size, Utility and Year.
[58] *Ibid*, p. 72.

Air Quality Support

SCG is requesting additional O&M funding in the amount of $0.215 million to help customers address tough new and existing air quality regulations. As discussed in Section I.C., AB 32 and federal Climate Change Regulation represent a very significant new area of environmental regulation. In addition, there are a number of newly implemented and pending local air quality regulations that will have significant impact on many customers. Some examples of these regulations include:

- 2011 Air Quality Management Plan ("AQMP")
- SCAQMD Rule 433.1 – Gas Quality changes due to LNG derived gas
- SCAQMD Rule 1138 - Control of Emissions from Restaurant Operations
- SCAQMD Rule 1111 - Natural Gas fired Residential Central Furnaces
- SCAQMD Rule 1147 – NOx Emissions from miscellaneous sources
- Proposed PM(2.5) Regulation - Rule analysis and health and emissions studies
- AB 32 - Climate Change Regulations
- 2012 RECLAIM amendments
- Permit Moratorium
- SCAQMD Periodic Monitoring
- Federal GHG Regulation
- SJV Agricultural Engine Study
- Biogas/Renewable Project

This non-labor funding will be used for hiring specialized consultants to assist SCG personnel in the following broad range of activities: conducting and coordinating air quality studies, help with data acquisition, responding to environmental justice issues, public notices, perform emissions inventories, estimating cost impact of proposed rules, health risk assessments/modeling, engineering and emission credit analysis. These activities will be coordinated with Environmental Affairs staff, with consultants engaged where it is more cost-effective than using internal staffing, or when consultants have specialized expertise needed for a particular study.

4. RD&D Program

a. Overview

This section summarizes activities and costs incurred by the RD&D organization. The RD&D program was originally authorized in D.97-07-054, and the current annual funding level of $10 million with one way balancing account treatment (Refundable RD&D program) for the GRC cycle was

included in the Test Year Settlement that was approved in the 2008 GRC Decision ("D. 08-07-046"). The balancing treatment allows SCG to spend up to the authorized amount. Any spending below that level is refunded to ratepayers, with spending above that level at the expense of shareholders. This is accounted for over the entire GRC period, rather than on an annual basis.

As previously discussed in the Summary of Request section, the TY 2012 forecast for Refundable RD&D program is estimated using a zero base forecast methodology. SCG proposes to increase the authorized annual funding level for the RD&D Refundable program to $13 million from the current authorized $10 million. The incremental funding of $3 million is needed to implement additional projects to accelerate the development, demonstration, and commercialization of solar thermal and bioenergy renewable resources. Table GAW-12 below summarizes the TY 2012 forecast for RD&D program. In addition to the Refundable RD&D costs, the RD&D organization also incurs certain non-refundable expenses which are identified as Technology Development Support costs in Table GAW-13. As described in more detail in Section II. 4. b., Technology Development Support costs are forecast using a 5 year historical average.

Summary of Proposed TY 2012 RD&D Funding Request

SCG requests the following for its base margin RD&D program in the TY 2012 GRC cycle:

Funding. SCG requests a funding level for refundable RD&D of $13.0 million per year during the proposed GRC cycle. This request represents an increase of $3.0 million per year compared to current authorized funding to fund solar-thermal and bioenergy projects, and associated project management and program administration. Table GAW-12 below summarizes TY 2012 funding proposal by project area. A complete description of SCG's TY 2012 RD&D program proposal can be found in Appendix A.

Table GAW-12
RD&D Program Matrix & TY 2012 Funding Request
(Thousands of 2009 Dollars)

Program	Sub-Program	Project Areas	TY 2012 Request
1) Gas Operations	Gas Distribution	Construction Technologies	$75
		O&M Technologies	$575
		Pipeline Technologies	$550
	Environment & Safety	Environment	$300
		Safety	$250
	Gas Transmission & Storage	Transmission Operations	$1,000
		Compressor Station & Storage Operations	$250
2) Customer Applications	Residential	Appliances	$492
	Commercial	Buildings	$100
		Cooking & Food Service	$241
		Heating & Cooling	$305
	Industrial	Boilers	$450
		Processes	$450
3) Clean Generation	Integrated Systems	DG/CHP	$1,313
		Prime Movers	$700
	Advanced Generation	Fuel Cells & Hydrogen	$500
		Carbon Capture & Sequestration	$259
4) Clean Transportation	Infrastructure	Compression & Storage	$220
	Systems & Components	Engines & Applications	$370
		Fuel Composition & Blending Applications	$245
5) Solar-Thermal & Bioenergy	Solar Thermal	Solar Thermal	$750
	Bioenergy	Biogas Conditioning	$850
		Pyrolysis & Gasification	$705
		Bioenergy Integration	$500
6 Management & Administration	Project Management		$1,025
	Program Planning & Administration		$525
		Total	**$13,000**

Tracking of RD&D Expenditures. SCG proposes to maintain a one-way balancing account to track RD&D expenditures. The expenses will be trued-up at the end of the TY 2012 GRC cycle.

Royalties. SCG proposes to continue its sharing mechanism for net revenues (royalties and sale of securities) related to RD&D project assets, and from divestiture of equity investments initiated after implementation of SCG's 2008 GRC Decision D.08-07-046 Net revenues are split 60/40 between ratepayers and shareholders (60% ratepayers, 40% shareholders).

NGV Engines. SCG requests that the Commission revise its policy set in D.95-11-035 which restricted the utilities' ability to use RD&D funds to conduct research on NGV engines.

b. Description of Services

Technology Development Support

In addition to the costs incurred in support of various RD&D projects which comply with the requirements of the refundable RD&D program, SCG also incurs non-refundable costs indirectly supporting these RD&D activities, but that do not meet the funding requirements of the Refundable RD&D program.[59] These costs are identified as "Technology Development Support" costs in Table GAW-13 to distinguish them from Refundable RD&D costs. Examples of Technology Development support include the following:

1. external consulting work and subscription fees for evaluating certain emerging strategic initiatives that require specialized expertise, research data and analysis and which are not incurred by a specific refundable RD&D project.
2. advocacy and outreach efforts to pursue U. S. Department of Energy ("DOE") or other governmental or public funding opportunities, often in collaboration with other strategic partners.

SCG expects these costs will continue in TY 2012. For TY 2012, using a 5 year historical average, SCG forecasts the Technology Development Support costs for TY 2012 to be $0.186 million,

Table GAW-13
O&M Nonshared Services
(Thousands of 2009 dollars)

	2009 Adj. Recorded	5 Year Average	2012 Estimated	Change from Baseline
Technology Development Support	*270*	*186*	*186*	*0*

Refundable RD&D Program

The development of new and emerging technologies is essential to advance energy security and sustainability. The mission of SCG's RD&D program is to accelerate the development of key enabling technologies that promote an energy secure and sustainable future, while providing value to

[59] See D.82-12-005. "Rulemaking on the Commission's Own Motion to Adopt Evaluation Guidelines for Research Development and Demonstration, (RD&D) Projects for Ratemaking Purposes", Appendix A, Section I.C.

utility customers and shareholders. Important RD&D themes include reliable and efficient pipeline systems, clean transportation, renewable resources, energy efficiency, and distributed energy.

SCG's RD&D activities are complementary to private sector, government, and academic programs. The research supported by SCG often involves technologies that do not have a market of sufficient size to attract investment from major players. For example, many technologies supported by SCG must, among other things, meet air quality regulations that exist only within California. SCG's RD&D program supports California's Loading Order[60], which lists the following priorities for meeting energy needs: (1) Energy Efficiency & Demand Response; (2) Renewable Energy Resources; and (3) Clean and Efficient Fossil Generation. SCG strives to be a leader in the natural gas industry in driving development of clean energy-efficient appliances and equipment that support California energy and environmental policy objectives, such as the development of the Super Boiler and various industrial processes.

Specifically, SCG's RD&D program supports the following policy goals:

1. Reduce customer natural gas consumption by 175 million therms[61]
2. Reduce grid-based energy purchases for state-owned buildings by 20% by 2015, through cost-effective efficiency measures and distributed generation technologies [62]
3. Meet accelerated Renewable Portfolio Standards for California – 33% by 2020[63]
4. Reduce state greenhouse gas emissions to 1990 level by 2020, and to 80% of 1990 level by 2050[64]
5. Reduce NO_X emissions by 80% to comply with Federal 24-hour Ozone standard and comply with the new Federal PM 2.5 emission standard
6. Increase the production and use of biofuels made from renewable resources to a minimum of 20% within California by 2010, 40% by 2020, and 75% by 2050[65]
7. Increase the use of alternative fuels consistent with California mandates[66]

[60] The Loading Order was adopted in the *2003 Energy Action Plan, and subsequently confirmed in 2005 and 2008 Energy Action Plans. The* California Energy Commission's *2003 Integrated Energy Policy Report (2003 Energy Report)* used the loading order as the foundation for its recommended energy policies and decisions.
[61] California Public Utility Commission (Commission) – Decision 09-09-047 (pages 46).
[62] Executive Order S-20-04. Achieve "Net Zero Energy" homes/buildings by 2020/2030.
[63] Executive Order S-14-08.
[64] California's Global Warming Solutions Act of 2006. (AB 32)
[65] Executive Order S-06-06.
[66] Alternative Fuels AB 118.

SCG has a well developed RD&D program that is designed to produce tangible benefits to ratepayers as well as the broader population in California. SCG's program has helped accelerate the launch of many products that would not have otherwise been deployed in a timely manner. SCG's RD&D program is also driven to develop and adopt new technologies that help SCG aggressively manage utility operating costs while maintaining high system reliability. SCG's RD&D activities range from analytical technology assessments to royalty-bearing technology development contracts and, in some cases, equity investments in technology startup companies.

SCG has prepared five appendices to support this Testimony.[67] These appendices provide details concerning SCG's ongoing and proposed RD&D activities, and illustrate the value of these activities to SCG's customers and shareholders. The appendices are:

- Appendix A (Attached): Proposed TY 2012 Funding Details
- Appendix B (See workpaper 2IN008.001): Key Accomplishments (2006-2009)
- Appendix C (See workpaper 2IN008.001): Equity Investments (2006-2009)
- Appendix D (See workpaper 2IN008.001): Cost Benefit Analysis
- Appendix E (See workpaper 2IN008.001): Letters of Support

Benefits of RD&D Program

SCG's RD&D program provides significant benefits to SCG customers. Below are highlights of RD&D program benefits:

- Helping to lower utility operating costs by developing new technologies which are designed to improve system operations and productivity.
- Accelerating development of affordable, low-emission, highly energy efficient gas combustion systems that are compliant with stringent air quality regulations with low first costs and operating expenses.
- Developing a more diverse suite of clean transportation solutions for customers in order to reduce dependency on gasoline and diesel fuels and to meet new emissions requirements.
- Accelerating development and adoption of natural gas assisted renewable energy, primarily solar thermal and bioenergy, to help customers reduce their natural gas consumption and reduce GHG emissions, while potentially creating new green jobs.

[67] Appendix A is attached to this testimony, while Appendices B – E can be found in the associated workpaper 2IN008.001, identified as "RD&D Appendix B", etc.

- Maintaining a balanced RD&D portfolio that emphasizes short to medium-term (1-4 years) technologies that meet the needs of utility operations and customers.
- Coordinating with other key stakeholders such as CEC, DOE, and the Gas Technology Institute ("GTI") in order to optimize use of funds and avoid duplication of efforts (letters of support from stakeholders are included in **Appendix E** in workpaper 2IN008.001).
- Collaborating with and obtaining co-funding from, stakeholders in order to maximize the impact and value of SCG's RD&D funds. The co-funding ratio for SCG (total program cost divided by SCG RD&D cost) has been consistently greater than 5:1. SCG's co-funding goal for TY 2012 is 6:1.
- Producing modest financial returns to ratepayers. SCG's ratepayers received $2.7 million from 2006 through 2009 from royalties and investment returns.
- Enhancing commercialization potential by transferring successful RD&D results to SCG's Emerging Technologies program for extended field evaluation and product deployment – and ultimately, the marketplace.
- Keeping program administration costs low (proposed to be 3.9% of total RD&D expenditures).
- Producing benefits that exceed costs. The benefit to cost ratio for the period between 2005 and 2009 is 1.49 (details are provided in **Appendix D** in workpaper 2IN008.001).

Royalty and Equity Investments

SCG carefully screens RD&D investment opportunities and selects projects that offer the best potential value to SCG and its customers. Project selection criteria include the following:

1) Value to customers
2) Alignment with utility business needs and strategies
3) Technology breakthrough and reasonable probability of success
4) Favorable fit with overall project portfolio balance (e.g. risk, duration, and customer targets)
5) Potential for partnering – obtain co-funding to share risk and leverage assets

For many years, SCG negotiated royalty provisions as part of its RD&D programs and continues to do so where this makes the most sense from a ratepayer benefits perspective. In D.97-07-054 (SCG 1997 Performance Based Ratemaking decision) the Commission authorized a 50/50 royalty sharing mechanism, splitting royalties and other revenues from RD&D investments between

ratepayers and shareholders. Subsequently in D.08-07-046 (SCG TY 2008 GRC decision), the Commission modified the sharing of royalties and other revenues from RD&D investments to 60/40 (Ratepayers / Shareholders). SCG proposes to continue this sharing mechanism for the TY 2012 GRC period. Table GAW-14 shows financial benefits from 2006 through 2009 from royalties and equity investments.

Table GAW-14
Ratepayer Royalties & Investment Income
SCG's RD&D Program

Year	Customer Royalty Revenue	Customer Equity Investment Revenue	Total
2006	$223,980	---	$223,980
2007	$333,725	$1,600,000	$1,933,725
2008	$276,184	---	$276,184
2009	$256,019	---	$256,019
Total	**$1,089,908**	**$1,600,000**	**$2,689,908**

SCG is currently managing ten equity investments in emerging technologies. Several of these technologies have reached beta testing or early commercialization. These investments are described in detail in **Appendix C** in workpaper 2IN008.001.

SCG's RD&D Program Complements CEC PIER RD&D Program

SCG's RD&D program fully complements the gas and electric public purpose RD&D programs, otherwise known as Public Interest Energy Research Program ("PIER"), administered by the CEC. In general, SCG's regulated RD&D program focuses on developing technologies related to utility operations and energy efficiency for customers, while the CEC reaches out to a broader range of public energy needs. SCG's program is primarily focused on short to mid-term RD&D, while the CEC concentrates on a broader range of energy assessments, strategies, and mid to longer-term technology solutions. SCG emphasizes both technology and product development and demonstrations, whereas the CEC is inclined toward the research and development end of the RD&D spectrum. Furthermore, SCG's RD&D program includes a strong component addressing gas transmission and distribution operations, whereas the CEC program does not encompass gas system operations.

SCG's and CEC's RD&D programs are also complementary in another important aspect: SCG can provide ready access to its gas transmission and distribution system and can facilitate access to customer data for combined SCG and CEC RD&D activities. This cooperation allows for technology testing under real-world conditions. Technology demonstrations can be executed more effectively where SCG and CEC co-fund and co-manage these demonstrations.

SCG and CEC agree on the critical need and value of well-coordinated customer-focused and public purpose RD&D programs, which complement one another and avoid overlap. SCG and CEC RD&D program managers meet on a regular basis to discuss potential collaboration opportunities and projects of mutual interest; including technology demonstrations at utility or customer facilities.

A letter of support from CEC for the SCG RD&D program is included in **Appendix E** in workpaper 2IN008.001.

Summary of TY 2008 – 2011 Expenditures

SCG's RD&D program is organized into six major program areas with several subprograms. Table GAW-15 shows 2008 and 2009 actual expenditures and 2010 and 2011 forecasts for each sub-program. The 2008 expenditures were $5.4 million, which is lower than the $10 million authorized for 2008, primarily due to the uncertainty that existed until August 2008, when the TY2008 GRC was approved. This limited the ability to initiate new RD&D projects and spend to the authorized $10 million level. The 2009 expenditures were ramped up to $9.6 million, which is slightly below the annual authorized level. Proposed expenditures for 2010 and 2011 are above the annual authorized amount. For the entire four year cycle, expenditures are expected to be $39.9 million, which falls within the authorized level of $40 million for the 2008 GRC cycle.

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Table GAW-15
SCG's RD&D Actual & Proposed Expenditures (2008-2011)

Programs	Sub-Programs	Actual		Proposed		Total
		2008	2009*	2010	2011	
1) Gas Operations	Gas Distribution	$771,640	$875,972	$975,000	$1,250,000	$3,872,612
	Environmental & Safety	$180,581	$727,425	$220,000	$250,000	$1,378,006
	Gas Transmission	$419,799	$598,783	$920,000	$1,000,000	$2,938,582
2) Customer Applications	Residential	$30,000	$187,128	$200,000	$250,000	$667,128
	Commercial	$238,239	$223,386	$165,000	$250,000	$876,625
	Industrial	$590,730	$586,769	$875,000	$1,000,000	$3,052,499
3) Clean Generation	Integrated Systems	$620,157	$1,413,780	$1,850,000	$750,000	$4,633,937
	Advanced Generation	$65,812	$100,000	$850,000	$750,000	$1,765,812
4) Clean Transportation	Infrastructure	$102,916	$633,226	$550,000	$500,000	$1,786,142
	Systems & Components	$655,561	$707,374	$915,000	$1,000,000	$3,277,935
5) Solar-Thermal & Bioenergy	Solar Thermal	$238,579	$539,468	$400,000	$600,000	$1,778,047
	Bioenergy	$118,765	$1,521,840	$3,700,000	$3,000,000	$8,340,605
6) Project Management, Program Planning, & Administration		$1,328,407	$1,464,932	$1,380,000	$1,400,000	$5,573,339
Total		**$5,361,186**	**$9,580,083**	**$13,000,000**	**$12,000,000**	**$39,941,277**

* 2009 Actual Total does not match the total in Table GAW-2 because the figure in GAW-2 is adjusted to remove overheads and certain other costs accounted for elsewhere.

Discussion of TY 2012 RD&D Program & Funding Request

As described in Section I. D., the TY 2012 RD&D Refundable Program forecast was developed using a zero base method. This section discusses the proposed project funding for each program in more detail, including a discussion of the purpose, important drivers, and key accomplishments.

Gas Operations

SCG proposes a budget in TY 2012 of $3.0 million for Gas Operations. Table GAW-16 shows the breakdown of proposed funding by sub-program and lists project areas covered.

Table GAW-16
Gas Operations Project Areas

Program	Sub-Programs	Project Areas	TY 2012 Expenditures
1) Gas Operations	Gas Distribution	Construction Technologies	$1,200,00
		O&M Technologies	
		Pipeline Technologies	
	Environment & Safety	Environment	$550,000
		Safety	
	Gas Transmission & Storage	Transmission Operations	$1,250,000
		Compressor Station & Storage Operations	

The mission of the Gas Operations program is to develop and implement new technologies and processes prompted by operational requirements and regulatory mandates. Research activities include improving pipeline inspection methods, promoting the development of technologies that benefit air quality and the environment, and understanding performance and advancing innovative technologies in engineering materials, measurement, and construction design. To meet the regulatory, legislative, and global challenges of this decade, we are proposing to add projects in the area of distribution maintenance and asset rehabilitation with environmental co-benefits.

The research program in Gas Operations is managed and administered by Gas Engineering personnel and is divided into the following sub-programs.

- **Gas Distribution** – SCG requests $1.2 million in TY 2012 to Develop and deploy new technologies that reduce the cost of inspection, operations, maintenance, and construction, ensure continued safe and reliable service, and reduce GHG emissions. New technologies include innovative field tools, equipment, and processes that will increase field crew productivity in their daily activities and advanced leak and substructure detection technologies that enhance customer and public safety, improve gas measurement accuracy.
- **Environment and Safety** – SCG requests $0.550 million in TY 2012 to improve customer, employee and public safety. Objectives include the development of advanced pipeline locating and gas leak detection systems and the real time monitoring

of gas quality of new sources of gas supply with differing gas compositions and heating values.

