Clean Energy®

North America's leader in clean transportation

Biomethane Vehicle Fuel

Harrison Clay, Clean Energy

Natural Gas and
Southern California's Renewable Energy Future
Los Angeles, CA

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Clean Energy


- Leading provider of natural gas as a vehicle fuel in North America: fueling over 20,000 natural gas vehicles daily
- Turn-key station construction & fuel supply for CNG & LNG
- Biomethane and LNG production
- Natural Gas Vehicle Fuel Compressors
- Natural Gas Vehicle Conversions

CNG Stations

LNG Plant & Stations

Dallas Clean Energy, LLC: McCommas Bluff

- City of Dallas owns & operates landfill
- Dallas Clean Energy, LLC ("DCE") purchased biogas rights & processing plant
- Joint Venture w/ Cambrian Energy
- PSA clean-up system
- Current capacity 9MM CFD in & 4.5MM CFD out
- Anticipate 7.5MM CFD out by 2015
- Equal to 60,000 gasoline gallon equivalents a day of vehicle fuel

Sauk Trail Hills, Michigan Landfill Project

- In November, 2010 we executed a first of its kind agreement with Republic to develop an RNG project at a Republic-owned landfill outside of Detroit, MI
- Anticipate 2,500 Mmbtus a day of production of RNG at peak – or 20,000 GGEs a day
- Republic has option to use RNG as vehicle fuel at Clean Energy-built and operated stations – fuel can be delivered to Republic fueling yard anywhere on the interconnected grid
- Project anticipated to be on-line first half of 2012

Biomethane: Best & Highest Use

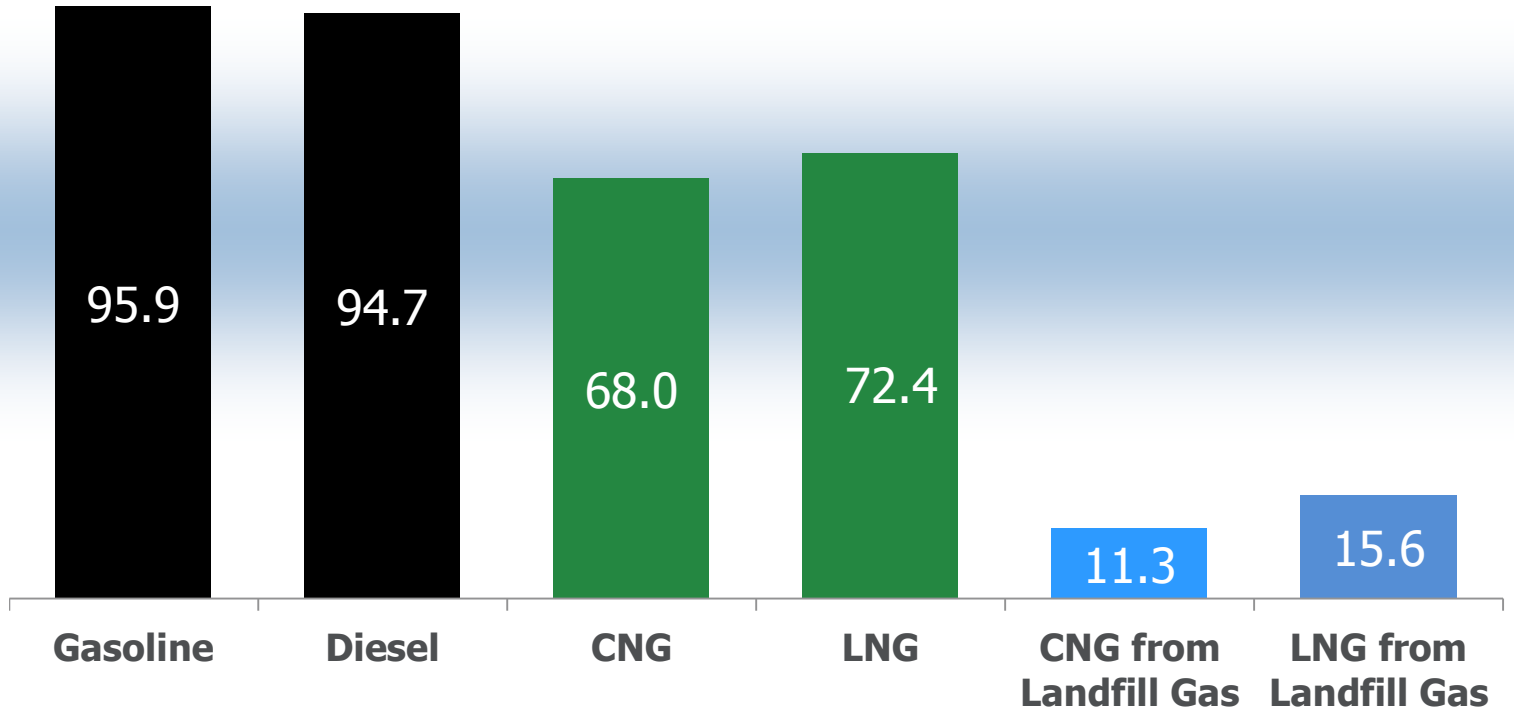
- If all government incentives for biomethane production & use were equal – what would be the highest, best use?
- #1: Vehicle Fuel: No other readily available alternative fuel to gasoline & diesel that can achieve all of the following:
  - 90% reduction in GHG emissions associated with transportation
  - Renewable
  - Easily distributed through existing infrastructure locally, regionally & nationally
  - Suitable for all applications from light duty passenger to heavy duty trucking
  - Can be produced at reasonable cost in commercial quantities today

