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Sempra Energy comments on July 6 EE Symposium

Attachment 1 of 2

Additional submitted attachment is included below.

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California Energy Commission
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July 27, 2015

RE: Comments of the Southern California Gas Company on the Joint Agency Workshop on the Governor's Energy Efficiency Goals. Docket No. 15-IEPR-05

Dear Commissioners:

The Southern California Gas Company, a Sempra Energy utility, appreciates the opportunity to participate in the Joint Agency Workshop on the Governor's Energy Efficiency (EE) Goals. We offer the following comments on: 1) renewable natural gas (RNG); 2) electrification of water heating; 3) meeting California's air quality standards; and 4) community-scale generation.

The Governor has established new and challenging goals for California to reduce greenhouse gas emissions over the next 35 years. In his State of the State address on January 5, 2015, Governor Brown mentioned the need to move to cleaner heating fuels for homes and businesses. In the workshop, Commissioner McAllister asked the panel to consider two alternative paths for homes - lower carbon heating fuels, like renewable natural gas, or electrification. SoCalGas would like to expand on the information shared during the workshop and address several questions/comments raised by Commissioners and other participants in the workshop.

1. Renewable Natural Gas

SoCalGas has been looking at the long-term role for natural gas in a low carbon energy mix. We engaged Energy + Environmental Economics (E3) to expand on their prior work for the Energy Principles to look at: *Decarbonizing Pipeline Gas to Help Meet California's 2050 Greenhouse Gas Reduction Goal.*[1] In the E3 study (Appendix A), there would be deep de-carbonization of the natural gas supply. By 2050, more than 50% of our natural gas supply would come from RNG. E3 concluded:

- Pipeline de-carbonization works together with renewable electricity and electrification strategies towards GHG reduction objectives.
- Decarbonized pipeline gas reduces emissions in sectors that are otherwise difficult to electrify, including heavy duty vehicles; certain residential and commercial end uses, such

[1] SoCalGas' initial work with E3 was on the 2050 target to reduce GHG emissions by 80% below 1990 levels. We had assumed a straight-line progression to the 2050 target. So, by 2030, we would achieve a 34% reduction in GHG emissions. We would hit the 40% GHG reduction target between 2032 and 2033.

as cooking, and existing space and water heating; and certain industrial end uses, such as process heating.

- Decarbonized gas in the form of power-to-gas can play an important role integrating variable renewable generation by producing gas, and then storing it in the pipeline distribution network for when it is needed to serve residential and commercial customers or for electricity generation.
- A transition to decarbonized pipeline gas would enable continued use of the state's existing gas pipeline distribution network, eliminating the need for new energy delivery infrastructure to meet 2050 GHG targets, such as dedicated hydrogen pipelines or additional electric transmission and distribution capacity.
- Decarbonized gas technologies help diversify technology risk associated with heavy reliance on a limited number of decarbonized energy carriers, and would allow consumers, businesses and policymakers greater flexibility and choice in the transition to a low-carbon energy system.

RNG can be produced from a variety of renewable feedstocks,[2] including agricultural residue, animal manure, energy crops (like switch grass and algae), fats, oils and grease, forestry and forest product residue, landfill gas, municipal solid waste, and wastewater treatment gas. RNG production is largely produced via two established conversion technologies: anaerobic digestion (microorganisms break down organic material in an environment without oxygen) or thermal gasification (reacting organic material at high temperatures without combustion).

There are several national studies on the availability of biomass feedstocks. Table 1 below shows the RNG supply potential based on four studies. Where data was available, we have shown the feedstock within California based on each study.

	Sources (billion cubic feet / year)	
	California	**National**
BAC/UC Davis[3]	322.8	N/A
NPC[4]	N/A	4,840
AGF[5]	54.3 – 132.7	966 – 2,486
DOE BT[6]	67.2 – 98.6	1,256 – 9572

[2] U.S. Department of Energy (DOE), Billion Ton Update: Biomass Supply for a Bioenergy and Bioproducts Industry (August 2011) (DOE BT). Biomass Supply for a Bioenergy and Bioproducts Industry led by Oak Ridge National Laboratory provides the most comprehensive available study of long-term biomass potential in the U.S. In this study, we have assumed that California can import up to its population-weighted proportional share of the U.S.-wide biomass feedstock resource potential.

3 BAC/University of California, Davis (UC-Davis), White Paper (November 2014). The BAC white paper draws from an analysis performed by UC-Davis.

4 National Petroleum Council (NPC), An Overview of the Feedstock Capacity, Economics, and GHG Emission Reduction Benefits of RNG as a Low-Carbon Fuel (March 2012).

5 American Gas Foundation (AGF), The Potential for Renewable Natural Gas: Biogas Derived from Biomass Feedstocks and Upgraded to Pipeline Quality (September 2011).