- **Transmission and Storage** – SCG requests $1.25 million in TY 2012 to improve the reliability, asset life, and efficiency of equipment and systems used in high pressure gas utility operations. Projects include developing tools to comply with DOT pipeline integrity and inspection regulations, advancing and implementing new pipeline design standards, and improving efficiencies of gas storage and compressor station assets. A new area of emphasis is to develop and introduce ways of reducing GHG emissions from our existing infrastructure and equipment.

Gas Operations RD&D – Summary of Key Accomplishments (details in **Appendix B** in workpaper 2IN008.001):

- In the Gas Distribution Sub-program area, notable accomplishments include a trenchless plastic pipe splitting system as a cost-effective trenchless alternative to the traditional service pipe replacement method; a web-based construction coordination process to improve communications between city and company construction planners; and a "Magic Box" technology as a single system solution to repairing plastic pipe efficiently and effectively.
- Environmental and Safety-related projects successfully completed include a new flame resistant suit that provides enhanced protection for employees against flash fires; a pneumatic actuator or Lift Assist to reduce the amount of lift required by the field crews when using jackhammers; and a sampling technique to assess gas quality from landfill or waste water treatment systems.
- In Transmission and Compressor Operations, projects involve a tensile strain limit model to support strain-based pipeline design; comprehensive laboratory performance testing for ultrasonic and other new meters; a study on the impact of high Btu and Wobbe natural gas supplies on elastomers found in valves used in our system; and an innovative robotic inspection system for high pressure, large diameter pipeline integrity purposes.

Customer Applications

SCG proposes a budget in TY 2012 of $2.038 million for Customer Applications. Sub-programs and project areas are listed in Table GAW-17.

Table GAW-17
Customer Applications Project Areas

Program	Sub-Programs	Project Areas	TY 2012 Expenditures
2) Customer Applications	Residential	Residential Appliances	$492,000
	Commercial	Buildings	$646,000
		Cooking & Food Service	
		Heating & Cooling	
	Industrial	Boilers	$900,000
		Processes	

Activities in the Customer Applications program are designed to develop, demonstrate and commercialize improved natural gas technologies for residential, commercial and industrial customers. These new technologies increase energy efficiency and reduce emissions, which results in cost-effective compliance with air quality regulations for customers.

Air Quality Drivers: In March 2008, the Environmental Protection Agency ("EPA") lowered the federal 8-hour ozone standard under the National Ambient Air Quality Standard under the Clean Air Act from 84 ppb to 75 ppb. As a result of this new federal standard, additional emission reductions for key ozone causing pollutants will be required in many local air districts in southern California. Both the South Coast Air Quality Management District ("SCAQMD") and the San Joaquin Valley Air Pollution Control District ("SJVAPCD") are currently rated "Extreme" non-attainment areas. SCAQMD models show that the NOx inventory will have to be reduced from approximately 800 tons per day (inventory in 2008) down to about 70 tons per day by the compliance deadline of 2024. In order to meet this reduction, all sources of NOx, including all stationary point sources, will have to meet far more stringent emission levels in the future.

Another precursor to ozone is particulate ("PM") pollution. The National Ambient Air Quality Standard ("NAAQS") under the Clean Air Act for PM must be met by 2014. Typically, most natural gas-fired equipment emits very little PM, and therefore is not impacted to a large extent by PM focused regulations. However, one exception is under-fired charbroiling in commercial food service.

In addition, as described in Section I. C. implementation of AB 32 will eventually require all natural gas customers to participate in the Cap and Trade program to reduce California GHG emissions.

SCG's Customer Applications program includes the following sub-programs:

- **Residential (appliances)**: SCG requests $0.492 million in TY 2012 to develop new gas furnaces to meet SCAQMD emissions requirements, an to develop technologies that are energy-efficient, cost-effective and meet environmental regulations for residential natural gas appliances and research into the effects of gas appliances on indoor air quality.
- **Commercial (buildings, cooking, HVAC)**: SCG requests $0.646 million in TY 2012 to develop technologies that lead to highly energy efficient, cost-effective gas fired cooking equipment for commercial food service establishments, focused on improving technology used for frying, baking, and steaming food, for institutional and restaurant markets. Also technologies leading to high energy-efficient natural gas space conditioning equipment including research related to appliances-building interaction and safety, high efficiency gas powered chillers and heat pumps and gas-fired refrigeration.
- **Industrial (boilers and processes)**: SCG requests $0.900 million in TY 2012 to develop technologies that lead to highly energy-efficient, low-emission, cost-effective natural gas-based industrial technologies which allow customers to meet competitive and environmental challenges.

Customer Applications RD&D – Summary of Key Accomplishments (additional details in **Appendix B** in workpaper 2IN008.001):

Residential

- Developed a user-friendly Internet-based tool that allows for the analysis and easy selection of the latest applicable energy saving technologies for residential and commercial building applications.
- Developed Carbon Information Center ("CIC") to serve as a clearinghouse for relevant carbon management information and a resource for creating functional tools to meet the needs of our customers.
- Developed a computer based training and on-line reference tool with information on the latest gas technologies (displayed with user friendly graphical user interface).

Commercial

- Developed and tested a low oil volume fryer that reduces the amount of oil required by 40% (from about 50 pounds for a typical deep fat fryer to about 30 pounds).

- Developed and tested the Pitco Solstice fryer, which achieves improved cooking performance and high efficiency using atmospheric combustion.
- Developed and tested high efficiency Avantec commercial combi oven for commercial cooking applications.
- Developed a new high efficiency Stellar steamer that meets or exceeds production capacity of best available electric steamers.
- Initiated field tests of a more efficient gas-fired ware-washer at two restaurants – one in Marina del Rey and one in El Segundo.
- Field tested emerging Gas Engine-Driven Heat Pumps ("GEHPS") for residential and light commercial applications using technology recently introduced in Japan, Korea and Europe.

Industrial

- Completed development, testing and field demonstration of the Super Boiler, which achieves single digit NOx emissions and over 95% efficiency.
- Developed and demonstrated the Transport Membrane Condenser that has the potential to improve boiler efficiency by approximately 10 percentage points (from approximately 80% to over 90%).
- Completed field demonstration of reverse annulus single ended radiant tube burners at major steel industry customer and achieved over 20% fuel savings and over 30% NOx reduction compared to standard burners.

Clean Generation

SCG proposes a budget in TY 2012 of $2.772 million for Clean Generation. Sub-programs and project areas are listed in Table GAW-18.

Table GAW-18

Clean Generation Proposed RD&D Program

Program	Sub-Programs	Project Areas	TY 2012 Expenditures
3) Clean Generation	Integrated Systems	DG/CHP	$2,013,000
		Prime Movers	
	Advanced Generation	Fuel Cells & Hydrogen	$759,000
		Carbon Capture & Sequestration	

SCG's Clean Generation program includes the following sub-programs:

- **Integrated Systems:** SCG requests $2.013 million in TY 2012 to design, develop, demonstrate and evaluate advanced and innovative electric power generation and energy conversion technologies. California energy users, like those throughout the country, adopt Distributed Generation ("DG") and Combined Heat & Power ("CHP") systems for two basic reasons. The first, and most important, is to increase efficiency and lower operating costs. The second is the increased power reliability that many customers believe that these systems will provide. The SCG strategy is to develop a portfolio of DG and CHP technologies that provide customers a choice in meeting electrical and thermal needs; and compete with grid-supplied electricity with respect to cost effectiveness, efficiency, fuel flexibility, reliability, high power quality, and low emissions.
- **Advanced Generation:** SCG requests $0.759 million in TY 2012 to continue to assess strategies on how to accelerate the commercialization process with various fuel cell manufacturers and is developing a long range plan for evaluating and developing business opportunities that can provide benefits to its ratepayers. There are demonstrations set for 2010-2012 with several manufactures including Fuel Cell Energy, Plug Power, and Ceramic Fuel Cells Ltd. Other manufacturers will be closely monitored for demonstration and R&D opportunities. SCG will support work on both high and low temperature fuel cells in residential, commercial, and industrial applications. SCG plans to beta test a few small modular fuel cells at selected residential and light commercial sites. This program also includes carbon capture, transportation and sequestration. Together with the CEC, DOE and others, SCG is actively working to develop safe, reliable, and cost-effective technologies for capturing CO_2 emissions from natural gas power plants, compressors and industrial processes. Over the past several years SCG has been instrumental in developing CO_2 capture technology. CO_2 sequestration sinks are plentiful in California's oil fields where CO_2 is valuable in enhanced oil recovery operations. As described further in this testimony, safe, cost-effective CO_2 transportation is the missing link that now needs to be addressed in order to complete the carbon capture and sequestration cycle.

Clean Generation RD&D – Summary of Key Accomplishments (additional details in **Appendix B** in workpaper 2IN008.001):

Integrated Systems

- Developed and demonstrated a high-efficiency ultra-clean power and steam package that will meet distributed generation emission requirements in Southern California.
- Demonstrated several CHP packages using microturbines and absorption chillers at various customer sites in Southern California.
- Made substantial progress in the development of the next generation, 50% efficient inter-cooled-recuperated, microturbine that does not require a fuel compressor.
- Made substantial progress in the development of the next generation air-fuel ratio controller for gas engines to consistently meet CARB emission requirements.
- Continued to develop thermal chemical recuperation ("TCR") technology that reforms natural gas to produce a hydrogen rich gas that can then be combusted in an engine to increase engine efficiency by 10% and reduce NOx emissions to levels required by CARB.

Advanced Generation

- Continued to be active in supporting the development and demonstration of fuel cell and hydrogen technologies.
- Continued testing Plug Power high temperature PEM 5 kW fuel cells in residential and commercial applications.
- Completed the development and testing of 2,000 scf and 10,000 scf hydrogen generators that use natural gas feedstock.
- Developed and initiated testing of oxy-fuel combustor for natural gas power plants – system designed with 100% CO_2 capture.

Clean Transportation

SCG proposes a budget in TY 2012 of $0.835 million for Clean Transportation. Sub-programs and project areas are shown in Table GAW-19.

Table GAW-19

Natural Gas Vehicle Proposed RD&D Program

Program	Sub-Programs	Project Areas	TY 2012 Expenditures
4) Clean Transportation	Infrastructure	Compression & Storage	$220,000
	Systems & Components	Engines & Applications	$615,000
		Fuel Composition & Blending Applications	

The objective of the NGV RD&D Program is to develop safe, reliable, and cost-effective NGV's and related refueling station technologies, consistent with the requirements outlined in Public Utilities Code 740.3 and 740.8 and AB 118 mandating the development and demonstration of alternative fuels technologies and products. SCG's NGV RD&D is focused on advancing the development and demonstration of natural gas powered vehicles and related refueling station technologies. NGV RD&D has played a key role in the development of the NGV market in Southern California. However, technology challenges remain and RD&D is still needed to support this important emerging market.

SCG requests that the Commission revise its policy set in D.95-11-035 which restricted the utilities' ability to use RD&D funds to conduct research on NGV engines. Recent regulatory changes and developments in the marketplace necessitate such a policy revision. For instance, in 2006, state legislation updated the ratepayer interest test criteria in Public Utilities Code § 740.8 in order to recognize changes in state policy that have occurred since 1995 including the adoption of AB 32 which seeks to reduce green house gases in California and the Governor's Executive Order S-01-07 which seeks to reduce the carbon intensity of transportation fuels in California. Further, recent stringent EPA, CARB, and SCAQMD emission standards for NGV's have forced engine and vehicle developers to meet tight new air quality standards which require average vehicle emission targets to be significantly reduced from 1.2 g/bhp-hr of NOx in 2007 to 0.2 g/bhp-hr in 2010. Additional zero emission targets are now being considered for new transit and heavy duty vehicles. SCG submits that the application of these funds in the manner requested falls within the revised state objective of providing SCG customers safe, reliable and environmentally clean NGV's. Similar to electricity, natural gas helps achieve U.S. energy independence, and makes an attractive and strategically important vehicle fuel due to its abundant domestic and international supply, stable prices, relatively

clean features, and readily available storage and fueling infrastructure. Specifically, SCG requests that the Commission allow a portion of its NGV RD&D funds for engine development, in addition to testing and demonstration in order to determine endurance, efficiency, emissions and reliability associated with the operation of low emission engines in natural gas vehicles. It should be noted that the bulk of work in developing natural gas engines will be left to manufacturers. SCG simply plans to supplement these efforts and help with engine certification and testing.

In addition, the reliability and cost-effectiveness of NGV's and its refueling infrastructure need to be improved in order to achieve greater market acceptance. There are over 20,000 compressed natural gas ("CNG") vehicles in operation throughout Southern California. SCG is working to understand and improve the capacity and reliability of compressor systems, improve the reliability and cost effectiveness of station dispensing systems, demonstrate advanced engine and engine components, improve fuel storage systems, and evaluate technology options to properly blend or condition fuel where pipeline gas does not meet the CARB CNG fuel specification.

SCG's Clean Transportation program includes two sub-programs: Infrastructure and System & Components.

- **Infrastructure:** SCG requests $0.220 million in TY 2012 to develop and demonstrate safe, reliable and cost-effective CNG refueling and storage systems for all types of vehicles. Projects include developing more accurate CNG station dispensing technologies, developing sophisticated CNG cylinder inspection techniques to prolong the life of CNG cylinders and ensure safe usage, developing advanced CNG storage cylinders to increase capacity and/or reduce weight and bulk associated with current cylinders, and demonstrating NGV home refueling systems.
- **Systems & Components:** SCG requests $0.615 million to demonstrate advanced CNG engines that meet stringent Environmental Protection Agency ("EPA"), CARB, and SCAQMD engine emission or fuel standards for the 2010-2016 timeframe and beyond. Additional projects include: developing and demonstrating retrofit options for existing, "legacy fleet," CNG engines to permit operation over the range of natural gas compositions permitted under SCG Rule 30; testing and demonstrating safe, reliable and cost-effective hydrogen and hydrogen-CNG blend engine and refueling station technologies; and testing and demonstrating safe, reliable and cost effective operation

of various NGV vehicles using natural gas over a range of BTU content and Wobbe Index Value.

Clean Transportation RD&D – Summary of Key Accomplishments (additional details in **Appendix B** in 2IN008.001):

Infrastructure

- Conducted extensive testing and evaluation on the effects of varying the natural gas fuel composition on existing "legacy fleet" engines – testing driven by potential changes in natural gas quality standards.
- Demonstrated CNG home refueling system for NGV's – tested six Phill home refueling compressor systems.

Systems & Components

- Conducted field demonstration of new low emission Cummins ISL G engine with selected transit bus and refuse collection fleets.
- Initiated the demonstration of four CNG fuel powered Class 8 drayage trucks at the Los Angeles Port to help the Port meet lower emission targets.
- Demonstrated repowering of two International DT466 diesel engines to natural gas to met CARB 2007 emission levels of 0.8 g/bhp-hr NOx.

Solar-Thermal & Bioenergy

SCG proposes a budget in TY 2012 of $2.805 million for Solar-Thermal & Bioenergy. Sub-programs and project areas are listed in Table GAW-20.

Table GAW-20

Renewable Energy Proposed RD&D Program

Program	Sub-Programs	Project Areas	TY 2012 Expenditures
5) Solar-Thermal & Bioenergy	Solar Thermal	Solar Thermal	$750,000
	Bioenergy	Biogas Conditioning	$2,055,000
		Pyrolysis & Gasification	
		Bioenergy Integration	

SCG's Solar-Thermal & Bioenergy program includes two sub-programs: Solar Thermal and Bioenergy

- **Solar Thermal:** SCG requests $0.750 million in TY 2012 to accelerate the commercialization of breakthrough solar thermal technologies. Renewable energy plays an increasing role to promote innovative technologies to spur job development, economic growth and reduce greenhouse gases. California leads the nation in the development of solar technology, yet efficiency and cost obstacles remain that hinder the growth of this important renewable resource.

The SCG Solar Thermal RD&D Program is formulated in response to the State of California mandates to achieve 33% renewable by 2020 for electric generation and the 8-year CSI Solar Thermal Program for reducing the statewide natural gas consumption. One of the most expedient approaches to meet both goals is to advance solar thermal air conditioning ("a/c") technologies with distributed commercial solar installations. Air conditioning with solar heated hot water can greatly lower the on-peak electric demand during the cooling seasons, and the solar heated hot water can reduce gas consumption during the heating season.

Specific objectives include: SCG plans to demonstrate the world's leading solar technologies; develop solar-assisted natural gas powered domestic hot water solutions and commission prototypes that are attractive and affordable to homeowners, and commercial and industrial users; test and evaluate innovative concentrating solar power collector technology for hot water and space conditioning applications; the technologies are expected to lower installed costs, and validating and showcasing these innovative advanced technologies and thereby accelerating their commercialization to the benefit of our customers and the region; and information gained from these projects will be used to evaluate technical and economic viability for these renewable solar technologies. Technically, the performance, reliability and installation issues will be evaluated. Economically, we will be considering capital costs, operating cost savings, tax consequences, impact from state, local and federal incentives, and implications of third party financing.

- **Bioenergy:** SCG requests $2.055 million in TY 2012 for the bioenergy program, which was created to make biological energy resources widely available and cost-effective in California. This goal is consistent with California's broader goal of deriving 33% of its energy from renewable sources by 2020.

  Executive Order S-06-06 specifically calls for increasing the production and use of bioenergy fuels made from renewable resources to a minimum of 20 percent within California by 2010, 40 percent by 2020, and 75 percent by 2050. Regarding the use of

biomass for electricity production, the state must meet a 20 percent target within the established state goals for renewable generation for 2010 and 2012.

Bioenergy opportunities fall into three primary categories: 1) Anaerobic digestion and biogas recovery, upgrading, measurement, monitoring and control; 2) Pyrolysis, gasification and methanization; and 3) Utility integration of bioenergy resources. SCG proposes conducting an RD&D project in each of these areas.

Anaerobic digestion uses microbes to consume wet biomass. The microbes in turn separate methane and carbon dioxide through their metabolic processes. Digester economics in terms of capital expenses per MMBtu flatten out at about 0.7 to 1.0 million gallon tanks capable of handling about 100,000 to 150,000 tons of solid waste per year. Potential feed stocks include waste water treatment plant effluent, food waste, manure, grease, agricultural and food processing and algae.

The technology challenge is to cost-effectively separate and upgrade raw digester gas to meet quality standards for injection into the natural gas distribution grid. Currently, all of the biogas resource in California is being combusted on-site to produce heat or electricity, or it is flared. Essentially none of our biogas resource is being injected into the natural gas distribution grid. This utility-based biogas RD&D program is necessary to address key biogas technology gaps: (1) Optimizing anaerobic digestion processes to produce as much biomethane as possible. This will improve project economics and minimize the amount digester sludge sent to landfills. (2) Maximizing the amount of biomethane recovered from raw digester gas. This will improve project economics and minimize the need to flare biomethane. (3) Reducing the cost of biomethane recovery and upgrading to meet pipeline quality standards. This will improve project economics and enable biogas recovery at small digesters. (4) Safely, reliably and cost-effectively measuring, monitoring and controlling biomethane production and pipeline injection. This is an essential prerequisite for a sustainable biogas industry.

Pyrolysis and gasification are processes that convert carbonaceous materials, such as coal, petroleum, or biomass, into a synthesis gas comprised primarily of carbon monoxide and hydrogen. Pyrolysis and gasification react the raw material at high temperatures with a controlled amount of oxygen and/or steam. Traditional high-energy fuels such as petroleum coke and coal are standard gasification feed stocks. However,

pyrolysis and gasification are also very effective means for extracting energy from a variety of renewable organic materials, including municipal solid waste, forest waste, water treatment plant effluent, food waste, manure, grease, and algae. Additionally, gasifying mixtures of biomass coal or petcoke can secure beneficial attributes of both feed stock types. Currently, there are no commercial biomass gasification systems operating in California or North America.

The gross biomass resource in California, were it all to be used for power generation, would be sufficient to generate 35,000 GWh of electrical energy or roughly 12% of the current statewide demand of 283,000 GWh[68]. Converting the 35,000 GWh of electricity to the amount of natural gas required to generate that electricity yields a total of about 300 Bcf of natural gas, nearly equal to SCG' annual Core Portfolio volume.