Market Opportunity: Efficiently Distributed and Consumed

- RNG can be injected into the pipeline grid and efficiently distributed through existing pipeline or gas swaps to the point of consumption - new transmission investment not a requirement
- RNG is produced by waste streams that are generally located near population centers and energy demand
- RNG is base load: unlike solar and wind it is generated constantly and be stored at reasonable cost

Carbon Reduction from Biomethane Fuel

WTW Greenhouse Gas Emissions*
(in grams CO2eq/MJ)



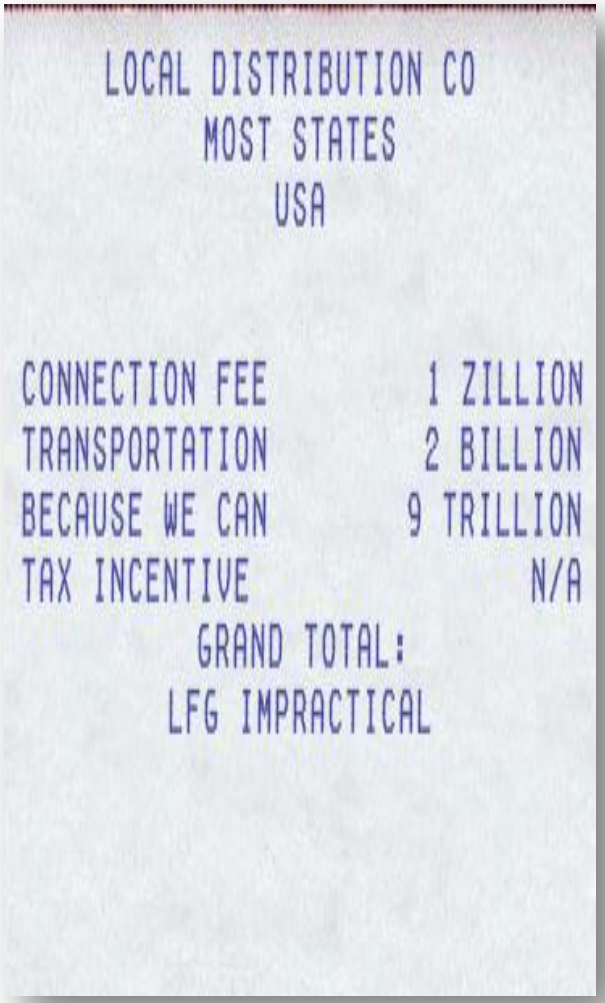
* CARB WTW data from LCFS

Economics of Biomethane Vehicle Fuel

- If the cost of biomethane production is $5.50 an MMbtu vs. $4.50 MMbtu cost for conventional ("Blue Gas") price = $0.69 GGE cost vs. $0.56 GGE cost (Blue Gas is $0.13 cheaper per GGE) ***and very few customers will voluntarily pay a premium for RNG***
- Customers will continue to fuel with cheaper Blue Gas CNG unless incentivized to use RNG
- If credit incentives (RINS, LCFS) for biomethane equal $0.13 GGE we have a "break even" with Blue Gas CNG
  - If credits are worth $1.00 GGE, that is an additional $8.00 per MMbtu of revenue
  - Still need to compete with $12 per MMbtu and higher prices in power generation market, as well as earn return on capital
  - ***LCFS and RIN credits critical to making biomethane vehicle fuel projects pencil out***

Biomethane Vehicle Fuel: Barriers to Market

- Vehicle Fueling with biomethane on any scale requires high BTU gas and pipeline injection
- **RNG production sites and fleet fueling sites are rarely co-located: grid injection and distribution required**
- Barriers to RNG Vehicle Fuel Use:
  - Pipeline connection fees, tariffs & specifications disallow or make RNG pipeline injection impractical due to high costs (recent quotes: $1.8mm-$2.5mm)
  - Incentive programs favor power gen projects (ITC) over RNG pipeline injection
  - Market for vehicle fuel incentives under LCFS (CA) and RFS II are uncertain, illiquid and are not "financeable"



Keys to Market Development

1. Ensure open access to pipelines and transportation on grid at reasonable cost:
   - AB 768 and/or ARB guidance document will accomplish this for LCFS

2. Ensure stability and liquidity of vehicle fuel credit markets

3. Level playing field by providing comparable tax incentives for RNG pipeline projects as are available in biogas power generation market

4. Develop natural gas vehicle market by incentivizing natural gas vehicle purchase and use

Keys to Market Development: Federal Tax Incentives for Natural Gas Vehicles

- Federal legislation supporting natural gas vehicle fuel use will put more natural gas vehicles (NGVs) on America's roads by increasing & extending several key tax credits
  - Tax credits offset incremental cost of natural gas vehicles
  - 200,000 natural gas fleet vehicles could displace 1.8 billion gallons of petroleum annually
  - If passed legislation could lead to as many as 500,000 new jobs
  - Key: more Nat Gas vehicles on the road and more fueling infrastructure creates demand for biomethane vehicle fuel

For more information:

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