6 DOE BT. Nationally, the DOE study found that if a proportional amount was produced based on population, there would be sufficient sources to meet this low carbon scenario. 25% would be generated from waste and 20% from energy purpose crops like switchgrass.

Table 1. RNG Potential Supply

Further study needs to be done on how to bring these biomass feedstocks to market. SoCalGas would be interested in partnering with CEC and others to develop a study of the costs to bring renewable natural gas to the market and the policy drivers that can facilitate the development of the renewable natural gas market.

During the workshop panel discussion, Cliff Rechtschaffen asked if SoCalGas supports state policy to develop renewable natural gas. SoCalGas believes that the renewable natural gas market will only develop if there are supportive policies in place to create opportunities for project developers. We believe the first step is to provide incentives for the development of projects. We have seen how effective incentive programs can be to the economic commercialization of technologies. For many years, solar PV panels have received tax credits and direct subsidies for early installation of technologies. As the number and scale of projects has increased, we have seen the amount of these subsidies decline. This approach has significantly increased solar adoption.

Currently, there is very little direct funding of biogas projects. CEC has been the only agency to actually fund biogas projects until recently. Last year, California set aside of a small amount from the Greenhouse Gas Reduction Funds (GGRF) for anaerobic digestion projects. However, we will need more GGRF to support development of biomass and biogas projects to meet the Governor's goals.

Recently, the CPUC authorized the utilities to fund a portion of the interconnect costs for biomethane projects.[7] Biomethane developers looking to inject into utilities' pipeline are eligible for a one-time payment of 50% of the interconnection costs, up to $1.5 million. The program is authorized for up to $40 million dollars.

The program with the greatest opportunity to support the development of the RNG market is the Low Carbon Fuel Standard (LCFS). As the LCFS market deepens, RNG use will increase in the transportation sector. The market has been slow to develop due to delays in implementing the program and the low carbon intensity reduction target for 2015 fuels. Once the program is reauthorized later this year and the reduction target starts to decline towards the 2020 goal, we will see greater value in the LCFS market creating opportunities for project developers. This market program provides the best opportunity for the early development of the RNG market, as well as other alternative fuels.

The transportation sector is diverse and will require a variety of solutions to meet our near-term and long-term goals. While, we are starting to see a variety of options for electric and hydrogen fuel cell vehicles in the passenger car market, there continues to be technological and economic challenges in the heavy-duty sector. Heavy-duty natural gas trucks provide an immediate opportunity to reduce emissions. The LCFS and the Federal Renewable Fuel Standard create financial incentives to fuel these trucks with renewable natural gas.

2. Electrification of Water Heating

Some consider electrification as the only path to deep GHG reductions. They focus on moving to renewable electricity sources, like solar and wind power, and electrifying all end uses. However,

[7] Phase 2 Biomethane OIR Decision (D.15-06-029)

electrification under the current mix of electricity sources would actually increase GHG emissions for applications, such as water heating, where there is greater efficiency in the natural gas equipment.

As part of a 2011 study on the 'Cost of Electrification as a NOx Abatement Strategy', E3 also considered the GHG impact of electrification of end use equipment. The study found that carbon emissions increase for water heating applications (residential water heating and commercial boilers).

A conventional tank natural gas water heater would have lower CO2 emissions than an equivalent-sized electric water heater until the electricity mix exceeds 50% renewables.[8] Looking at a potential comparison in 2030 with a tankless water heater using a mix of conventional natural gas and renewable natural gas versus the electric alternative, we would expect to see a continued GHG benefit and cost benefit to natural gas water heating.

Furthermore, as Commissioner Weisenmiller noted in his discussion with Peter Miller of NRDC, you would need to look at the emissions from the marginal generating facility when evaluating the near-term GHG impact of electrification. In most instances, natural gas is the marginal generating unit. Therefore, you must compare the emissions from the direct use of natural gas in the home for water heating with the emissions at the local power plant. The direct use of natural gas in the home has lower GHG emissions.