To be effectively utilized, biomass gasification systems must be integrated with utility operations. Syngas from biomass gasification may be combusted directly in utility steam/electric generators or used to produce various other fuels used by utilities such as methanol, hydrogen, diesel and methane. Methanation and conditioning of syngas to pipeline quality standards provides flexibility on how and where it is ultimately sold and consumed by utilities and their customers. SCG biomass pyrolysis, gasification and methanation RD&D is required to bring the initial biomass gasification and methanation systems on-line in Southern California.

Utility operations generate large quantities of byproducts that can be recycled into the bioenergy resource production cycle. For example, CO_2, waste heat and water from power plants can be recycled and used to stimulate plant growth in greenhouse operations and algae ponds. Currently, these significant resources are being wasted.

Today, biogas upgrading for pipeline injection; biomass pyrolysis, gasification and methanization; and, utility integration with bioenergy resources are essentially nonexistent in California and North America. To achieve our renewable energy goals, utility-based bioenergy RD&D programs, as proposed herein, must be funded and nurtured.

[68] CEC Biomass Resource Assessment in California, April 2005, Page 26 (Report prepared by California Biomass Collaborative).

Solar-Thermal & Bioenergy RD&D – Summary of Key Accomplishments (additional details in **Appendix B** in workpaper 2IN008.001):

Solar Thermal

- Demonstrating two types of concentrated solar collectors that produce hot water for domestic, space heating and cooling applications for commercial buildings.
- Initiated demonstration of solar and natural gas powered domestic hot water solution and commissioned a prototype that is attractive and affordable to homeowners.
- Initiated development and demonstration of a solar-assisted natural gas water heater for high temperature water heating needs in commercial, industrial, and agricultural applications – potential energy savings of up to 40 percent and reduced installation costs of 10-20 percent.

Bioenergy

- Developed, installed and commenced testing a 300 standard cubic foot per minute ("scfm") pressure swing adsorption biogas upgrading system at a waste water treatment plant.
- Developed a bench top, proof-of-concept of a "smart" microwave gasifier to confirm the quality and components of syngas.
- Funded a study to identify the most promising technologies and integrated systems in three areas of biogas energy recovery: 1) biomass digestion, 2) biogas conditioning, and 3) biomass gasification for power generation.

RD&D Project Management and Program Planning & Administration

SCG proposes a budget in TY 2012 of $1.55 million for Project Management, Program Planning and Administration. This budget includes $195,000 for two additional FTE's who will be responsible for managing the solar-thermal and bioenergy program area and provide additional program planning and administration.

The $1.550 million TY 2012 budget will support approximately 16.5 FTEs. A portion of this total, $1.025 million, will be used to support 12.5 FTEs completely dedicated to managing specific RD&D projects. Staff project managers directly support project development and management, and coordination and collaboration with other stakeholders. They ensure that projects pursued are high value, cost effective and are completed on time and on budget. The balance of funding, $525,000 will support 4.0 FTEs and non-project related Program Planning and Administrative costs of managing the SCG RD&D program. Program Planning and Administration covers support and ancillary activities

related to RD&D including portfolio management, project tracking, RD&D balancing account management, royalty tracking, and occasional consultant support to enhance the technology development process.

III. SHARED SERVICES

A. Introduction

The CS&I area includes shared management and staff groups that support the Natural Gas Vehicles Program, Capacity Products and Planning, Environmental Affairs, Biofuel Market Development, and Others.

- The NGV Program is a shared-service program that provides account management, customer information, education, and training services to the general public, operators of NGVs, operators of NGV refueling stations, government agencies, and others throughout the service territories of both SCG and SDG&E.
- Capacity Products' shared service elements includes both direct customer service and staff support. Capacity Products provides capacity services for gas marketers, some large nonresidential customers, and core aggregators, and manages business relationships with interconnecting pipelines at SCG and SDG&E. Capacity Products provides analytical and regulatory compliance support for intrastate transportation, storage product and Hub Services activities, and provides staff support for large electric generation, enhanced oil recovery and wholesale customers, for both SCG and SDG&E.
- The Biofuels Market Development Group provides strategic initiative support for SCG and SDG&E to advance the market development of the sustainable energy source derived from biogas applications.
- The Environmental Affairs group provides direct liaison with federal, state, and local air quality regulators for both SCG and SDG&E, with a primary focus on assisting large non-residential customers with increasingly complex air quality related compliance and regulatory issues.
- The remaining shared services costs are for shared management from Emerging Technology and the VP of Customer Solutions, supporting both SCG and SDG&E.

For shared services, the forecasted CS&I expense for TY 2012 is $6.73 million book expense reflecting a $2.213 million increase relative to 2009 base year recorded book expenses, including an

increase of $0.3 million for billed-in services from SDG&E. The TY 2012 forecast of incurred costs is $6.392 million. This reflects $1.728 million incremental incurred costs over the base year forecast for NGV and Biofuel Market Development and the 5 year average for all other shared services, which totals $4.664 million. This is a $2.059 million increase over 2009 recorded incurred costs of $4.333 million. The incremental expenses support the following activities:

- NGV - Increased customer outreach and education in response to dramatic customer growth - $0.860 million;
- Capacity Products - Increased administration support resulting from Firm Access Rights implementation. - $0.320 million, and upgrades to storage product analysis software - $0.168 million;
- Biofuel Market Development - Market assessments and feasibility studies to advance the biofuel market. - $0.120 million;
- Environmental Affairs - Expansion of air quality support activities - $0.260 million.

Table GAW-21 summarizes CS&I's O&M expenses for shared services.

Table GAW-21

O&M Shared Services
(Thousands of 2009 dollars)

CS - INFORMATION			
Categories of Management	2009 Adjusted-Recorded	TY 2012 Estimated	Change
A. NGV Program	1,220	2,028	808
B. Capacity Products & Planning	1,855	2,600	745
C. BioFuel Market Development	181	364	183
D. Environmental Affairs	151	295	144
E. Emerging Technology	64	88	24
F. VP Customer Solutions	200	209	9
G. USS Billed-in from SDG&E	846	1,146	300
Total Shared Services (Book Expense)	4,517	6,730	2,213
CS - INFORMATION			
	2009 Adjusted-Recorded	TY 2012 Estimated	Change
Incurred Costs (100% Level)			
A. NGV Program	1,396	2,256	860
B. Capacity Products & Planning	1,980	2,767	787
C. BioFuel Market Development	257	377	120
D. Environmental Affairs	209	476	267
E. Emerging Technology	121	123	2
F. VP Customer Solutions	370	393	23
Incurred Costs Sub-Total	4,333	6,392	2,059
Allocations Out To SDG&E			
A. NGV Program	175	227	52
B. Capacity Products & Planning	125	167	42
C. BioFuel Market Development	76	13	-63
D. Environmental Affairs	58	181	123
E. Emerging Technology	57	35	-22
F. VP Customer Solutions	170	184	14
Allocations Out To SDG&E SubTotal	661	807	146
Retained by SCG			
A. NGV Program	1,220	2,028	808
B. Capacity Products & Planning	1,855	2,600	745
C. BioFuel Market Development	181	364	183
D. Environmental Affairs	151	295	144
E. Emerging Technology	64	88	24
F. VP Customer Solutions	200	209	9
SCG Retained Sub-Total	3,671	5,584	1,913
Billed-In From SDG&E	846	1,146	300
SCG Book Expense	4,517	6,730	2,213

B. Discussion of Shared Services Activities

1. Natural Gas Vehicles

a. Overview

The NGV Program is a shared service program that provides account management for NGV customers, along with customer information, education, and training services to the general public, operators of NGVs, operators of NGV refueling stations, government agencies, and others throughout the service territories of both SCG and SDG&E.

For TY 2012, SCG is requesting total incurred costs of $2.256 million reflecting $0.860 million to support a dramatic increase in customers seeking utility services. As described in section I.D, TY 2012 forecast is based on 2009 base year expense plus adjustments to account for specific program growth. After shared services allocation to SDG&E, SCG forecasts a TY 2012 book expense of $2.028 million as shown in Table GAW-22 below.

Table GAW-22

O&M Shared Services
(Thousands of 2009 dollars)

A. NGV Program	2009 Adjusted-Recorded	TY 2012 Estimated	Change
Incurred Costs (100% Level)	1,396	2,256	860
Allocations Out To SDG&E	175	227	52
Retained by SCG	1,220	2,028	808
SCG Book Expense	1,220	2,028	808

b. Description of Services

NGV customers are geographically distributed throughout the service territory of both SCG and SDG&E and operate an estimated 17,200 NGVs.[69] In 2009, SCG and SDG&E served over 290 NGV refueling stations operated by NGV customers. Most of these customers own and operate both NGVs and NGV refueling stations, but some customers operate "public access" fueling stations to serve the general public and nearby fleets. NGV customers vary significantly in terms of the number and type of NGVs operated, including transit buses, school buses, waste haulers, street sweepers, airport fleets (taxis, shuttles), goods movement fleets, and commuter vehicles.

[69] Estimate based on information contained in two reports: Gas Technology Institute, "Light-Duty CNG Vehicle Fuel Composition Study", Project Number 20245, April 2006 and SCG/SDG&E report, "2008 Southern California Heavy-Duty CNG Vehicle Report", March 30, 2009

As described in Section II. B, 3. b. above, SCG and SDG&E provide individualized account management services using specialized, NGV ARs that assist customers in identifying, developing and implementing NGV transportation solutions and process improvements. The type of service and information required by NGV customers varies widely. A list of the NGV-related information typically provided to customers by NGV ARs is summarized in Table GAW-23:

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Table GAW-23

NGV Information

Category	Description
Utility Service	Requests for gas service, explanation of utility tariffs and rules, gas quality and supply, timing for installation of utility interconnection facilities, calculation of line extension allowances, nearest available high pressure service options.
Rules & Regulations	CARB fleet rules, South Coast Air Quality Management District ("SCAQMD") fleet rules, regulatory compliance dates, regulatory applicability to customer, regulatory alternatives, High Occupancy Vehicle ("HOV") lane access, Energy Policy Act of 1992 ("EPACT") regulations, CARB compressed natural gas ("CNG") fuel specification regulations, state and federal tax credits
Infrastructure	Production of CNG fuel, determination of compressor size for a fleet application, space requirements for compressor systems, fuel storage requirements, noise level issues, equipment sizing for specific fleet fuel requirements, CNG station costs, design issues, permit requirements, construction issues, gas quality and need for dryers, dispensers for fast-fill (need for 3,600 pounds per square inch ("psi") or 3,000 psi), cost to add public access, option of fast-fill or time-fill, difference between liquefied natural gas ("LNG") and CNG, fuel cards to access network stations, card readers, billing, fuel metering, meter calibration, fueling network and providers, CNG fuel station maps.
Safety	Tank safety, pressure relief devices, facilities modifications for maintenance, cylinder inspection, gas detection, emergency shut-off device, training on safe fueling, dispenser nozzle standards (NGV1 and NGV2), CNG and LNG station standards.
Public Access Stations	Dispensers required, pressure offerings (3,000 psi or 3,600 psi), card reader access, billing card management, other billing issues, location of other public access stations, CNG fuel station map listing, training to use public

	access, emergency shutdown requirements.
Economics	Price history of natural gas, compressed vs. uncompressed prices, economics of owning station, fuel tax exemptions, taxes applied to CNG and LNG fuel, applicability of utility users tax
Emissions	Emissions of NGVs vs. other vehicles (diesel, gasoline, etc.), emission reductions achieved by converting an application to natural gas, emissions trading, emission ratings for specific products
Funding	Sources of funding and dollars available, timing and availability of requests for proposals, timing of program opportunities, availability of station grants, vehicle incentive funding, tax credits.
Light-duty Product	Original Equipment Manufacturers ("OEMs") with natural gas products, models available, engine size, horsepower, fuel economy, fuel capacity/range, differential price of vehicle, fuel tank pressure offered, location of fuel tanks, safety, viability of conversions, durability, reliability, new product introduction.
Heavy-duty Product	OEMs with natural gas products, availability in CNG/LNG, chassis options, engine options, engine specifications, transmission options, fuel capacity options, payload capacity of vehicle with fuel, fuel tank placement, fuel capacity expansion options, type of tanks, weight of tanks, location of tanks, tank safety given location, dual-fuel engine availability, durability, reliability, new product introduction, re-power options, products in development/testing with manufacturers, timing of new product availability

c. Explanation of Key Changes

Key cost drivers for the NGV Program include the following:

- Increasing numbers of customers that operate NGVs and/or NGV refueling stations requiring information, education and training;
- Increasing numbers of and changes to government legislation, regulations and programs impacting customers that operate natural gas vehicles and/or natural gas vehicle refueling stations; and

- Increasing numbers of and changes to the range of third-party products and services offered to customers that operate NGVs and/or NGV refueling stations.

Over the past ten years, the use of natural gas as a vehicle fuel by customers that operate NGVs and/or NGV refueling stations has grown at an average annual rate of 14.8% in the combined service territories of SCG and SDG&E. In the future, the CEC/CARB AB 1007 Natural Gas Scenario forecasted statewide use of natural gas as vehicle fuel at growth rates ranging from 6.4% to 14.6% through 2022, dependent upon the level of enhanced activity from utilities, government and private industry necessary to help the state satisfy petroleum reduction goals, GHG emissions reduction targets, and achievement of low-carbon fuel standard goals.[70] Using the "moderate" growth rate scenario developed by CEC/CARB (equivalent to a growth rate of 12.9%), the use of natural gas as a vehicle fuel by customers that operate NGVs and/or NGV refueling stations in Southern California will grow from 106.2 million therms in 2009 to 220.3 million therms in 2015, an increase of almost 108%.

Federal and state legislation and regulation continue to emphasize the use of alternate transportation fuels, including natural gas, to improve air quality and reduce GHG emissions. An illustrative example is the CARB Low Carbon Fuel Standard, which mandates a 10% reduction in the carbon intensity of transportation fuels used in California by 2020.[71] Natural gas, when used as a motor vehicle fuel, has a carbon intensity that is 28% less than traditional petroleum based fuels, such as gasoline and diesel.[72] Legislation and regulation present opportunities to customers, such as tax credits or grants, as well as requirements, such as compliance dates for the use of low carbon fuels or low emission vehicles. The need for customer information and education programs related to legislation and regulation will increase over time as additional regulation and legislation is introduced, current regulation and legislation changes, and the number of customers continues to grow.

New and updated third-party products and services continue to be offered to customers that operate NGVs and/or NGV refueling stations. Examples include the recent development and commercialization of natural gas powered trucks from major vehicle OEMs (Freightliner, Kenworth, Peterbilt, and others), new modular refueling station products from Galileo USA, and the purchase and pending re-introduction of the Fuelmaker Phill home refueling appliance by Fuel Systems Solutions. New products and services present opportunities for customers to lower costs, increase reliability, and

[70] CEC/CARB Presentation "AB 1007 State Plan To Increase Alternative Fuels Use – Natural Gas Scenario", May 31, 2007.
[71] CARB, "Low Carbon Fuel Standard Final Regulation Order", April 15, 2010
[72] CARB, "Low Carbon Fuel Standard Lookup Tables".

enhance the safety of their vehicle-related operations. The need for customer information and education programs related to new products and service will increase over time as additional products and services are introduced, current products and services are revised, and the number of customers continues to grow.

Over the past ten years, the amount of natural gas provided to NGV customers increased by 297% and the number of customers on the G-NGV tariff increased by 112%. However, from 1995 to 2008 when the NGV program was refundable, NGV Program authorized funding remained static at $1.55 million. In 2009, NGV incurred spending was $1.396 million. The utility has responded to customer growth by increasingly focusing efforts on assisting customer requests for services and less on customer outreach. In order to address this dramatic increase in the number of customers, the demand for utility services, and the need for increased customer outreach, for TY 2012, the NGV Program proposes to increase incurred funding by $0.860 million above base year spending. The incremental funding includes $0.432 million in labor costs, and $0.428 million in non-labor costs. The labor costs would be used to increase the number of NGV AR's from 4 FTEs to 7 FTEs and increase the number of NGV staff from 2 FTEs to 4 FTEs. Non-labor costs would be used for additional customer training courses and market outreach activities including industry event and trade organization participation, and market research. These market outreach activities focus on cost-effectively identifying and interacting with current and potential customers, vendors and suppliers.

d. Description of Allocations:

For 2009, the allocation percentage is estimated proportionally using meter counts for each utility. Meter count is a good proxy for the relative amount of resources required to provide customer information, education, and training programs. For TY 2012, the allocation percentage will be 89.7% to SCG and 10.3% to SDG&E based proportionally on meter counts for each utility.

2. Capacity Products and Planning

a. Overview

This organization provides staff support for both SCG and SDG&E on customer and policy issues related to activities in Capacity Services, Pipeline and Storage, and service to electric generation, enhanced oil recovery, and wholesale customers. The shared services activities for Capacity Products are incurred at SCG, with approximately 6% allocated out to SDG&E, and zero billed-in expense from SDG&E to SCG. The four shared services groups are:

- **Capacity Products and Planning**
- **Pipeline Support**

- **Capacity Support**
- **Pipeline and Storage Strategy**

For TY 2012, SCG is requesting a total book expense of $2.600 million for Capacity Products shared services after allocation to SDG&E, as shown in Table GAW-24. As described in section I.D, the forecast is based on a 5 year average cost, with an incremental request of $0.488 million incurred funding as shown in Table GAW-25, for the following:

- **Increased** administration support for Firm Access Rights implementation - $0.320 million.
- **Upgrade** of storage product analysis software - $0.168 million.

Table GAW-24

O&M Shared Services
(Thousands of 2009 dollars)

B. Capacity Products & Planning	2009 Adjusted-Recorded	TY 2012 Estimated	Change
Incurred Costs (100% Level)			
1. Capacity Products and Planning (2200-0246)	250	327	77
2. Pipeline Support (2200-0248)	693	697	4
3. Capacity Support (2200-0328)	505	993	488
4. Pipeline and Storage Strategy (2200-0330)	532	750	218
Incurred Costs Sub-Total	1,980	2,767	787
Allocations Out To SDG&E			
1. Capacity Products and Planning (2200-0246)	13	16	3
2. Pipeline Support (2200-0248)	35	14	-21
3. Capacity Support (2200-0328)	50	99	49
4. Pipeline and Storage Strategy (2200-0330)	27	38	11
Allocations Out To SDG&E SubTotal	125	167	42
Retained by SCG			
1. Capacity Products and Planning (2200-0246)	237	311	74
2. Pipeline Support (2200-0248)	658	683	25
3. Capacity Support (2200-0328)	455	894	439
4. Pipeline and Storage Strategy (2200-0330)	505	712	207
SCG Retained Sub-Total	1,855	2,600	745
SCG Book Expense	1,855	2,600	745

Table GAW-25

O&M Shared Services
(Thousands of 2009 dollars)

Capacity Products and Planning Cost Centers	2009 Adjusted-Recorded	5 year Average	TY 2012 Estimated	Change from 5 Year Average
Incurred Costs (100% Level)	1980	2279	2767	488

b. Description of Services

The shared groups in Capacity Products provide staff support for large electric generation, enhanced oil recovery, wholesale customer and gas producer account management, capacity services and regulatory compliance and support related to intrastate pipeline transmission and storage services.

Capacity Products and Planning

Capacity Products and Planning (2200-0246) tracks management and supervision costs of shared and non-shared services within Capacity Products organization along with associated non-labor expenses.

Pipeline Support

Pipeline Support works behind the scenes to support the needs of customers, producer access, regulatory agencies and Capacity Products ARs. Pipeline Support provides analysis, customer needs assessments, and consistent, accurate customer communication materials. Pipeline Support works with other utility departments to facilitate safe and consistent service to Capacity Products customers in accordance with Commission tariff rules and regulations. Examples of Pipeline Support activities include, but are not limited to:

- Creating Communication , training and safety materials: Pipeline Support develops letters, forms and instructions, analysis tools and bill inserts for ARs and Capacity Products customers in order to effectively communicate and implement tariff rate changes, regulatory changes, and safety advisories orders by the Commission, in collaboration with Customer Communications.
- Contract analysis, and negotiations: Pipeline Support completes competitive assessments for customers and prospective customers requesting special contracts to compete with alternative pipeline service or alternate fuels. Pipeline Support develops negotiating guidelines and contract terms and conditions, gains management approval

for negotiated contracts, develops testimony and supporting documentation to gain Commission approval of the negotiated contracts, and develops and implements internal procedures and controls for contract management and regulatory compliance.

- Analysis: Expert analysis of economics to help Capacity Products ARs work with their customers to select the utility rates and services that best suit their facility needs. Pipeline Support maintains a bill estimator tool allowing ARs to educate customers of their rate options and the costs associated with each service. Pipeline Support also works with Gas Engineering, Accounting and ARs to implement tariff line extension allowances, and works with ARs, customers and Engineering to resolve customer questions regarding gas measurement.
- Financial and information controls and tariff compliance: Pipeline Support develops and manages procedures and tools to ensure that all activities undertaken to support Capacity Products customers comply with all financial and customer confidentiality policies in addition to complying with all applicable Commission decisions, resolutions, and tariff rates and rules. Examples include: Sarbanes-Oxley Act, Affiliate Transaction rules, Confidentiality Agreement policy, records retention policy, and audit procedures. Pipeline Support also works with Commercial/Industrial/Government staff and Gas Transmission Planning to track available capacity, assign firm capacity for new customers and to identify transmission areas that are potentially capacity constrained.
- Regulatory filings and response: Pipeline Support must stay abreast of impending regulations and tariff changes and provide the education and training material to support the rollout of new programs. Regulatory compliance and support includes technical contributions to major proceedings, advice letters, compliance filings, data requests, applications, market forecasts, and the preparation and submission of reports to regulatory agencies. All of these activities either directly or indirectly affect Capacity Products customers by setting or affecting customer rates, customer programs, and customer regulatory compliance, either individually or for specific customer classes. Examples include, but are not limited to:

  Major regulatory proceedings – The cost allocation proceedings, Firm Access Rights Update, Line Extension Proceedings, GRC and the California Producer Access proceeding. These proceedings normally have numerous phases and occur over many

months or years. They require gathering and analyzing customer and cost data, performing impact analysis for all stakeholders, establishing policies and procedures to be proposed, preparing testimony and exhibits, preparing rebuttal to parties with opposing views, responding to data requests, participating in hearings before the Commission, settlement meetings, and attending Commission workshops.

Advice letters and applications – Periodic changes in regulatory, legislative or market conditions necessitate the support for regular filings of advice letters or applications.

Regulatory reporting – Reports that are periodically required by regulatory agencies, such as the Commission, California CEC, air quality management districts, Energy Information Agency, and Federal Energy Regulatory Commission. Pipeline Support provides data analysis and presentation, work papers, and responses to follow-up inquiries. A notable example is the biennial California Gas Report and its annual updates.

Legislative initiatives – Pipeline Support responds to data requests and provides input into the development of policies and procedures needed to implement major legislative initiatives that will impact Capacity Products customers. Examples include: AB 32, and AB1613, Waste Heat and Carbon Emissions Reduction Act.

Capacity Support

Capacity Support is responsible for the development and administration of pipeline capacity products that provide customers access to upstream pipelines, California in-state gas production, underground storage, and the corresponding natural gas supplies on both the SDG&E and SCG systems. Activities include:

- Establishing policies and procedures for scheduling and nominations on the SCG system.
- Managing the sale of receipt point access capacity to 71 marketers and large business customers through the open season process and through SCG's secondary market on the SCG Electronic Bulletin Board ("EBB").
- Managing the SCG Contracted Marketer program with 26 marketers serving 851 noncore customers to ensure a high level of service to meet the needs of both the marketers and our customers.

- Managing the SCG Core Aggregation programs with 13 Energy Service Providers ("ESPs") serving approximately 18,000 core customers to ensure a high level of service to meet both the needs of the ESPs and our customers.
- Managing the EBB, including user access rights, informational posting, security, training, and EBB agreements.
- Administer EBB Agreements with the major pipelines, producers, marketers, agents, and liquefied natural gas ("LNG") project developers interconnecting with the SCG pipeline system.
- Negotiating and managing all aspects of interconnect and operational balancing agreements with upstream pipelines that deliver natural gas into the SCG system.
- Establishing primary contact and negotiations with new pipeline suppliers and new gas supply project developers related to facility studies, development of interconnections and take-away capacity enhancements.
- Participate in North American Energy Standards Board ("NAESB") activities at the committee level on behalf of SCG where industry standards are developed; and in regulatory matters that relate to the interconnecting pipelines and that affect operations.
- Provide back office support for the administration of Storage Products and Hub Services including scheduling and invoicing support.

Failure to provide these services could result in SCG being in violation of applicable Rules, Tariffs, and Remedial Measures, Affiliate Transactions Rules and the Sarbanes-Oxley Act; impacting regulatory filings; and exposing SCG to potential penalties resulting from non-compliance with reporting requirements.

Pipeline and Storage Strategy

Pipeline and Storage Strategy supports Capacity Products by monitoring energy markets, recommending changes to capacity and storage market activities in response to energy market developments, developing pricing guidelines for storage and hub products offered via the California Energy Hub, and monitoring the financial performance of California Energy Hub product offerings.

Pipeline and Storage Strategy provides analytical staff support to the non-shared services groups, Storage and Hub Services, and Capacity Support. They develop and run storage valuation tools to set pricing guidelines for various short-term and long-term unbundled storage products. Pipeline and Storage Strategy works with Gas Operations to set volume guidelines for various short-

term and long-term unbundled storage and Hub products. Pipeline and Storage Strategy provide the regulatory support and witnesses in regulatory proceedings dealing with balancing and unbundled storage products. Pipeline and Storage Strategy also drafts the tariffs associated with these products. They provide analyses of long-term storage investments (such as Honor Rancho and Aliso Canyon) to determine their effect on customer service and revenues. Pipeline and Storage Strategy also analyzes storage competitors throughout the Western United States to determine the impact on unbundled storage, as well as the need for new storage investments and new storage product positioning.

Pipeline and Storage Strategy staff also provides support to Capacity Support. This support involves major transmission products like Firm Access Rights , backbone transmission rights, and off-system services. Pipeline and Storage Strategy examines general market conditions to assess the value of these products. Pipeline and Storage Strategy also examines the marketing of other transmission products in the Western United States to determine their applicability to SCG's practices.

c. Explanation of key Changes

EBB Customer Support and Administration

With implementation of the Firm Access Rights and Off System Delivery decision (D.06-12-031) on October 1, 2008, SCG became responsible for the customer contact, service and administration of Receipt Point Capacity contracts, conducting open seasons for this capacity and managing the secondary market for receipt point capacity via the SCG EBB system. Implementation resulted in the administration of approximately 300 new agreements in effect as of July 2010, with gas marketers, financial institutions and large customers that were not in existence prior to Firm Access Rights implementation.

Commission decision D.07-12-019 (Omnibus Order) authorized adoption of changes to the operation of the SDG&E/SCG system and to selected service offerings. The changes included a range of revisions to the natural gas operations and service offerings of SCG and SDG&E relating to core operations, unbundled storage, and provisions for expansion of storage capacity.

Costs for Omnibus-related activities were authorized by D.07-12-019. The Order specifically states:

> SCG and SDG&E are hereby authorized to recover from customers the reasonable costs of establishing and maintaining new postings on the EBB, a secondary market for storage rights, a new fifth nomination cycle, new optional enhanced balancing services, and system expansion studies (plus any related third-party review). (O.P. No. 30)

For TY 2012, SCG requests an incremental $0.300 million in labor costs reflecting 3 FTE's to support the additional administration requirements and customer support requirements created by the Firm Access Rights decision and the Omnibus Order. SCG plans to fill these positions with 2 FTE's who were assigned to the capital projects related to the underlying information system requirements of implementing the two decisions until August 2009, and one additional FTE.

In addition, SCG requests an additional $0.188 million in non-labor costs for an upgrade of its storage valuation software, at a cost of $0.168 million, and $20,000 in employee expenses associated with the additional FTE's. In order to effectively price storage services provided to off system customers, SCG needs to enhance its analytic capability to consider wheeling/locational cost differentials in addition to time differentials and to have it installed on two computers.

d. Description of Allocations:

For 2009, the allocation percentage is estimated proportionally based on relative total gas volume transported for each utility. The relative gas throughput is the best available proxy of resource allocation for providing policy and customer support between SCG and SDG&E for this organization. The allocation percentage will remain unchanged in TY 2012 as follow:

- Cost Center 2200-0246: 95% to SCG and 5% to SDG&E
- Cost Center 2200-0248: 98% to SCG and 2% to SDG&E
- Cost Center 2200-0328: 90% to SCG and 10% to SDG&E
- Cost Center 2200-0330: 95% to SCG and 5% to SDG&E

3. Biofuel Market Development

a. Overview

The Biofuel Market Development team was recently formed for the purpose of dedicating resources to promoting and developing the biogas markets. The primary focus is in promoting and supporting the installation of biogas conditioning systems at certain customer sites for the purpose of capturing 'raw biogas' and converting it to pipeline quality biogas (biomethane). Biogas is currently a largely untapped source of sustainable energy. Because of its expertise and corporate values, SCG is in a unique position to advance this biogas market development effort and is positioned to play a leadership role in advancing the use of biogas while supporting the objectives of both AB 32 and Executive Order S.06-06 to reduce GHG emissions and provide California and its ratepayers with the environmental benefit of production of useful energy from organic waste.

For TY 2012, SCG is requesting a total incurred costs of $0.377 million to support market assessments and engineering studies. As described in Section I.D, this reflects an incremental request

of $0.120 million incurred cost over base year 2009 adjusted-recorded cost of $0.257 million. As shown in Table GAW-26 below, SCG forecasts a book expense of $0.364 million for TY 2012 after shared services allocation to SDG&E.

Table GAW-26

O&M Shared Services

(Thousands of 2009 dollars)

C. Biofuel Market Development	2009 Adjusted-Recorded	TY 2012 Estimated	Change
Incurred Costs (100% Level)	257	377	120
Allocations Out To SDG&E	76	13	-63
Retained by SCG	181	364	183
SCG Book Expense	181	364	183

b. Description of Services

This group was established in early 2008 for the purpose of identifying new products and services. The focus for this organization has evolved and is now focuses entirely on biogas market development. The two FTEs research and identify opportunities in various industries most suitable for installation of biogas conditioning systems as commercial projects that feature technologies important to market advancement. In addition, industry experts and engineering firms are utilized as needed to conduct general market assessment studies to prioritize market opportunities and to conduct engineering studies to evaluate various technological options.

c. Explanation of Key Changes

For TY 2012, the forecast for the labor costs for this cost center is unchanged from the 2009 base year. SCG requests to increase non-labor expenses by $0.120 million due to incremental costs required for additional market assessment and engineering studies. Cultivating an untapped market requires the pursuance of various leads broken down by market sector and technology application. As a result, multiple market assessment studies and feasibility studies are needed which determines the viability of further action. These market assessment and engineering studies are for the purpose of advancing commercial biofuel projects and are different than those conducted for biofuel projects funded in the SCG RD&D refundable program. In general, RD&D funded biofuel projects are pilot or demonstration projects primarily for proof of concept and technology.

d. Description of Allocations

For the base year, allocation for this cost center was 70% SCG and 30% SDG&E. For TY 2012, the allocation is revised to 95% SCG and 5% SDG&E. The revised allocation is based on an estimate of potential benefits to each utility. During this GRC period, SCG will be the primary beneficiary of this biogas market development effort based on near term potential opportunities identified.

4. Environmental Affairs

a. Overview

This organization's primary focus is to assist large nonresidential customers with increasingly complex air quality related compliance and regulatory issues. The group also provides similar support with respect to both SCG and SDG&E facilities to allow for cost effective operation and maintain compliance given the establishment of stricter emissions control requirements.

For TY 2012, SCG is requesting total incurred costs of $0.476 million. Environmental Affairs' costs are forecast using a 5 year average, as described in Section I. D. The TY 2012 request includes a $0.260 million increase over the 5 year average to expand air quality support activities in response to stricter and more numerous air quality regulations from local, regional, state, and federal agencies. As shown in Table GAW-27 below, SCG forecasts a book expense of $0.295 million for TY 2012 after shared services allocation to SDG&E. Table GAW-28 compares 100% incurred costs for TY 2012 forecasts with 5 Year Average.

Table GAW-27

O&M Shared Services
(Thousands of 2009 dollars)

D. Environmental Affairs	2009 Adjusted-Recorded	TY 2012 Estimated	Change
Incurred Costs (100% Level)	209	476	267
Allocations Out To SDG&E	58	181	123
Retained by SCG	151	295	144
SCG Book Expense	151	295	144

Table GAW-28

O&M Shared Services
(Thousands of 2009 dollars)

Environmental Affairs	2009 Adjusted-Recorded	5 year Average	TY 2012 Estimated	Change from 5 Year Average
Incurred Costs (100% Level)	209	216	476	260

b. Description of Services

Expenses in this cost center reflect the labor and non-labor costs of two FTEs consisting of Environmental Affairs Program Managers. FTEs in this organization also serve as SDG&E and SCG's liaison to federal, state, regional, and county air quality agencies. In this capacity, the program managers monitor and analyze issues to identify potential air quality regulatory and compliance impact on customers and on the utilities' ability to serve ratepayers cost effectively, and they work with air regulators to find the most cost effective way to achieve air quality goals for the attainment of health based standards. Program managers also assist nonresidential customers with air quality permitting and compliance issues, including providing permitting services for a fee through the Permit Works program.

The air quality program managers also serve as the utilities' liaison to varied external organizations, including Coalition for Clean Air, Natural Resources Defense Council, California Council on Economic and Environmental Balance, Operation Clean Air (San Joaquin Valley) and California Natural Gas Vehicle Coalition. The managers communicate with these organizations to mutually address environmental issues of concern and inform and educate the organizations about utility customer and gas operations, policies, and programs. These organizations, in turn, could serve as a conduit to provide utility customers with additional assistance through their industry membership.

c. Explanation of Key Changes

As health-based air quality standards become stricter and federal, state, regional and county air quality agencies are developing stricter emissions requirements, permitting is becoming more complex, and inspection/compliance activities are increasing. For example, recent SCAQMD amended boiler and engine rules[73] were written to achieve over 50% reduction in current NO(x)

[73] SCAQMD Staff Report Boiler Rules 1146 page 1 and 1146.1 page 1, SCAQMD Engine Rule 1110.2 Socioeconomic Report pages i-iii Executive Summary.

emission levels within the next three years, requiring businesses to modify or replace existing equipment. Furthermore, these rules also instituted a more rigorous compliance monitoring program requiring businesses to invest in more advanced monitoring systems and services. An increased level of effort will be necessary to work with the various agencies to ensure that the utilities' customers and affected facilities comply in the most cost effective and timely manner, as well as to communicate the potential scenarios that could impact service to the utilities' ratepayers.

Environmental Affairs was expanded in 2008, bringing together the additional personnel focused on air quality activities that had been housed in several different areas of the company, in order to provide focused support to deal with GHG regulation and associated opportunities, new air quality rules, and increased compliance activities for existing rules in the following key areas:

- Support for the expanding rules and regulatory arena (e.g., Rules 1147, 1138, 1111, 1146, 1110.2, RECLAIM, 433, 1160, etc.),
- Project assistance in facility modernization efforts in the area of permitting and compliance such as the ongoing SCAQMD Permit Moratorium,
- Development and production of educational materials and sponsorship of technical and compliance seminars and workshops,
- Customer support in the ongoing implementation and compliance of state and federal Climate Change Programs, and
- Support and expanding role in our advocacy efforts to promote strategic initiatives in the biomethane/biofuels renewable energy market.

These challenges continue to expand, and additional air quality challenges are anticipated in the TY 2012 GRC cycle. Therefore, the TY 2012 forecast of incurred expenses includes labor costs of $0.200 million for two additional FTEs, and $0.060 million for their associated non-labor, to expand air quality support activities. Upcoming challenges requiring additional support, in cooperation with Nonresidential Markets, include the following:

- 2011 Air Quality Management Plan ("AQMP")
- SCAQMD Rule 433.1 – Gas Quality changes due to LNG derived gas
- SCAQMD Rule 1138 - Control of Emissions from Restaurant Operations
- SCAQMD Rule 1111 - Natural Gas fired Residential Central Furnaces
- SCAQMD Rule 1147 – NOx Emissions from miscellaneous sources
- Proposed PM(2.5) Regulation - Rule analysis and health and emissions studies

- AB 32 - Climate Change Regulations
- 2012 RECLAIM amendments
- Permit Moratorium
- SCAQMD Periodic Monitoring
- Federal GHG Regulation
- SJV Agricultural Engine Study
- Biogas/Renewable Project

d. Description of Allocations

For 2009, the allocation methodology is based on the cost center manager's assessment of time spent completing specific activities and the allocation of this time between the utilities. For TY 2012, the allocation will be 62.3% to SCG and 37.7 to SDG&E based on the cost center manager's assessment of support and resource requirements by each utility.

5. Emerging Technology

a. Overview

The Emerging Technology group has shared services with both SDG&E and SCG. The group identifies future trends in energy technology and policy and proactively explores opportunities to better serve SCG's and SDG&E's customers, whose changing needs are driven by the rapid advance of technology as well as environmental awareness, regulation and policy.

For TY 2012, SCG is requesting a total incurred costs of $0.123 million based on 5 year average forecast without further adjustment. The TY 2012 forecast is also consistent with our 2009 base year spending. As shown in Table GAW-29 below, SCG forecasts a book expense of $88,000 for TY 2012 after shared services allocation to SDG&E.

Table GAW-29
O&M Shared Services
(Thousands of 2009 dollars)

E. Emerging Technology	2009 Adjusted-Recorded	TY 2012 Estimated	Change
Incurred Costs (100% Level)	121	123	2
Allocations Out To SDG&E	57	35	-22
Retained by SCG	64	88	24
SCG Book Expense	64	88	24

b. Description of Services

The Emerging Technology group assesses emerging technologies for potential new utility services and related policy drivers for applicability to SCG and SDG&E services, to ensure customers benefit from technological advances. The group is charged with evaluating cost performance characteristics of new energy technologies for potential deployment at the utilities, and identifying opportunities that are cost effective for ratepayers and environmentally sound. The group also provides technical and analytic support for SCG's and SDG&E's participation in regulatory proceedings that advance the Commission's environmental goals.

The Emerging Technology group develops conceptual projects and programs that would be needed to implement the strategic direction approved by senior management. An example is the biogas initiative, which was developed under the Emerging Technology organization before being split into its own organization. The group has also been involved in the development of proposals to meet GHG goals.

c. Explanation of Key Change

As described in section I.D, a 5 year average is used as the basis for TY 2012 forecast. The TY 2012 forecast of $88,000 book expense results in $24,000 higher than 2009 base year expenses primarily due the change in allocation percentage as further explained in Description of Allocation below. No other incremental costs are requested for this organization.

d. Description of Allocation

For 2009, Multi-Factors percentages were used for the allocation between SDG&E and SCG for this cost center. Multi-Factors allocation percentages are calculated based on weighted average of labor costs, operating revenue, operating expenses, gross plants and investment for each company. This allocation method is appropriate to allocate general shared costs proportionally to each utility. For TY 2012, the allocation methodology is based on the cost center manager's assessment of time spent completing specific activities and the allocation of this time between the utilities. For TY 2012 the allocation percentage will be at 72% to SCG and 28% to SDG&E.

6. Vice President - Customer Solutions

a. Overview

This activity includes labor and non-labor cost of the office of Vice President – Customer Solutions. For TY 2012, SCG is requesting a total incurred costs of $0.393 million based on 5 year average forecast, as described in Section I.D., without further adjustment. As shown in Table GAW-

30 below, SCG forecasts a book expense of $0.209 million for TY 2012 after shared services allocation to SDG&E.