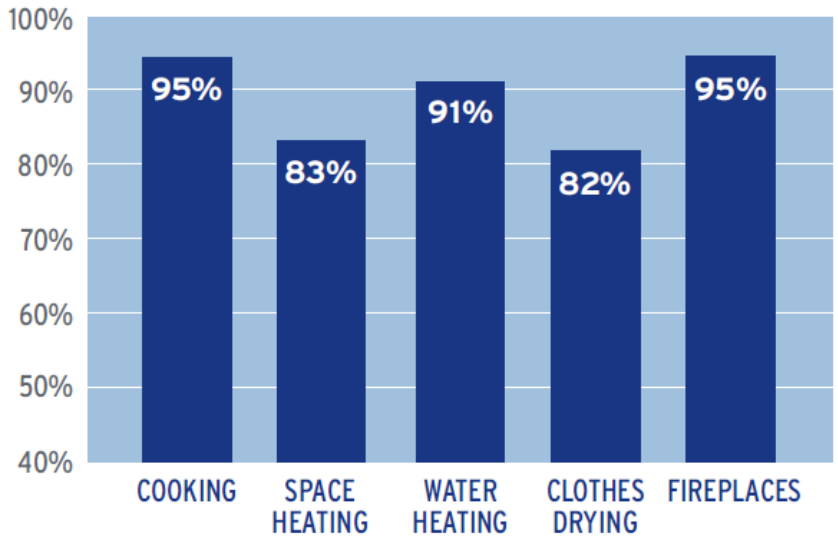
Second, natural gas water heating is more cost effective than electric heat pump water heating. Based on a cost analysis performed by NegaWatt in response to the Title 24 Instantaneous Water Heater Codes and Standards Enhancement Initiative (CASE) study, the initial equipment and installation cost ($1,868) of an electric heat pump water heater is more than twice the cost of a natural gas condensing instantaneous water heater ($758), making the electric heat pump water heaters cost prohibitive. Additionally, building out the electricity grid for a fully electrified end-use economy requires a large transmission and distribution line infrastructure build-out.

Third, electric heat pump water heaters will negatively impact SoCalGas' economically challenged customers. High upfront, installation, and maintenance costs[9] of heat pump water heaters are cost prohibitive for low-income customers.[10] Over 90% of homes in SoCalGas territory use natural gas space and water heating due to efficiency and cost. For existing homes that use natural gas heating fuels, it makes sense to pursue renewable natural gas and low-carbon natural gas rather than retrofit homes for electric load. Talbot Gee, CEO of Heating Air-Conditioning & Refrigeration Distributors International, stated during the workshop that space constraints can be an issue when converting natural gas water heaters to electric ones, and in his professional experience, homeowners are not going to remodel their home to be in compliance.

Furthermore, consumers overwhelmingly prefer natural gas appliances over electric ones. This is demonstrated in the *2014 Visions Consumer Survey* (Appendix B)[11] which found that 91% of

[8] The CO2 emissions for electric water heating is based on 33% renewable electricity by 2020.
[9] Following installation, electric heat pump water heaters cost 60% more to operate.
[10] 35% of SoCalGas customers qualify for Low Income Programs.
[11] The 2014 Visions Home Preference Survey was administered by Meyers Research LLC and was co-sponsored by the Building Industry of Southern California and SoCalGas. The results are based upon responses in July 2014 from 1,926 home buyers and renters who had initiated gas service in the previous 30 months. SoCalGas, The Vision 2014 Home Preference Survey (October 2014) (SoCalGas Survey), 1.

respondents preferred natural gas water heating over electric, and on overage, 89% chose natural gas appliances over electric, shown in Graph 2 below. Customers also responded that when looking for a new home they noticed whether or not appliances were natural gas,[12] preferred a home with an outdoor natural gas outlet,[13] would spend more for a home with efficient natural gas appliances,[14] and preferred natural gas amenities in community areas.[15] These energy preferences indicate that natural gas continues to be the appliance energy of choice for Southern California homebuyers and renters. Considering this reality, SoCalGas believes that California can still meet air quality and climate change goals with a mixed energy use approach.



Graph 2. Percent of homebuyers and renters that prefer natural gas appliances[16]

3. Meeting California's Air Quality Standards

Reducing GHGs is an important challenge for all Californians. In Central and Southern California, we have an equally important challenge of improving air quality. SCAQMD and San Joaquin Valley Air Pollution Control District (SJVAPCD) areas continue to have the worst air quality in the nation. It is critical to reduce criteria pollutants, such as particulate matter and ozone, to address the immediate and on-going health impacts of poor air quality.

Over the past several years, SoCalGas has worked with the air districts to identify opportunities to reduce oxides of nitrogen (NOx) emissions, a precursor to ozone, from stationary and

[12] 88% stated that when searching for a home (to purchase or rent) they noticed whether the appliances were NG or electric. SoCalGas Survey, 2.
[13] 92% stated that they preferred their new home provided a NG outlet in the patio area that could be used for outdoor gas appliances like a barbeque or outdoor patio hearer. SoCalGas Survey, 2.
[14] 84% stated that they would spend more for a home or rental that included efficient NG appliances that would both decrease their utility bill and increase their comfort. SoCalGas Survey, 2.
[15] 88% stated that they would prefer that their residence included NG amenities in the community areas like barbeques, fireplaces, or outdoor patio heaters. SoCalGas Survey, 2.
[16] SoCalGas Survey, 2.

transportation sources. Our work has focused on near-term NOx reductions and longer-term GHG reductions. On the transportation side, SoCalGas has partnered with SCAQMD and CEC to fund new engine technologies that will significantly reduce NOx emissions. On stationary sources, SoCalGas continues to research technologies to reduce emissions and supports advances in energy efficiency to further reduce energy consumption and emissions.