Table GAW-30

O&M Shared Services

(Thousands of 2009 dollars)

F. VP Customer Solutions	2009 Adjusted-Recorded	TY 2012 Estimated	Change
Incurred Costs (100% Level)	370	393	23
Allocations Out To SDG&E	170	184	14
Retained by SCG	200	209	9
SCG Book Expense	200	209	9

b. Description of Services

The Customer Solutions vice-president oversees the following non-shared services for SCG:

- Customer Communications
- Nonresidential Markets excluding Capacity Products function[74]
- RD&D

The vice president is also responsible for overseeing the following shared programs and activities for both SCG and SDG&E:

- Customer Assistance[75]
- Customer Programs
- NGV Program
- Environmental Affairs
- Biofuel Market Development
- Emerging Technology

c. Explanation of Key Changes

As described in section I.D, a 5 year average is used as the basis for TY 2012 forecast. The TY 2012 forecast results in $9,000 higher book expense than the 2009 base year. No other incremental costs are requested for this organization.

[74] The Capacity Products and Planning function, one part of nonresidential markets, reports to the Vice President of Engineering and Operations Staff.
[75] The SDG&E portion of Customer Assistance and Customer Programs is covered by SDG&E Witness Kathleen Cordova, Exhibit SDGE-15.

d. Description of Allocation

For 2009, Multi-Factors percentages were used for the allocation between SDG&E and SCG for this cost center. Multi-Factors allocation percentages are calculated based on weighted average of labor costs, operating revenue, operating expenses, gross plants and investment. This allocation method is appropriate to allocate general shared costs proportionally to each utility. For TY 2012 the allocation percentage will remain at 53% to SCG and 47% to SDG&E.

7. Allocation In From SDG&E

The total TY 2012 shared services funding request of $6.730 million includes $1.146 million billed-in from SDG&E. The TY 2012 SDG&E billed-in amount is estimated to increase by $0.300 million in comparison to the base year. The increase in billed-in amount is primarily due to changes in the allocation percentages for TY 2012 based on expected activities. The billed-in amount reflects SCG's portion of the shared services costs incurred at SDG&E for activities in Emerging Technologies, Biofuel Market Development, and Environmental Affairs. SCG has reviewed these expenses and finds them reasonable for all SDG&E billed-in services.

IV. CAPITAL

A. Introduction

SCG is undertaking three capital projects to support business needs and objectives of CS&I. This section provides the business justification for these projects, while the funding requests are sponsored by other witnesses as referenced in the discussion below. Table GAW-31 summarizes the planned capital expenditures for these projects. The first project is a new program, Sustainable SoCal, to promote development of small scale biomethane production in southern California. The other two projects are information technology systems projects, modifying and upgrading existing systems to support Capacity Products and Planning activities.

Table GAW-31

Capital Expenditures*

(Thousands 2009 dollars)

Category Description	Cost Witness	Exhibit Number	2010 Estimated	2011 Estimated	2012 Estimated
1. Sustainable SoCal Program	R. Stanford	SCG-5			$11,272
2. California Producer	J. Nichols	SCG-12	$234	$474	
3. Next Generation Envoy®	J. Nichols	SCG-12		$787	$787
Total Capital:			**234**	**1,261**	**12,059**

* Capital cost estimates provided here are for reference only, these costs are forecasted and reflected in the testimonies of the SCG Witness for each project identified in this Table.

B. Capital Request Detail

1. Sustainable SoCal Program

Project Description

SCG proposes to install four biogas conditioning systems at certain customer sites for the purpose of capturing 'raw biogas' and converting it to pipeline quality biogas (biomethane). This project will advance the market development efforts associated with producing pipeline quality biogas from digester 'raw biogas' generated from small to mid size wastewater treatment plants. SCG's primary role in this project will be to design, install, own and operate biogas conditioning systems at biogas producer sites having raw gas volumes in the range of 200 to 600 standard cubic foot per minute ("scfm"). SCG plans to use a turnkey system integrator for the system installations, and will consider a variety of proven equipment vendors and technologies for this project as discussed in details in the testimony of Raymond K. Stanford, Exhibit SCG-5. All of the producer biogas will be cleaned to pipeline quality and meet the gas quality specifications as set forth in SCG Rule No. 30, Section I.

The primary objectives of this project are to:

- Encourage and promote market development of the biogas market, particularly in the small size producer segments. The cost-benefit analysis for biogas producers in the range of 200 to 600 scfm does not provide the necessary financial return for biogas producers to move forward with the installation of biogas conditioning facilities. As a result, it is more economical for the biogas producer to flare the gas.

- Support the objectives of both AB 32 and Executive Order S.06-06 in GHG emissions reduction. In addition, support local air quality by reducing emissions from flaring raw biogas.
- Reduce the GHG emissions of SCG's own operations, and be a model for creative solutions to more sustainable operations.

Project Justifications

According to data from EPA[76], the biogas market potential for waste water treatment facilities in SCG and SDG&E service territories is estimated to be approximately 20 million standard cubic feet per day ("MMscfd"), and the majority of this biogas is currently an untapped source of sustainable energy. Currently, it is challenging for small to mid size biogas producers to economically justify the implementation of gas conditioning projects. Many wastewater treatment plants have digesters as part of their treatment process, and produce biogas (also called digester gas) as a byproduct. Many capture at least some of the raw biogas produced for onsite use in some heating and cogeneration applications. However, these onsite biogas applications are also becoming less viable options due to stricter air quality and emission regulations. Any biogas not used for onsite combustion must be burned in a flare, producing emissions without productive use of the energy. The successful implementation of this project will allow the participating small to mid-size biogas producers to avoid flaring, and give local residents the benefit of cleaner air. The pipeline quality biomethane injected into SCG's gas distribution system will be used in place of natural gas that would otherwise have been consumed, creating a net reduction in emissions by avoiding the wasteful flare emissions. In addition, displacing natural gas with biomethane will eliminate GHG emissions, because biomethane is a carbon neutral fuel. The project will act as a reference framework and model across the SCG service territory to capture and utilize sources of biogas, and will support several important State goals:

- Meets the objectives of AB 32 by providing California and its ratepayers with the significant environmental and economic benefits of GHG emissions reduction
- Meets the objectives of State Executive Order S-06-06, which directs state agencies to promote in-state bioenergy production and use. S-06-06 established the instate production goals of a minimum of 20 percent of its consumed biofuels by 2010, 40 percent by 2020, and 75 percent by 2050

[76] http://www.energy.ca.gov/research/renewable/biomass/anaerobic_digestion/data.html.

- Meets the objectives of the Memorandum of Understanding (dated June 15, 2006) between the State of California and the Kingdom of Sweden where the two governments and their related industries pledged to work together to develop bioenergy with a particular emphasis on biomethane.

Utility Biofuel Production Model

SCG can leverage its long experience in natural gas processing and deep knowledge of gas processing technology to take on a leadership role to impel the biogas market forward.

SCG proposes to lease a small space (approximately 2,500 square feet) from a participating host facility to house the required gas conditioning system and pipeline interconnection facilities onsite. The biogas producer will be required to provide SCG, its employees, contractors, and agents access to the biogas facility to observe, monitor and inspect the biogas conditioning equipment. In addition, SCG will have a long term contract (10 – 15 years) to take the raw biogas from host facility at a minimal cost, and process it through the biogas conditioning system.

The output biomethane, conditioned to meet SCG gas standards, will be compressed and injected into SCG's gas pipeline system. SCG will use this gas for company facilities use and to fuel CNG fleet vehicles. As a rule of thumb, a wastewater treatment plant treating approximately 25 million gallons per day of inflow can produce over 800,000 therms of pipeline quality gas per year.[77] At this production volume, the total gas produced by the four proposed installations would cover approximately 75-80% of SCG's gas use for company facilities and fleet. In addition, starting in 2015 this volume of biomethane used in place of natural gas will result in avoided costs for GHG credits, which SCG estimates could be worth $130,000 per year.[78]

SCG proposes to recover the costs of these facilities in base rates. The avoided costs for natural gas commodity will be reflected in reduced costs for "Other Company Use Gas", allocated to all customers in base rates, and in reduced costs for GHG credits for SCG operations. SCG Witness Greg Shimansky (Exhibit SCG-34) presents SCG's proposed cost recovery mechanism for costs related to the cap and trade program, the New Environmental Regulatory Balancing Account. All customer classes thus would share in both the costs and benefits of this biomethane.

[77] Biogas production based on reported production of several regional wastewater plants close to this size, and methane content assumed to be 62%.

[78] When cap and trade is implemented for small GHG sources--expected to be in 2015. Assumes allowance cost of $30/ton CO2e. In addition, because SCG will be reducing GHG emissions before the compliance date of 2015, benefits for early action to reduce GHG emissions may be recognized under whatever mechanism is ultimately adopted to account for early action, as yet not defined.

Project Cost and Benefit Analysis

Based on the project lifecycle analysis, SCG estimates that the average cost of biogas conditioning will be approximately **$14.31/MMbtu**[79]. The primary assumptions used to develop the average cost are shown in Table GAW-32 below. After factoring in cost avoidance for gas commodity and GHG credits, SCG estimates a net lifecycle incremental cost to produce pipeline quality gas from raw biogas of **$4.31/MMbtu.**

Table GAW-32

Summary of Project Lifecycle Cost Analysis

PRIMARY ASSUMPTIONS (PER SYSTEM)

Raw Biogas Processed	300 scfm
Capacity Factor	95%
Methane Yield from Cleaning	90%
Annual Biomethane Produced	82,750 MMBtu
Annual Biomethane Production Growth Rate	2.0%
Total Direct Capital	$ 5,636,000
Total Annual Direct O&M	$ 303,000

LIFECYCLE COSTS

	$/MMbtu
Biogas Production Cost for Sustainable SoCal Program	$ 14.31
Cost Avoidance Components	
Levelized Cost of Natural Gas*	$ (8.40)
GHG Credit **	$ (1.6)
Net Incremental Cost to Produce Pipeline Quality Gas from Biogas	$ 4.31

* Levelized natural gas forecast - average of 2010 California Gas Report and 2009 MPR Model between 2012-2026.

** Assuming allowance cost of $30/ton CO_2 consistent with 2009 MPR model.

Because biogas is a renewable resource and a relatively untapped market, the biogas production cost is higher than natural gas. As shown in Table GAW-33 below, the incremental cost to produce renewable biogas compared to natural gas is approximately 43%. This premium for the renewable energy is in the lower range comparing with other renewable technologies such as PV thin film (ranges from 41% to 110% as shown in table below). As has been the case with other renewable technologies, we expect biogas production costs to decline as the market develops and matures.

[79] Assumes raw biogas methane content of 62% and electricity cost of $0.13kWh (to operate conditioning equipment)

Table GAW-33

Analysis of Biogas Premium

	Sustainable SoCal Program (Biogas)	PV Thin Film
	$/MMBTU	$/MWh
Total Production Cost	$14.31	$138 - 206*
Comparable Energy Cost**	$10.00	$98.19
Renewable Premium***	43%	41% - 110%

* Source: Renewable Energy Transmission Initiative Phase 2B Final Report, May 2010 – Figure 1-1

** Comparable Energy Cost includes cost of GHG

Natural Gas - average of 2010 California Gas Report and 2009 MPR Model between 2012-2026

Electricity Cost - 2009 Market Price Reference Model[80] assumes "Project Start Date" of 2012, "Contract Term" of 15 Years

*** Cost above comparable energy costs to generate renewable energy

SCG will gain valuable operating experience from the initial four biogas conditioning systems, and gas transaction costs will be minimized by using the relatively low volume of pipeline quality gas for company facilities use and to fuel CNG fleet vehicles. The initial four systems will act as the foundation to expand the Sustainable SoCal Program in the future.

As part of this expansion strategy, SCG will evaluate additional options to maximize economic benefits for ratepayers including selling biogas as a renewable energy for electric generation. Table GAW-33 shows a typical cost of generation range for PV thin film of $138 to $206/MWh. The Sustainable SoCal Program biogas production cost of $14.31/MMBtu, translates to a cost of electricity produced with biomethane of $132/MWH using the combined cycle heat rate in the MPR model, of 6924 Btu/kWh. Biomethane is therefore a potentially cost-effective source of renewable energy for electric generation when compared to other renewable technologies such as PV thin film. SCG will seek Commission approval prior to moving forward with expanding the Sustainable SoCal Program beyond the initial four systems, and/or selling the biomethane outside of SCG.

2. California Producer Access

On August 23, 2007, the Commission approved D.07-08-029, which adopts the terms and conditions by which natural gas produced by gas producers located in California will be granted access to the SCG transmission system. On October 4, 2007, SCG filed a Petition for Modification ("PFM") of D.07-08-029, and the Executive Director of the Commission granted SCG's request for extension to delay the advice letter filing implementing the new terms and conditions until 30 days

[80] http://www.cpuc.ca.gov/NR/rdonlyres/1406475F-6F1E-4A3F-85AF-6EA53419BA01/0/2009_MPR_Model.xls.

after the issuance of a final Commission decision on SCG's PFM. The Commission has not yet issued a final decision on the PFM, therefore, the final tariffs implementing D.07-08-029 have not been filed nor approved.

After the Commission issues its final decision on the SCG PFM on the monitoring and enforcement protocol, SoCalGas will file an Advice Letter to implement tariff provisions consistent with the decision. Changes resulting from D.07-08-029 include the following in order to accommodate the new California producer access into the SoCalGas system: non-Operational Flow Order day cumulative California producer supply balancing with a tolerance band of +70% of Interconnect Capacity, California producer supply balancing to be monitored and enforced over a rolling 7 day period, provide California producers a 14-day payback period to cure imbalances, provide for multiple California producers to continue to deliver through a single meter or split meter rules, provide California producers the ability to trade supply imbalances with other California producers, institute California producer cash-out rules for supply imbalances outside the tolerance band, apply Operational Flow Order rules to California producers with respect to supply imbalances, enhance the monthly bills provided to producers to allow for inclusion of additional information, and the overall handling of new contractual arrangements adopted by D.07-08-029. SCG will need to modify systems including SoCalGas ENVOY®[81] , Customer Contract System, and Specialized Customer Billing System. The costs to modify the systems are described in the testimony of Jeffrey C. Nichols (see Exhibit SCG-12 and associated workpapers).

3. Next Generation Envoy®

SCG provides its customers access to its electronic bulletin board ("EBB") system otherwise known as SoCalGas ENVOY® ,to facilitate communication and utility-to-customer and customer-to-customer transactions for balancing and secondary market trading. SoCalGas ENVOY® is a comprehensive gas scheduling and capacity management system designed to provide online, real-time access to a variety of gas transportation, firm transmission rights and storage rights trading, hub services, and informational postings (operational and critical). This system is mandated by the Commission and must be in compliance with Affiliate Transactions Rules and Remedial Measures. The Envoy service is governed by Rule 33 of SCG's tariffs.[82]

[81] Note the modifications to SoCalGas ENVOY® to support California Producer Access requirements are different than those to support Next Generation SoCalGas ENVOY®.
[82] See SCG Rule 33 for a comprehensive list of transaction types that SoCalGas ENVOY® is intended to facilitate. http://www.socalgas.com/regulatory/tariffs/tm2/pdf/33.pdf.

The SoCalGas ENVOY® Next Generation Project would allow customers to access up-to-date information, improved usability, and improved navigation allowing system accessibility via personal digital assistants or smart phones. It would also provide customers with the ability to access their proprietary information to develop customized bill, contract information, and purchase and rights trading reports for their own use. These additional capabilities were developed based on input from Envoy service users. Customers are seeking improvements in data querying capabilities, simplified data input for gas transactions and new ways to view information and receive and/or be alerted of the events affecting gas deliveries. Major enhancements under consideration include:

- Major Browser Support - Envoy currently only supports Internet Explorer which limits the customers' ability to use other browsers to access the application. The external homepage of Envoy does allow for other types of internet browsers for viewing such as Chrome or Firefox.
- Main Menu Navigator and Redesign - The navigation and menu should allow the user to navigate within a section such as Reports, Informational Postings and to other functional modules including:
  - Combine global navigation with context menu.
  - Allow user to select a module and specific action item with ease
  - Make navigation more intuitive and user-friendly.
  - Querying of data through filters needs to be simplified.
- Data Ledgers in the Envoy system need to be redesigned and simplified.
- Internal Landing Page Re-design.
- My Envoy - Summary views for customer contract rights and relationships should drive user to take actions. The summary view for Envoy should indicate to the user their own status and the pipeline system status along with links to processes for transactions or inquiry. Link examples include:
- Adding a Nomination
- Buying or selling storage rights
- Buying or selling firm capacity rights
- Changing nominations
- Managing Imbalance account
- Listing of a company's Envoy users and their user rights

- Providing ability to save template of My Account view
- Monthly Balancing
- Pool balancing
- Receipt Point Access Balancing
- Operational Flow Order Status
- Storage Account Balance
- Nominations
  - Confirmed volumes
  - Scheduled volumes
  - Actual meter usage
- Web Help - The online help and tutorial will need to be completely redesigned to function with new navigational functions, links, modules, homepage and commands functions. This online tutorial should be searchable for topics from any of the web pages. This online knowledge base will serve as first line of training for users of the Envoy system. The web help will also include information and instructions on all functions within the Envoy system as well business information and rules.

Refer to Jeffrey C. Nichols' testimony (Exhibit SCG-12) and associated workpaper for details on the project cost forecast.

V. CONCLUSION

CS&I provides services that are highly valued by customers, and current and planned activities will enhance customer value and advance Commission and state policy goals, particularly to develop renewable energy sources and reduce GHG emissions. CS&I proposes total funding of $41.536 million for TY 2012, an increase of $12.25 million over base year 2009 spending of $29.286 million. This reflects total incremental requests of $10.947 million, $9.219 million for non-shared services and $1.728 million for shared services, above the baseline using the adopted forecasting methodologies for CS&I functions of $30.251 million (including $25,587 million for non-shared services and $4,664 million for share services incurred costs).[83] The majority of the incremental request, $9.404 million, is

[83] For all but three functions, CS&I used a 5 year historical average to forecast baseline costs for TY 2012. The three functions using a different methodology were NGV and Biofuel Market Development, which used a base year forecast because of insufficient historical data, and RD&D, which used a zero base forecast because of the project oriented nature of their activities.

for the five categories described below, which respond to customer expectations and demands, Commission and state policies.

1. **Customer Assistance requests $2.800 million additional funding** to conduct NGAT testing required for the majority of LIEE treated homes. Under Ordering Paragraph 48 of D.08-11-031 SCG has a goal that started in 2009 to test an average of 133,426 homes per year, of which SCG projects that 90% require NGAT testing.

2. **RD&D Requests $3.000 million additional refundable funding** to expand the established and successful RD&D program at SCG to include project areas for renewable energy - biogas and biofuels, and solar thermal, along with associated project management and program administration.

3. **Communications, Research, and e-Services requests $2.264 million additional funding** to improve the usability and accessibility of SCG's website and other electronic platforms, to meet customer expectations for presence in social media, and to improve the amount, quality, and relevance of information being communicated through all the proliferating channels for communication, for instance by increasing and improving the quality of Spanish language information on the www.socalgas.com website.

4. **NGV requests $0.860 million additional funding** to expand account management services and add customer outreach and education to support the rapidly growing NGV market, and help both current and potential NGV customers understand the opportunities and requirements for NGV. These resources will support CEC and CARB goals to reduce GHG and other emissions from the transportation sector.

5. **Commercial, Industrial, and Government Services requests $0.480 million additional funding** to expand resources to support CHP and air quality support services. Both of these activities will help advance the state's ambitious goals to increase installation of efficient CHP to reduce GHG emissions. As new and more complex air quality regulations are introduced each year, customers require education and assistance to keep their operations running. CHP projects represent a key category of customer that particularly requires assistance on air quality and permitting issues.

The total request is detailed in Tables GAW-2 and GAW-3 in Section I.D.

The capital projects described in Section IV represent long term investments to support these same policies: meeting customer expectations and demands for services and electronic capabilities, and advancing the development of renewable energy. The Sustainable SoCal program will demonstrate that small scale biomethane development is feasible, and there is a renewable version of natural gas. SCG's goal is to make small scale development economically viable and easily repeatable, leveraging our expertise and building our knowledge with the projects.

The Commission should approve CS&I's TY 2012 forecast because it represents a prudent, targeted use of ratepayer funds to support services customers value and demand, and to advance state policy goals with the actions and resource commitment necessary to make substantial, lasting progress toward those goals.

This concludes my prepared direct testimony.

VI. WITNESS QUALIFICATIONS

My name is Gillian A. Wright. I am currently the Director of Commercial and Industrial Services for Southern California Gas Company ("SCG"). My responsibilities are to manage business planning, customer satisfaction, communication, regulatory support, and implementation of the energy efficiency programs for the commercial and industrial market segment. Prior to my current position I was Director of Energy Markets and Capacity Products for SCG and San Diego Gas & Electric ("SDG&E") from 2006 through 2007, and Director of Regulatory Affairs for SCG and SDG&E from 2003 to 2006. I joined Sempra Energy, the parent company of SCG and SDG&E, as a Regulatory Policy and Analysis Analyst in 1999. I held positions of increasing responsibility in Regulatory Affairs until my promotion to Director in 2003. Prior to joining the Sempra companies I held positions of increasing responsibility as a consultant on energy industry economics. I received a Master of Public Policy degree from the John F. Kennedy School of Government at Harvard University in 1998, and a Bachelor of Arts degree in Economics from Reed College in 1992. I have previously testified before the California Public Utilities Commission.

APPENDIX

RD&D APPENDIX A

Proposed TY 2012 Refundable RD&D Funding Details

Table 1 below provides a high level overview of the proposed portfolio of RD&D programs, and the program details are described in the following pages.

TABLE 1 - RD&D Program Matrix

Programs	Sub-Programs	Project Areas
1) Gas Operations	Gas Distribution	Construction Technologies
		O&M Technologies
		Pipeline Technologies
	Environment & Safety	Environment
		Safety
	Gas Transmission	Transmission Operations
		Compressor Station & Storage Operations
2) Customer Applications	Residential	Residential Appliances
	Commercial	Buildings
		Cooking & Food Services
		Heating & Cooling
	Industrial	Boilers
		Processes
3) Clean Generation	Integrated Systems	DG/CHP
		Prime Movers
	Advanced Generation	Fuel Cells & Hydrogen
		CCS
4) Clean Transportation	Infrastructure	Compression & Storage
	Systems & Components	Engines & Applications
		Fuel Composition & Blending Applications
5) Solar-Thermal & Bioenergy	Solar - Thermal	Solar-Thermal
	Bioenergy	Biogas Conditioning
		Pyrolysis & Gasification
		Bioenergy Integration
6) Project Management, Program Planning & Administration		

1) Gas Operations

The proposed budget for Gas Operations RD&D for TY 2012 is $3 million. Since the elimination of a FERC surcharge for national gas research funding in 2004, SCG has stepped up efforts to participate in collaborative research forums to maintain the high degree of project funding leverage and technical expertise made possible under past FERC programs. SCG supports and participates in research consortiums such as Operations Technology Development, the Pipeline Research Council International, and the Northeast Gas Association.

The Gas Operations program is presented in **Table 2**, with descriptions of each program following the table. The program descriptions provide details on the spending forecast, the program scope and project highlights.

TABLE 2

Gas Operations Proposed Funding Request

($000)

RRD&D Sub-program Area	**TY 2012 Request**
• Gas Distribution	1,200
• Environment & Safety	550
• Transmission & Storage	1,250
Total Gas Operations	**3,000**

a. Gas Distribution

SCG proposes a TY 2012 budget of $1.2 million for Gas Distribution RD&D. The research projects within the Gas Distribution sub-program are grouped into three project areas: 1) Construction Technologies, 2) Operations and Maintenance Technologies, and 3) Pipeline Technologies.

Construction Technologies

Improvements in construction technologies provide cost-effective alternatives to the installation of gas pipelines in open trench excavations. The Construction Technologies project area will focus on testing and demonstrating advances in trenchless technologies, lining technologies to rehabilitate existing pipelines, and pipeline splitting. Trenchless technologies have been around for many years and further advancements to improve their capabilities are in the horizon. Older steel

pipelines can be rehabilitated with lining technology developed to operate at high pressures. Pipeline splitting is beneficial in congested subsurface corridors as the same bore path is reused. This technology can be enhanced to split thicker walled pipe or operate easily in hard soils. Other trenchless developments will center on providing steering for smaller pneumatic moles used for short range boring of small diameter gas mains and services. These innovative developments are expected to continue to advance trenchless operations, reduce construction costs, and minimize damage to public roadways and private driveways.

Operations and Maintenance Technologies

Increased worker productivity can be accomplished with the development of new tools and equipment. The Operations and Maintenance Technologies project area will focus on testing and demonstrating automation of welding and fusion, tools for small or keyhole excavation, and high frequency digging tools. Routine field O&M activities such as welding of steel and fusion of polyethylene pipeline components can be accomplished with consistent high quality workmanship by automating these processes. Further benefits can be realized by designing these tools to perform the work in reduced size or keyhole excavations. Another routine O&M field task is in the removal of hard compacted soil during bellhole or small trench excavations. The application of high frequency to digging tools will be explored to reduce the manual labor effort of breaking apart tightly pact soil structures.

Pipeline Technologies

New federal regulations on pipeline integrity continue to mandate the need to identify and mitigate threats to our pipeline infrastructure. The Pipeline Technologies project area will focus on testing and demonstrating for utility use new technologies for non-intrusive inspection, rapid remediation and non-invasive strength testing. Advancement in non-intrusive sensors and tools will be developed to reduce the cost of inline or direct inspection of buried pipelines. New pipeline technologies in material and repair processes will be developed for rapid remediation of anomalies to restore the pipeline's integrity. Non-invasive methods to measure the strength of the pipeline material will be developed and implemented to eliminate the need to remove pipeline sections for laboratory strength testing.

b. Environment and Safety

SCG proposes a TY 2012 budget of $550,000 for Environment & Safety RD&D. Recent emphasis has been placed on developing technologies to address climate change and introduction of biomethane into our pipeline system. Worker and public safety continues to be a high priority area for the company. The research projects within the Environment and Safety sub-program are grouped into two project areas: Gas Quality and Safety.

Gas Quality

The Gas Quality project area will focus on developing a more accurate and current approach to quantifying fugitive emissions from pipeline operations and refining standards for gas quality of biomethane. CARB and EPA have proposed regulations to mandate the monitoring and reporting of greenhouse gas fugitive emissions from the natural gas industry. Current reporting requirements mandate the use of default emission factors ("EFs") that were developed in 1996. In order to provide more accurate emission levels from the company's natural gas system as new pipeline material and gas processes have been installed, SCG will investigate an improved approach to quantifying fugitive emissions from various gas operating sources to increase the level of accuracy and certainty.

A key consideration for development of biomethane as a renewable source of pipeline gas is gas quality monitoring and control. Biomethane composition is somewhat different than natural gas. SCG participated in earlier research on gas quality for biomethane from Dairy Waste, which was found to contain minimal harmful constituents. Other potential sources of biomethane such as biogas from landfills and wastewater facilities are known to contain constituents such as siloxanes and vinyl chlorides which are known to be harmful to end-use equipment and potential health hazards. SCG has released a guidance document for biomethane specifying very broad required testing for potential constituents and generally requiring removal of potentially harmful constituents to below the minimum detectable level. To support development of this renewable resource, SCG plans to conduct additional studies to refine testing, monitoring and removal requirements for biogas constituents.

Safety

The Safety project area will focus on developing new sensor technologies to improve the accuracy of gas pipeline and sewer lateral location to reduce/eliminate unintentional damages from excavation, improving pipeline leakage and natural gas odorant detection for public safety, and developing and testing lightweight and ergonomically designed hand tools to reduce worker injury.

c. Gas Transmission and Storage

SCG proposes a TY 2012 budget of $1.25 million for Gas Transmission and Storage RD&D. This includes $500,000 for development of internal and external inspection tools for gas transmission pipelines, including a potential equity investment to partner with an inspection services company to use advanced, in-line inspection robotics technology that could be in high demand throughout the gas pipeline industry. The ability to inspect un-piggable pipeline segments efficiently and effectively has significant benefit to SCG's ratepayers and customers. The 20" to 26" diameter system, currently under development, could be ready for commercial use in 2012. However, there is an urgent need to develop, test, and expand the product line to cover pipeline diameters ranging from 12" to 36". Separately, a mini-camera based robotic probe is being developed for inspecting external corrosion and problem areas for difficult to access, cased pipelines.

Participation in collaborative research at Pipeline Research Council International along with related projects represents another $500,000. SCG proposes to participate in the following project areas: Measurement, Integrity and Maintenance, Design, Materials, Construction, Compressor and Pump Stations, and Underground Storage. Research on the strength of materials and welding practices, as well as design criteria, can provide critical information on the reliability and performance of many of our older assets in the ground. The development of pipeline risk assessment models and tools provides alternative pipeline integrity compliance and management methods useful in operations. Understanding the physical strengths and characteristics of our system is especially important, as the service area is uniquely earthquake prone.

Development and testing of more efficient and cleaner burning retrofit equipment for our vintage or "legacy" gas engines installed at our critical gas transmission stations (North Needles, South Needles, Blythe, and Newberry Springs) has a planned budget of $200,000. Retrofitting this old but reliable and durable equipment would allow SCG to defer costly replacement to meet air quality regulation requirements.

Finally research to improve injection and withdrawal operations for natural gas storage is budgeted at $50,000. Natural gas storage wells performance deteriorates over time, impacting deliverability and maintenance costs.

2) Customer Applications – Funding Proposal

SCG proposes a TY 2012 budget of $2.038 million for Customer Applications RD&D. This customer focused energy efficiency RD&D program is presented in **Table 3**, with descriptions for each program area following the table.

TABLE 3

Customer Applications Proposed Funding Request

($000)

Customer Applications Project Areas	TY 2012 Request
Residential Appliances	**492**
Commercial Buildings	**100**
Commercial Cooking & Food Services	**241**
Commercial Heating & Cooling	**305**
Industrial Boilers	**450**
Industrial Processes	**450**
Total Customer Applications	2,038

a. Residential Appliances

SCG proposes a budget of $492,000 in 2012 for residential appliance RD&D. The objectives of the Residential Appliances effort are to develop, test, and introduce into the market innovative, energy efficient, cost-effective and environmentally acceptable residential natural gas appliances such as hot water heaters, furnaces, clothes dryers, fireplaces, and ovens and ranges. SCG is uniquely qualified to address these needs as it has direct access to customers and knows their needs and concerns. SCG works with equipment manufacturers and outside RD&D organizations to address these needs.

SCG initiated several multi-year projects with major gas furnace manufacturers to develop new space heating appliances that will address the 14 nanograms of NOx per joule (ng/joule) standard adopted by SCAQMD in 2008. Currently, all gas-fired central furnace designs sold in southern California have to meet 40 nanagrams of NOx per joule level. The

new lower NOx standards will go into effect in October 2014. Approximately 250,000 central furnaces are sold into the SCAQMD service territory each year, primarily as replacement units in existing homes.

We will also look at the development of near condensing space heating appliances that will be higher efficiency than base units, but below efficiency of full condensing products. This approach will result in improved product efficiency at a lower installed cost for the home owner. Current condensing space heaters have a low penetration rate in California due to high first costs combined with a short heating season, which result in poor paybacks for the homeowner.

In residential water heating, SCG will work with manufacturers to investigate ways to lower first and installation costs of condensing water heaters and tankless water heater products. These high efficiency water heating products have had low penetration into the market, primarily due to high costs with poor economic payback.

SCG also plans to identify, customize and integrate new natural gas equipment technologies such as solar thermal water heating and hybrid tankless water heaters for both new homes and retrofit applications. Hybrid designs would focus on issues with current tankless products on the market, including the need for larger gas piping and initial hot water delivery issues.

SCG will also develop technologies specifically targeted to the low-income residential gas customer market. This includes (1) a low-cost, 92% fully condensing combination gas water/space heater that uses a water-to-air heat exchanger in place of a gas furnace, (2) a triple integrated appliance, for gas heating and hot water, and electric air conditioning, (3) a "Super Boiler" for multifamily buildings, taking advantage of technology under development by the Department of Energy ("DOE") and GTI for industrial-sized boilers, but scaled down to 2 MMBtu/hr, with over 94% efficiency and NOx levels under 5 parts per million ("ppm"), and (4) an advanced energy management system that provides comfort and yet can sense when rooms are not occupied.

SCG recognizes the importance of ensuring that gas technologies comply with appropriate codes and standards, and that natural gas receives equitable treatment in the creation or revision of these rules. Maintaining the option for cost-effective gas technologies for gas consumers is a critical, but often unseen, element of the broader product development and deployment process. Working closely with the gas industry and research partners, this task

area will develop and present in-depth scientific and technical information needed by safety, environmental, and energy efficiency codes and standards organizations and regulatory bodies.

b. Commercial Buildings

SCG proposes a TY 2012 budget of $100,000 for the Commercial Buildings program area.

Since 2008, various new products have been introduced into the marketplace which addressed the issue of software compatibility between various building control system platforms. Thus, resources were shifted to more pressing energy efficiency challenges such as the development and demonstration of boilers and process heater technologies. SCG will now focus on investigating the development of building management controls for interfacing with newly developed green technology and associated ancillary equipment. Specifically, SCG will try to ascertain how to best integrate new, state of the art concentrated solar hot water systems with space conditioning equipment and determine the optimal blend of solar, natural gas and electricity for various customer needs and plant configurations. Advanced controls will be required to maximize the performance characteristics of the solar system, chillers, heaters and water heaters, along with the backup requirements.

c. Commercial Cooking & Food Service

SCG proposes to budget $241,000 in 2012 for Commercial Food Service RD&D.

There are over 25,000 restaurants in the SCG service territory. Many of these customers depend on natural gas ovens, steam generators, fryers, charbroilers, griddles, water heaters, and dishwashers. Customers are facing many issues in the daily operation of their facilities that center on these gas appliances, which include reduction in energy use and associated costs. The TY 2012 program will focus on improving efficiency of gas-fired commercial cooking equipment. Much of the equipment used today has not changed significantly over the last 50 years. We will work with manufacturers to improve the thermal efficiency of woks, ranges, griddles, rethermalizers, conveyor ovens, convection ovens, and ware washers. New higher efficiency products must also meet production cooking output and

production cooking quality requirements which are always key concerns in the restaurant / commercial food service industry.

Also, SCAQMD is in the final stage of amending its regulation for control of particulates that are emitted from underfired charbroilers. This is the primary piece of equipment used to cook hamburgers in restaurants. The proposed regulation would require removal of 85% of both condensable and non-condensable particulate. SCG will investigate possible technical solutions to develop under-fired charbroiler equipment that would meet this regulation.

d. Commercial Heating & Cooling

SCG proposes to budget $305,000 for commercial heating & cooling in TY 2012 for RD&D.

The objective of this program area is to design, develop, demonstrate and evaluate highly energy-efficient and innovative natural gas space conditioning equipment. The benefits of the space conditioning program include energy savings, peak load reductions, lower maintenance cost, improved building comfort and indoor air quality, while providing customers with alternate fuel options.

Almost all residential and commercial gas heating systems will not operate during electric blackouts. This project will develop a unitary natural-gas-engine-driven combination heat pump and standby generator for the residential and small commercial market. The appliance comprises a low-emission natural gas engine-driven generator set that supplies electricity to a standard hermetic compressor or pre-selected standby electrical loads. The proposed appliance will benefit consumers by providing higher efficiency, lower operating costs, and greater electric reliability than currently available options. The technology will also allow gas customers to continue to receive heat even under conditions of electric blackouts.

SCG will investigate the development of indirect fired absorption and adsorption systems for waste heat application in light commercial and industrial cooling applications. These chillers will be designed to operate with exhaust gas from engines and microturbines as well as water from solar thermal applications. These chiller systems are available in hundreds of tons capacity. SCG will focus on smaller and more modular systems of less than 100 tons. This will allow them to be applied in light commercial and commercial sites.

SCG will investigate cost reduction options for improved commercial HVAC packages in order to take advantage of electric/gas and solar hybrid systems. This will include integration of smart controls and low NOx burner designs. New burner designs will be investigated for backup use with solar system integration for year round applications for both chiller, heating and hot water integrated systems.

A new generation of high efficiency, low temperature commercial gas-fired chillers, using waste heat off internal combustion engines, will be evaluated through an effort funded jointly by CEC, SCG and HVAC equipment manufacturers.

In addition, SCG will fund technical assessments of new heating and cooling products that enter the market, both in the United States and internationally. This could include new designs for absorption chillers, gas engine heat pumps and desiccant based HVAC equipment.

e. Industrial Boilers

SCG proposes to budget $450,000 for Industrial Boilers in TY 2012 for RD&D.

The objective of the industrial boilers program area is to design, develop, demonstrate and evaluate highly energy-efficient, low-emission, cost-effective boilers, process heaters and water heaters. The majority of the work will focus on development of new boilers that will meet newly adopted boiler regulations in both SCAQMD and the San Joaquin Valley Air Pollution Control District which affect the great majority of SCG industrial and commercial customers. In 2008, these air districts passed regulations that will require all existing boilers rated between 2 million Btu/hr and 75 million Btu/hour to reduce NOx emission levels from 30 ppm down to 9 ppm. Boilers rated greater than 75 million Btu/hour must achieve less than 5 ppm NOx. In order to meet these ultra low emission levels, new burner technology must be developed along with advanced boiler controls.

Another regulation that has a significant impact on all boiler operators is the requirement to check emission levels on a monthly basis. Improved boiler controls are needed to ensure continuous compliance with permit limits. In addition, boiler system efficiencies will be improved through development and integration of advanced heat recovery technologies. Efficiency improvements will provide energy cost savings to the operator along with reductions in greenhouse gases.

Specific research objectives include:

- **Large Watertube Boilers** -- Design, develop, demonstrate and evaluate energy efficient, low emission, and cost effective large watertube boilers for industrial applications. The projects in this program will focus on water tube boilers sized greater than 75 MMBtu/hr, which must achieve < 5 ppm NOx by 2013.

- **Firetube Boilers –** Design, develop, demonstrate and evaluate alternative firetube boiler technologies which incorporate innovative combustion processes to increase energy efficiencies while reducing NOx emissions. The projects in this program will focus on firetube boilers sized between 5-75 MMBtu/hr. Efficiencies will be improved and emissions reduced primarily by focusing on better control of the air/fuel ratio and mixing, combustion staging, and by eliminating the need for flue gas recirculation which can rob efficiency through parasitic fan losses. Existing boilers in this size range must achieve 9 ppm NOx by 2012-2016.

- **Commercial Water Heaters** – Design, develop and demonstrate high-efficiency, low NOx natural gas-fired commercial water heaters and controls using powered and non-powered burner technologies which enhance energy transfer to the load (increase efficiency) without sacrificing low NOx performance. These projects will focus on units rated 2 to 5 MMBtu/hr. This equipment must achieve 9ppm NOx by 2012 for powered combustion boilers and 12 ppm NOx by 2014 for atmospheric boilers.

f. Industrial Processes

SCG proposes to budget $450,000 for Industrial Processes RD&D in TY 2012.

The objective of the Industrial Processes program area is to design, develop, demonstrate and evaluate highly energy-efficient, low-emission, cost-effective natural gas-based industrial technologies which allow customers to meet competitive and environmental challenges. SCG believes that this effort will create new equipment alternatives that will enable industrial customers to choose the most cost-effective equipment options in compliance with evolving environmental regulations.

In 2009, SCAQMD passed new stringent NOx emission regulations that impact many types of industrial equipment including ovens, dryers, heaters, furnaces, kilns, calciners,

cookers, roasters, fryers, degassing equipment, incinerators, and soil remediation equipment. NOx limits range from 20 ppm to 60 ppm based on the following operating parameters: 1) 30 ppm for process temperature between 800 deg F and 1200 deg F; 2) 60 ppm for process temperature greater than 1200 deg F; 3) 20 ppm for process temperature lower then 800 deg F; and 4) 40 ppm for Asphalt operations

Another key driver for energy efficiency improvements is upcoming greenhouse gas reductions that will be required under California law – AB 32. CARB will implement their new greenhouse gas regulations starting in 2011. This new regulation will initially impact larger industrial operations that emit more than 25,000 tons of CO_2 per year. The primary way most industries will meet their mandatory CO_2 emission targets will be through efficiency improvements on existing equipment and through plant process improvements. SCG will continue to develop improved high efficiency gas equipment to help our customers meet the new CO_2 reduction regulations. Many of these research efforts will likely be co-sponsored by federal and state agencies and manufacturers to obtain highly leveraged technology development co-funding.

Specific industrial process technologies that will be pursued include:

- **Gas Guard Recuperator ("GGR")** – Corrosive gases, such as chlorine and fluorine, currently prevent the use of recuperators on these furnaces, which limits their efficiency. GGR operates at high temperature allowing commercial recuperators to be installed, saving large amounts of energy without making any changes to the melting operation. In this project, a sorbent-based approach, using trona, will be used to remove chlorine and fluorine gas species.

- **Low Emissions Industrial Ovens and Furnaces** – SCG will work with manufacturers to investigate low NOx burner technology that can be employed to reduce NOx emissions from various industrial equipment, including ovens, kilns, heat treat furnaces, and metal melting furnaces. Project goals will be focused on meeting the future emission requirements that were recently passed by SCAQMD, discussed in detail in the section above.

- **Waste Heat & Water Recovery** – Waste heat and water recovery from low grade waste steams are difficult and costly to recover. This project will utilize the transport

membrane condenser ("TMC") to recover 40-70% of the waste stream moisture and 40-90% of the waste heat from high moisture exhaust streams such as wet scrubbers, drying processes, evaporation processes, and biomass production.

- **RASERT Burner Demonstration** – Retrofit (128) reverse annulus single ended radiant tube ("RASERT") burners in zones 1-5 on the #1 galvanizing line at a major steel manufacturing in Fontana, CA. The other zones (22 RASERT burners) were previously retrofitted approximately two years ago to improve energy efficiency and reduce emissions. System thermal efficiency is expected to increase from 25% to 45%, and greenhouse gas emissions are expected to decrease by 30% with this retrofit.

- **TCR for Steel** – Design a retrofit package for an existing oxidizing furnace used on a continuous galvanizing line at a major steel manufacturing in Fontana, CA. The existing furnace includes 32 direct fired burners (total 70 MM BTH) that preheat substrate and volatizes surface oils. Currently, no waste heat recovery is utilized. This project would increase thermal efficiency of the process from the current 25% to 45-55%.

3) Clean Generation – Funding Proposal

SCG proposes a TY 2012 budget of $2.772 million for the Clean Generation RD&D program as indicated in **Table 4**. Following the table, there are descriptions of each project area.

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TABLE 4

Clean Generation Proposed Funding Request

($000)

Clean Generation Project Areas	**2012 Request**
a) DG/CHP	1,313
b) Prime Movers	700
c) Fuel Cells & Hydrogen	500
d) Carbon Capture & Sequestration	259
Total Clean Generation	**2,772**

a. Distributed Generation and Combined Heat & Power

SGC proposes a budget in TY 2012 of $1.313 million for distributed generation ("DG") and combined heat and power ("CHP") RD&D.

The primary objective of this program is to test several CHP systems in various commercial and industrial applications and to integrate these systems with customers' energy management systems. Secondary goals are to reduce manufacturing costs, increase efficiency and reliability, and ensure that emissions of CHP systems will comply with state and federal standards.

CHP is the most energy efficient and cost-effective form of distributed generation. The use of CHP systems in commercial, industrial, and multifamily residential establishments will improve the overall efficiency of energy use by displacing fuel use for boilers and marginal, predominantly gas-fired, sources of electricity generation.

A critical factor for CHP market penetration is the ability to be cost effective and to have acceptable environmental emissions levels. The objective of this program area is to conduct RD&D in three primary technologies: microturbines, IC engines, and Stirling engines.

Proposed project areas include:

- **Demonstrations** – SCG will work with system packagers to develop and demonstrate low emissions and high efficiency CHP systems and demonstrate these systems at various customers' sites. In addition to reducing emissions and increasing the overall

system efficiency, SCG will strive to achieve significant capital cost reductions in CHP systems targeted at commercial and light industrial applications. SCG will also focus on defining and standardizing these CHP packages for a number of specific end-use markets.

- **Multi-energy Process Candidates** – An assessment of current residential, commercial, and industrial processes will be carried out to identify the most suitable applications for multi-energy generation in terms of energy savings and economic viability. Examples of processes that could be evaluated include: space-cooling, chilling and refrigeration, and hydrogen production for commercial and industrial use.

- **Retrofit Equipment Systems for Integration** – Techniques, tools, and components will be developed and demonstrated for integration of commercially available energy generation equipment (e.g., boilers, water heaters, hydrogen generators, mechanical drives, etc) into existing processes to improve the system efficiency. Self powered equipment will also be considered.

- Waste **Energy-driven Technologies** – Improve or develop new technologies which capture and treat vented emissions such as flared fuels, vented greenhouse gases, and other emissions using technologies which could also produce electricity, dehumidification, heating, or cooling.

- **Integration of DG Systems** – Determine how DG systems can be practically integrated into large commercial and manufacturing markets such as light industrial, supermarkets, hotels, healthcare, office buildings, and education facilities. Projects will: 1) quantify energy, emissions, installation and retrofit costs; 2) research integration issues and recommend improvements; and 3) correlate data to analytical models and tools for end use customers.

- **High Efficiency Steam Driven CHP System** – The efficiency of existing steam CHP systems can be increased by optimizing both the steam generator and steam turbine. In particular, the steam generator can be designed for higher efficiency (up to 95%), a smaller footprint, and reduced greenhouse gas emissions. In addition, the steam

generator can be designed for an optimum steam pressure/temperature to improve the steam turbine efficiency. This project aims to optimize the steam CHP system efficiency and install a 3-5 MW demonstration.

- **Expand CHP for Opportunity Fuels** – Reciprocating engine generator sets have the largest current and projected market share for DG/CHP systems fueled with opportunity fuels such as landfill gas and biogas from anaerobic digesters. Substantially higher utilization of opportunity fuels in reciprocating engines for DG/CHP is possible. To enable this, a lower cost technology with faster response is needed for monitoring and controlling the impact of fuel quality variability (e.g., composition, heating value, biogas pressure) on the overall DG/CHP system performance and output, availability, revenue and operating costs

- **High Stability Combustion for CHP Systems** – In many cases gas turbine CHP systems utilize the gas turbine exhaust stream as combustion air for heat generation. These hot gases create problems for low NOx burner stability because of the oxygen lean composition of the gas. Coupled with combustion oscillations associated with low NOx burners results in stability issues. It is therefore critical to develop a high stability combustion system for CHP systems. This project will do a design study and prototype burner for pilot testing.

- **Flex CHP** – The Gas Technology Institute ("GTI") has developed a Flex CHP High-Efficiency Ultra-Clean Power and Steam Package which substantially improves the efficiency and greatly reduces the greenhouse gas emissions of the electricity and steam generation system. Flex CHP is an innovative unit that uses the effluent flue gas from a gas turbine to drive a steam boiler. System efficiency is increased from 22% to 84% while also reducing NOx emissions to 0.033 lb/MW output (>50% below the 2007 CARB target) and CO levels <0.10 lb/MW output. A 65 KW microturbine and a 100 HP steam boiler with supplemental burner are currently being tested at the GTI laboratory to showcase the increases in efficiency and reduction in emissions. This project will continue the development using the data obtained in this test.

b. Prime Movers

SGC proposes a budget in TY 2012 of $700,000 for Prime Mover RD&D to continue to develop and demonstrate emission controls technologies for gas engines.

The main objective of this program is to bring to market emissions control technologies which meet the CARB 2007, AB 32, and AB 118 requirements and develop advanced emissions monitoring systems to provide alarms and trending information to operators to ensure that emissions are maintained at or below the permitted emissions limitations. The secondary objective of this program is to lower manufacturing costs, and increase efficiency and reliability of internal combustion engines for all related applications, including power generation, cogeneration, space conditioning, refrigeration, and air compression. Key prime mover technologies include: internal combustion ("IC") engines, microturbines, and Stirling engines.

Internal Combustion Engines

The preponderance of CHP systems in commercial and light industrial applications employ natural gas internal combusting reciprocating engines ("IC engines"). IC engine-based CHP systems are the most economical and proven solution in the vast majority of commercial and light industrial applications. The continued availability of the engine CHP option is critical to the ongoing deployment of CHP in California's commercial and light industrial markets.

The California Air Resources Board ("CARB"), as well as regional and federal agencies, are calling for much lower NOx, CO, and volatile organic compound ("VOC") emission levels from engines than what can be produced using the most common current approach to manage emissions: a 3-way catalysts combined with precise air-fuel ratio controls.[84] The achievement of some of these reductions will require development of new systems

Proposed project areas include:

- **IC Engine Development** – SCG will invest in the development of advanced air / fuel ratio control systems and enhanced catalyst packages to address new emissions

[84] SCAQMD amended its engine rule in February, 2008 which adopted the CARB guidelines. These emission limits are: Nitrogen Oxides (NOx) 0.07 lb/MW-hr, Carbon Monoxide (CO) 0.20 lb/MW-hr, and Volatile Organic Compounds (VOCs) 0.10 (lb/MW-hr. Note the CO and VOC limits are higher than CARB guidelines.

requirements. Work will focus on these emissions control improvements for both rich burn and lean burn engine systems.

- **Engine** Efficiency – The majority of engines used in southern California are detuned to run fuel rich (rich burn engines). As a result of engine detuning, engine efficiency is significantly compromised, dropping to around 33%. This practice of running an engine fuel rich is done to allow use of inexpensive catalyst technology - nonselective catalytic reduction (3-way catalyst). In contrast, lean burn engines typically have efficiencies over 40%, but must employ selective catalytic reduction ("SCR") to meet the stringent emission standards required in southern California. Because of the cost of SCR, historically only large engines rated over 1,000 HP have been run in a lean burn mode. SCG will investigate exhaust gas recirculation ("EGR") technology. EGR employs hardware changes to recirculate engine exhaust into the combustion chamber of a heavy duty natural gas engine as an inert substitute for the excess air normally supplied in lean burn engine operation. EGR allows the combustion chamber to operate as if it were a rich burn engine and, since no excess oxygen is present in the exhaust, the much less expensive nonselective reduction catalyst can be used when after treatment is needed to meet further NOx emissions standards.

- **Continuous Emission Measurement Equipment** – IC engines require either weekly or continuous emission measurements as part of CARB and SCAQMD regulations. SCG will invest in the development of cost effective measurement equipment and components. The focus will be on using and applying advances made in larger detection systems and applying them to smaller, portable and more economical versions.

- **Continuous Emission Measurement Components** – IC engines today use O2 sensors before and/or after the catalysts to monitor and adjust emissions levels. These sensors provide feedback to the engine controller to adjust the timing, thereby optimizing the engine combustion and reducing the emissions. SCG will investigate the development of cost effective NOx sensors which can be installed directly on the engine thereby eliminating the need for portable measurement devices. These systems will provide the

customers with an economical option for measuring emission levels as mandated by regulatory agencies.

Microturbines

Microturbines utilize advances in automotive gas turbines, turbochargers, and auxiliary power equipment which enable them to operate with fewer moving parts than IC engines. The larger microturbine generators have fuel-to-electricity efficiencies of 25 to 30% -- slightly lower than larger utility class gas turbines. However, this doesn't take into account the fact that virtually all microturbine installations are designed to also use the high-temperature turbine exhaust in a wide range of useful applications. This can bring the overall thermal efficiency of the installation up to 75 to 80%, and makes the on-site generation package an attractive energy solution.

Microturbines produce lower emissions than engines, with NOx levels of less than 10 ppm without any post combustion treatment. Engines can achieve these levels but require control systems such as 3-way catalysts which increase maintenance costs.

Proposed microturbine project areas include:

- **Demonstrations** – Capstone and Ingersoll-Rand ("IR") have initiated the commercialization of their 30kW, 60kW, 200kW, and 250kW systems. Several units will be demonstrated at customers' locations in SCG's service territory. Several CHP systems using these turbines will also be demonstrated to verify emissions, efficiency and integration of these systems into the customers' energy management system and the local electric grid. SCG's objective is focused on improving the cost competitiveness, improving the durability and reducing the O&M costs of these fully integrated packaged microtubines.

- **Material and components** – SCG will work with manufacturers to identify and evaluate specific aerodynamic deficiencies in microturbine components including the compressor and turbine wheels and housings. By incorporating advanced alloys and ceramics in order to increase aerodynamic efficiencies and increase operating temperatures, the operating efficiency of the microturbine can be increased to over 35%. In addition, new heat exchangers and recuperators that can be packaged along with the microturbines will be designed and tested. Advanced combustion technology will also be designed and incorporated into the microturbine which will allow the unit to achieve NOx levels of less than 5 ppm. The microturbines will be

tested and demonstrated in laboratory and field sites in order to demonstrate their reliability and efficiency.

- **Recuperator Development** – Recuperators are a critical component of microturbines. They take advantage of the exhaust heat and can almost double the efficiency of the turbine. They are very expensive and difficult to manufacture. This program will evaluate and develop recuperator technology which includes improvements in design, fabrication and manufacturing processes.

- **Microturbine Cycle Analysis** – Various microturbine cycles have been developed which are based on either providing high efficiency electricity or maximizing the heat recovery in CHP applications. These cycles are either single stage or two stage systems which can use a recuperator in tandem with either power conditioning electronics or coupled to a standard generator. Pressure ratios also have impacts on cycle operation and fuel pressure requirements. This program area will optimize microturbine cycles and components for both electricity production and CHP applications.

- **Combustor Development** – Emission control requirements have become critical for prime movers in SCAQMD territory. Microturbine combustor designs have improved where they can achieve single digit NOx levels. This area will focus on optimizing combustors which will emit extremely low NOx which will lower or eliminate the use of a fuel compressor.

Stirling Engines

Stirling engines are external combustion, reciprocating engines which employ a sealed working fluid which is externally heated and cooled at different times in the thermodynamic cycle. SCG is interested in the capabilities of this novel generation technology.

Of particular interest to SCG is the Stirling engine's ability to burn a wide variety of fossil fuels. Because these engines combust fuel external to the cylinder, and their resident time in the combustor is significantly more than typical IC engines, anything that combusts can be used to operate them. Since these engines operate on the principle of temperature difference between hot and cold sides without regard to the source of heat, even waste heat from thermal oxidizers, furnaces and solar energy can be used to operate them. Additionally they are quiet, environmentally clean and produce

very little NOx and unburned hydrocarbons.

Also, compared to IC engines, Stirling engines have low maintenance requirements due to external combustion of the fuel and low part count. Finally, they require low fuel pressure to operate and are built on an automotive-style manufacturing process, with rapid cost reduction. All these factors make installed cost and life cycle operating cost of Stirling engines potentially competitive with IC engines.

Stirling engine development is ongoing. SCG will continue to monitor the space and conduct demonstrations as the technology advances.

c. Fuel Cells & Hydrogen

SCG proposes a TY 2012 budget of $500,000 for fuel cell and hydrogen RD&D to continue to demonstrate new fuel cell technologies.

Fuel cells have been under development for decades and are beginning to be commercialized on a limited basis. The marketing of the machines is still heavily dependent on state and federal subsidies to make the payback period attractive to customers. SCG has supported work in fuel cells, stacks, reformers, and systems, since the 1970's, and is a recognized leader in this area. Fuel cells represent a clean, highly efficient, and reliable energy source that can satisfy the needs of both the stationary and mobile power generation fields.

SCG is continuing to assess strategies on how to accelerate the commercialization process with various fuel cell manufacturers, and is developing a long range plan for evaluating and developing business opportunities that can provide benefits to its ratepayers. There are demonstrations set for 2010-2012 with several manufactures, including Fuel Cell Energy, Plug Power, and Ceramic Fuel Cells Ltd. Other manufacturers will be closely monitored for RD&D opportunities. SCG will support work on both high and low temperature fuel cells in residential, commercial, and industrial applications. SCG plans to beta test a few small modular fuel cells at selected residential and light commercial sites. The Engineering Analysis Center in Pico Rivera will conduct further evaluation, testing and showcasing. SCG's objective is to improve cost competitiveness and durability, and reduce the capital and installation costs of these fuel cells.

SCG will also continue to support work in hydrogen production. This includes demonstration of fuel cell technologies that are able to produce excess hydrogen that can be used for vehicle refueling applications as well as non-traditional technologies currently being

developed, such as microbial fuel cells and hydrogen production. Other avenues of interest are the coupling of fuel cells with other equipment, such as driving a chiller for commercial and industrial applications, and using the fuel cell as a combustor to operate a gas turbine. SCG will continue to support the commercialization of fuel cell deployment, and the deployment of hydrogen fueling stations for vehicles

Fuel cell and hydrogen project areas include:

- **Optimized Fuel Cell/Gas Turbine CHP Hybrid** – a high temperature fuel cell is uniquely suited to be coupled with a micro-turbine. FCE developed and built a hybrid system comprised of a 250 kW fuel cell stack and a 30 kW Capstone micro-turbine in an atmospheric fuel cell bottoming configuration, and achieved electrical efficiency of 57%. Much higher efficiencies could be achieved if the micro-turbine was sized correctly for the fuel cell. The resulting unit could have efficiencies exceeding 70%. This project would mate a 1.5 MW molten carbonate fuel cell with a Capstone micro-turbine. The proposed effort will (1) delineate the specifications for a gas turbine engine that is designed specifically for optimal integration with the molten carbonate fuel cell in a hybrid system, (2) test the system, and (3) deploy and field evaluate the system..

- **Transmission Integrated Grid Energy Resource ("TIGER") Station** – The transmission integrated grid energy resource TIGER station concept is a new concept for introducing a fuel cell into the utility grid network at a substation or other location in which the clean, dispatchable power of the fuel cell can directly support the utility grid network where it would otherwise be constrained. The TIGER station could be easily sited in non-attainment areas, due to the ultra-low emissions, designed to meet dynamic loads, due to transient response capabilities, and enabled to meet an adjacent heating or cooling demand if a local use was identified. The TIGER station would be designed for megawatt electricity generation capacity with communication and controls specifically designed and implemented to support the utility grid network.

d. Carbon Capture and Sequestration ("CCS")

SCG proposes a budget in TY 2012 of $259,000 for Carbon Capture and Sequestration.

CCS RD&D is directed at developing technologies and procedures to safely and efficiently transport CO_2 from power plants and industrial facilities with carbon capture to enhanced oil recovery customers and saline aquifer CO_2 storage facilities.

In order to meet existing and proposed laws and regulations mandating lower CO_2 emissions, CCS represents a critical RD&D element. Beginning in 2005, to develop technology for CO_2 capture from natural gas combustion, SCG invested in Clean Energy Systems ("CES"), a Rancho Cordova, California aerospace spin-off company that has developed a novel oxy-fuel combustion technology that enables electricity and process steam production with 100% carbon capture. The core of CES' process is an oxy-combustor adapted from rocket engine technology. This combustor burns a clean gaseous fuel with gaseous oxygen in the presence of water. Fuels include natural gas, syngas from various sources and liquid fuels. The combustion is performed at near-stoichiometric conditions in the presence of recycled water to produce a steam/CO_2 mixture at high temperature and pressure.

These combustion products power conventional or advanced steam turbines and may use modified gas turbines operating at high-temperatures for expansion at intermediate-pressures. The gas exiting the turbines may enter a condenser/separator where it is cooled, separating into its components, water and CO_2. The CO_2 is recovered, conditioned, purified as appropriate and sold or sequestered on-site. Most of the water is recycled to the gas generator but excess high-purity water is produced and available for other uses.

This process is essentially NOx-free and particulate-free because nitrogen-containing air is not involved in the combustion process. Concentrated CO_2 produced in this process is readily sequestered. Additionally, the high pressure oxy-fuel power cycle has the potential to be as efficient, or more efficient, than the latest combined cycle power plants because it produces steam at temperatures in excess of 3,000 F. SCG believes that oxy-fuel combustion represents the simplest, most cost effective and closest to commercial viability of any carbon capture technology for use in electric power and steam plants.

As a result of investments in CES' technology by SCG, CEC, DOE and others, a commercial oxy-fuel power plant with 100% CO_2 capture is now feasible and expected to be built in Southern California in the 2011 – 2013 timeframe. However, CO_2 capture solves only

one third of the CCS challenge. Once captured, the CO_2 must be transported to a geological sequestration site, preferably to an enhanced oil recovery ("EOR") project where the CO_2 has value. SCG's franchise includes pipeline rights-of-way leading to most of the oil producing resources in Southern California. It is therefore incumbent upon SCG to research, develop and demonstrate CO_2 transportation technology to assure that CO_2 can be moved safely and effectively from power plants and industrial facilities to CO_2 sequestration sites, most likely oil reservoirs that can benefit from CO_2-flooding. Therefore, SCG proposes to add a CO_2 transportation element to its CCS RD&D program area.

The goal for CO_2 transportation RD&D is to develop information that will help natural gas utilities and policy makers begin building a safe, cost-effective and reliable CO_2 transportation infrastructure, together with laws and regulations, necessary to complement the CO_2 capture and storage technologies that are currently under development.

CO_2 transportation RD&D tasks include: 1) CO_2 Conditioning – Develop an engineering model, in conjunction with parametric testing and analysis, of pressure, temperature and purity to determine the optimal conditions for CO_2 transmission by pipeline from power plants and industrial sources to sequestration sites; 2) Pipe Materials Testing – Evaluate and test a variety of potential CO_2 piping materials and components to identify optimal materials for safe, cost-effective and reliable CO_2 transportation (this will include potential structural materials (metals, plastic and composites), pipe sizes and pipe coating materials); and 3) Natural Gas and CO_2 Transportation Integration – Design and test methods of using the existing natural gas pipeline equipment and infrastructure to facilitate the transportation of CO_2 this will include: (a) running CO_2 pipelines and compressors parallel to existing natural gas pipelines and compressors; and (b) placing strands of CO_2 pipe inside abandoned or underused gas and oil pipelines that interconnect with potential enhanced oil recovery projects within its service territory).

4) Clean Transportation – Funding Proposal

SCG proposes a TY 2012 budget of $0.835 million for Clean Transportation. The Clean Transportation RD&D funding proposal is summarized in **Table 5**, with descriptions of each project area following the table.

TABLE 5

Natural Gas Vehicle Proposed Funding Request

($000)

Clean Transportation Project Areas	2012 GRC Proposed
a) Compression & Storage	220
b) Engines & Applications	370
c) Fuel Composition & Blending Applications	245
Total Clean Transportation	**835**

a. Compression & Storage

SCG proposes a budget in TY 2012 of $220,000 for Compression & Storage RD&D projects, to test and demonstrate new compressor technologies.

NGV cylinder design and safety has been of great concern for the NGV industry over the past decade. NGV cylinder design is of particular importance due to the weight and bulk of traditional steel CNG storage cylinders. In addition, many techniques have been developed to measure cylinder safety, including visual inspections, damage indicator coating systems, non destructive evaluation techniques, and real-time monitoring of composite pressure vessels used for high pressure storage of natural gas or hydrogen.

The purpose of this project is to develop and demonstrate safe, reliable and cost-effective fuel storage systems for all types of CNG vehicles. As a result, sub-projects will range from developing more sophisticated CNG cylinder inspection techniques to prolong life and increase safety to developing advanced CNG storage cylinders and reduce weight and bulk associated with current cylinders. New adsorption storage tank technology will also be developed and tested as part of increasing refueling efficiencies. These systems provide SCG customers increased opportunities to use NGV vehicles that are safe, reliable and economical in every vehicle market.

Specific objectives include: conduct various life testing demonstration programs; conduct field demonstration program; develop new safety standard, manuals and inspection protocols; develop cost-effective materials and sensors; and develop and test adsorption fuel storage technology.

The widespread availability of safe, reliable, and cost-effective CNG vehicle refueling stations remains an obstacle to expanding the use of NGVs in every potential market. There are over 200 CNG stations in operation throughout Southern California, but only about one-third are "public access" and available to the general public. Many "public access" stations do not always provide a complete fill due to inadequate dispenser technology, inadequate CNG storage, or faulty design. Since NGVs are likely to be promoted by state and local air quality and energy agencies as a means to enhance air quality and reduce dependence on petroleum, it is imperative that CNG station technologies be developed that are more economical, more reliable, and inherently safe.

The purpose of this project is to develop and demonstrate safe, reliable and cost-effective CNG refueling infrastructure for all types of vehicles. As a result, sub-projects will range from developing more accurate CNG dispensing techniques to demonstrating refueling systems for various NGVs applications.

Specific objectives include: develop, measure and apply new dispenser fill technologies to accurately measure vehicle tank pressure and volume, and demonstrate modular refueling stations that have the potential to reduce installation time and costs.

b. Engines & Applications

SCG proposes a budget in TY 2012 of $370,000 for projects related to Engines & Applications RD&D to develop, test and demonstrate new engine technologies.

The purpose of this project area is to develop and demonstrate new low emission medium and heavy-duty CNG engines and related technologies to help customers, fleet operators and vehicle suppliers to meet emission requirements for 2007-2010 and beyond. Additional efforts will focus on improving emissions beyond current regulations as part of continually reducing emissions for proposed regulations. Funding is expected to be leveraged with other partners to provide engine OEMs an economic incentive to move forward with engine development projects that would otherwise be delayed or canceled. These new technologies include stoichiometric combustion with heavy-mixing of cooled exhaust gas recirculation ("EGR") and stoichiometric three-way catalyst technologies. Older diesel engine conversion technologies will also be developed and funded to help encourage retrofitting of more polluting diesel engines.

New low emission medium and heavy-duty CNG engines can help fleet operators meet and possibly exceed very stringent 2007-2010 emission standards at a lower cost than new diesel technology. This could help to substantially improve fleet operator economics in the following market segments: medium and heavy duty vehicles for municipal, school bus, refuse hauler, and utility fleets; transit bus applications for articulated and non-articulated buses; short and medium haul trucking for goods movement between ports of entry and local distribution hubs; and light duty operators for customer and fleet vehicle applications.

Specific objectives include: develop engines and emission control technology that meet stringent EPA, CARB, and SCAQMD emission standards for the 2007-2010 timeframe and beyond; average vehicle emission targets will meet at least the 2010 CARB NOx standard of 0.2 g/bhp-hr.; evaluate the technical and economic options of developing emission control technology that will go beyond the 0.2 g/bhp-hr requirements; demonstrate diesel engine conversion to clean CNG applications that meet new air quality standards; support manufacturer demonstration programs to meet new air quality standards (criteria pollutants, air toxics, greenhouse gases) and petroleum reduction goals; and provide SCG customers with reliable, safe and economical NGV alternatives.

c. Fuel Composition & Blending Applications

SCG proposes a budget in TY 2012 of $245,000 for projects related to Fuel Composition & Blending Applications RD&D.

In 2007, SCG and SDG&E surveyed over 4,200 heavy-duty CNG vehicles in operation throughout Southern California. Over 3,000 or 70% of these vehicles are referred to as "legacy fleet" vehicles that contain engines that are not capable of operating on natural gas below Methane Number ("MN") 80. Since it is expected that shipments of LNG arriving at import terminals planned for operation in 2008 and beyond will supply gas below MN 80, it is important to understand what options are available to ensure all CNG vehicles operate safely and efficiently on the gas provided.

Legacy DDC, Cummins, John Deere, and Tecogen engines have specific gas quality specifications. These efforts will allow legacy fleet operators to operate their engines under more broad fuel specifications with potentially minimal engine modifications. This will be a considerable cost and operating savings when compared to engine or vehicle replacement.

The purpose of the fuel specification project area is to develop and demonstrate options for "legacy fleet" heavy-duty CNG engines to operate at the boundary conditions of the current SCG Rule 30 gas quality specifications or MN levels as low as 68.

Specific objectives include: develop new CNG engine fuel specifications, as required, that will meet engine manufacturer fuel requirements as well as potential new LNG import supplies; develop CNG engine retrofits for meeting new fuel specifications, such as knock sensors and controls; and address the concerns of policy makers, engine manufacturers and fleet operators about operating existing "legacy fleet" engines outside of the current manufacturer fuel specifications.

Based on concerns regarding energy independence and global warming, federal and state officials have expressed significant interest in the potential of a hydrogen-based fuel cells. As a result, there is an increased desire to develop enabling technologies for hydrogen to power fuel cells in vehicles and stationary applications. Natural gas is one of the major sources for on-site hydrogen generation. By making cost effective hydrogen on-site from natural gas feedstock, customers can avoid transport and logistical costs associated with transporting hydrogen. Using the existing natural gas infrastructure can be a cost effective bridge to support this effort. Furthermore, using a blend of hydrogen and natural gas as a fuel offers a way to gain valuable experience producing and using hydrogen, obtain additional air quality benefits (as much as 50% over existing natural gas engine emissions), and provide a cost-effective present day solution by using existing CNG vehicle and infrastructure technologies.

The purpose of the fuel blending project area is to test and demonstrate safe, reliable and cost-effective Hydrogen and Hydrogen-CNG station technologies.

Specific objectives include: develop risk/benefit mode for environmental and safety consideration of operating on-site; evaluate the safety, reliability, and cost effectiveness of operating small scale hydrogen and hydrogen- CNG fueling systems; work with hydrogen vehicle OEMs to lease and provide vehicles for demonstration; demonstrate the use of hydrogen-CNG in existing CNG vehicles; and evaluate benefits of utilizing existing infrastructure to support the hydrogen highway.

5) Renewable Energy – Funding Proposal

SCG proposes a TY 2012 budget of $2.805 million for the newly created Renewable Energy RD&D Program. This budget is comprised of $500,000 for solar thermal and $1,750,000 for bioenergy.

The Renewable Energy RD&D funding proposal for both solar thermal and bioenergy is summarized in **Table 6**. Details concerning each project area follow the table.

TABLE 6

Renewable Energy Proposal Funding Request ($000)

Project Areas	2012 GRC Proposed
a) Solar Thermal	750
b) Biogas Conditioning	850
c) Pyrolysis & Gasification	705
d) Bioenergy Integration	500
Total Renewable	**2,805**

a. Solar Thermal

The proposed TY 2012 solar thermal budget is $750,000. Project areas include modular concentrating solar power ("MCSP") technology, hot water applications, and chilled water applications.

Modular Concentrating Solar Power

MCSP can be applied to many applications, including generating high temperature water that can be used in industrial processes, drying, electric generation, and space conditioning. MCSP requires tracking the sun. Major concerns of MCSP are in the reliability of the tracker and controller. MCSP for distributed solar installations has the following characteristics comprised of three generic system architectures: 1) line focus consisting of parabolic trough and compact linear Fresnel reflector type collectors; 2) point focus central receiver systems consisting of power towers using heliostats; and 3) point focus distributed receiver systems consisting of dish engines.

R&D efforts will evaluate and test line focus technology due to advances in materials, tracking technology and modularity of the systems. The collector design will be parabolic, compound parabola concentrating ("CPC"), and Fresnel lens reflectors. The hot water produced from the line focus collectors are more applicable to cooling and water heating applications. Linear collectors capture the sun's energy with large mirrors that reflect and focus the sunlight onto a linear receiver tube. The collector fields consist of collectors in parallel rows that are typically aligned in a north-south orientation to maximize both annual and summertime energy collection. With a single-axis sun-tracking system, this configuration enables the mirrors to track the sun from east to west during the day, ensuring that the sun reflects continuously onto the receiver tubes.

The advantages of MCSP as compared to fat-plate and tubular solar collectors are listed below: 1) higher efficiencies at elevated temperatures of up to 400F; 2) efficiency range from 40% to 60%; 3) solar tracking capability; 4) longer period in harnessing of solar irradiation, by 20 % or more; 5) avoidance of stagnation heat and less prone to freezing; 6) modular systems can be deployed on commercial, industrial, and institutional facilities; and 7) installation can be roof or ground mounted.

Hot water applications

Domestic solar water-heating systems for buildings have two main parts, a solar collector and a storage tank. The most common collector used in solar hot water systems is the flat-plate collector. Solar water heaters use the sun to heat either water or a heat-transfer fluid in the collector. Heated water is then held in the storage tank ready for use, with a conventional system providing additional heating as necessary. The tank can be a modified standard water heater, but it is usually larger and very well insulated. Solar water heating systems can be either active or passive, but the most common are active systems. Flat-plate collectors are the most common solar collector for solar water-heating systems in homes and solar space heating. A typical flat-plate collector is an insulated metal box with a glass or plastic cover (called the glazing) and a dark-colored absorber plate. These collectors heat liquid or air at temperatures less than 180°F. Evacuated-tube collectors can achieve extremely high temperatures (170°F to 350°F), making them more appropriate for cooling applications and commercial and industrial applications. However, evacuated-tube collectors are more expensive than flat-plate collectors, with unit area costs about twice that of flat-plate collectors.

Chilled water applications

Solar thermal a/c necessitates the technologies of high efficiency concentrating solar power ("CSP") in the temperature range from 100° to 400° C and innovative thermally activated cooling equipment. Currently, there are tubular type solar products on the market that can satisfy the single effect ("1E") chillers, which can begin implementation of solar thermal cooling. However, the driving needs for future distributed solar a/c projects are in the small efficient modular CSP and cost-effective cooling equipment. Thus, it will greatly enhance benefits in the commercialization of solar thermal a/c installations in the near future.

Solar thermal cooling uses solar panels that capture the sun's energy with large mirrors that reflect and focus the sunlight onto a tube that contains water. The resulting hot water is piped to a storage tank and is used in the absorption air-conditioning process to provide cooling for a building. Absorption cooling systems use the solar-heated water in place of electricity or natural gas to boil a salt-water solution. This absorption cooling process is similar to the electric cooling process. The difference is heat is used instead of electricity as the power source.

The Solar-Thermal Program areas of focus will be: supporting manufacturers and other stakeholders in new technologies such as co-funding solar hot water and a/c demonstration projects; participating in co-funding development and demonstration of innovative and advanced thermally activated cooling systems; work on integration of the new technologies in MCSP, with thermal storage, advanced chillers and building HVAC systems; and work on technical challenges, including resolving issues related to applications, system sizing, equipment integration, installation issues.

Bioenergy

The proposed TY 2012 bioenergy budget is $2,055,000. Project areas included Biogas Conditioning, Pyrolysis & Gasification and Bioenergy Integration.

b. Biogas Conditioning

SCG proposes $850,000 for biogas recovery, upgrading, measurement, monitoring and control to build on its accomplishments to-date in testing an advanced biogas upgrading system for a wastewater treatment plant. With co-funding from vendors, the DOE and equity investors, these funds will be used to develop and test a low cost (both capital and O&M) biogas upgrading system that will recover at least 99% of biomethane from a landfill or

digester. Candidate technologies include advanced PSA, amine scrubbing and cryogenic distillation. The total installed cost of this system is estimated to range from $1.5 to $3.0 million, depending on the volume of raw biogas production.

The technology challenge is to cost-effectively separate and upgrade raw digester gas to meet quality standards for injection into the natural gas distribution grid. Currently, all of the biogas resource in California is being combusted on-site to produce heat or electricity, or it is flared. Essentially none of the biogas resource is being injected into the natural gas distribution grid. The sole example of biogas upgrading for distribution system injection in California today is SCG's RD&D project at a waste water treatment plant in the City of Escondido. The continuation of this utility-based biogas RD&D program is necessary to address key biogas technology gaps: (1) optimizing the anaerobic digestion processes to produce as much biomethane as possible (this will improve project economics and minimize the amount digester sludge sent to landfills); (2) maximizing the amount of biomethane recovered from raw digester gas (this will improve project economics and minimize the need to flare biomethane); (3) reducing the cost of biomethane recovery and upgrading to meet pipeline quality standards (this will improve project economics and enable biogas recovery at small digesters); and (4) safely, reliably and cost-effectively measuring, monitoring and controlling biomethane production and pipeline injection (this is an essential prerequisite for a sustainable biogas industry).

c. Biofuels Pyrolysis, Gasification and Syngas Conversion

SCG proposes $705,000 for a thermal pyrolysis, gasification and syngas conversion project. With co-funding from vendors, DOE and equity investors, these funds will be used to develop and build and test a pilot gasifier capable of using biomass such as municipal solid waste, agricultural waste, waste water treatment plant sludge and algae, along with low value fossil fuels such as petroleum coke. The syngas produced by the gasifier will be used to as fuel for an oxy-fuel power plant (described in the CCS section) and/or converted to methane for pipeline injection.

Pyrolysis and gasification are processes that convert carbonaceous materials, such as coal, petroleum, or biomass, into a synthesis gas comprised primarily of carbon monoxide and hydrogen. Pyrolysis and gasification react the raw material at high temperatures with a controlled amount of oxygen and/or steam. Traditional high-energy fuels such as petroleum

coke (petcoke) and coal are standard gasification feed stocks. However, pyrolysis and gasification are also very effective means for extracting energy from a variety of renewable organic materials, including municipal solid waste, forest waste, water treatment plant effluent, food waste, manure, grease, and algae. Additionally, gasifying mixtures of biomass coal or petcoke can secure beneficial attributes of both feed stock types. Currently, there are no commercial biomass gasification systems operating in California or North America.

d. Utility Integration of Bio Energy

SCG proposes $500,000 to build and test the integration of a natural gas compressor station with commercial greenhouse operations. This will build on an RD&D project that was launched in 2010.

The gross biomass resource in California, were it all to be used for power generation, would be sufficient to generate 35,000 GWh of electrical energy, or roughly 12% of the current statewide demand of 283,000 GWh. Converting the 35,000 GWh of electricity to the amount of natural gas required to generate that electricity yields a total of about 300 Bcf of natural gas, nearly equal to SCG's annual Core Portfolio volume.

To be effectively utilized, biomass gasification systems must be integrated with utility operations. Syngas from biomass gasification may be combusted directly in utility steam/electric generators or used to produce various other energy currencies used by utilities, such as methanol and pure hydrogen, diesel or methane. Methanation and conditioning of syngas to pipeline quality standards provides flexibility on how and where it is ultimately sold and consumed by utilities and their customers. SCG biomass pyrolysis, gasification and methanation RD&D is required to bring the initial biomass gasification and methanation systems on-line in Southern California.

Utility operations generate large quantities of byproducts that can be recycled into the bioenergy resource production cycle. For example, CO_2, waste heat and water from power plants can be recycled and used to stimulate plant growth in greenhouse operations and algae ponds. Currently, these significant resources are being wasted. Without a SCG RD&D effort this valuable resource will continue to be wasted.

6) RD&D Project Management, Program Planning &Administration

SCG proposes a budget in TY 2012 of $1.55 million for Project Management, Program Planning and Administration to support approximately 16.5 FTEs. A portion of this total, $1.025 million, will be used to support 12.5 FTEs completely dedicated to managing specific RD&D projects. Staff project managers directly support project development and management, and coordination and collaboration with other stakeholders. They ensure that projects pursued are high value, cost effective and are completed on time and on budget. The balance of funding, $525,000, will support 4.0 FTEs and non-project related Program Planning and Administrative costs of managing the SCG RD&D program. Program Planning and Administration covers support and ancillary activities related to RD&D, including portfolio management, project tracking, RD&D balancing account management, royalty tracking, and occasional consultant support to enhance the technology development process.