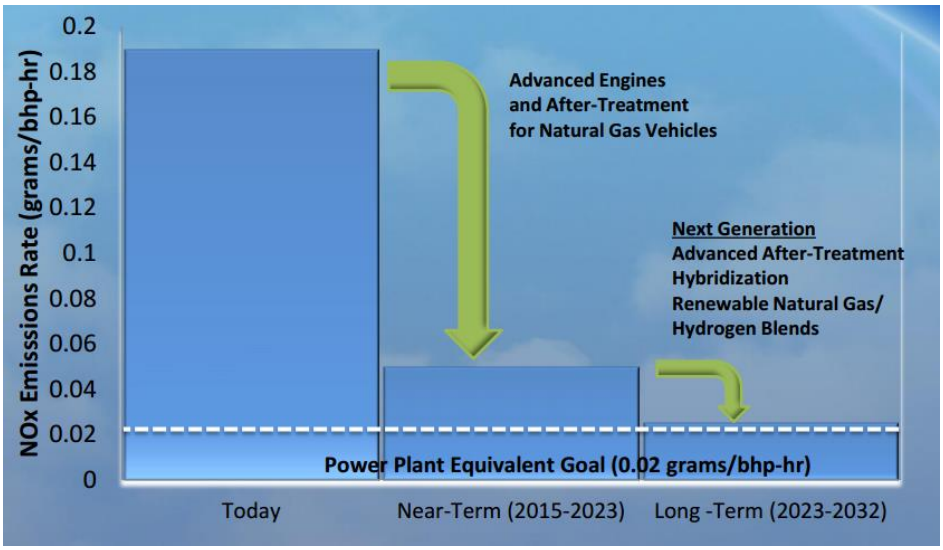
During the workshop, Chair Weisenmiller commented that SCAQMD may need to electrify end-uses to meet clean air requirements. While SCAQMD has made previous statements about getting combustion out of the LA Basin, their approach has moderated and they've acknowledged the need to pursue all available technologies to reduce emissions. In their 2012 Energy Policy, SCAQMD adopted a fuel neutral policy. They focused on identifying opportunities in all sectors to promote lower emissions technologies. In their 2016 Air Quality Management Plan (AQMP) draft white papers, SCAQMD has reinforced this policy of fuel neutrality and focused on an energy mix that can produce near-zero and zero emission technologies for the LA Basin. In the residential and commercial sector (Appendix C), SCAQMD has emphasized the importance of energy efficiency programs to reduce emissions. They have called for further coordination of the programs by the utilities and other state agencies to maximize the benefits from these programs.

Natural gas is an important part of SCAQMD's energy solution in the near-term, long-term, and as part of the broad solution to achieve their necessary emissions reductions. SCAQMD must reduce NOx emissions by approximately 65% in 2023 and 75% by 2032.[17] To achieve this reduction, SCAQMD states it is "essential" that they utilize many combustion related processes that use zero- and near-zero emission technologies in the mobile and stationary source sectors.[18] Plans include advancements in engine design, energy storage/conversion devices, and implementation of clean fuels like natural gas, propane, and hydrogen.[19] Stationary source plans incorporate low-NOx technologies, low-VOC coatings and processes, and clean energy alternatives.

SCAQMD plans to reduce emissions in the near-term by utilizing natural gas technology. The agency utilized SoCalGas' overview of the development and prospect of low emitting natural gas technologies as part of its preliminary draft, "A Business Case for Clean Air Strategies."[20] The Business Case highlighted an ongoing study by SoCalGas analyzing the emissions reduction potential of providing financial incentives for the purchase of natural gas vehicles. The study concluded that conventional natural gas heavy-duty vehicles are financially viable because the price advantage of natural gas over conventional fuels can drive natural gas technology adoption, especially with financial or other incentives to shorten the payback period. Near-zero emission natural gas heavy-duty trucks will soon be technologically feasible. SCAQMD and SoCalGas have supported natural gas technology research, development, and deployment. Technological advancements for on-road heavy-duty natural gas engines are expected to achieve a 0.02

[17] South Coast Air Quality Management District (SCAQMD), Preliminary Draft, Blueprint for Clean Air (April 2015), http://www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/blueprint-whitepaper-040215.pdf?sfvrsn=4 (SCAQMD Blueprint), 2-3; SCAQMD, Preliminary Draft, 2016 Air Quality Management White Paper, Goods Movement (June 2016), http://www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/preliminary-draft-goods-movement-white-paper---060515.pdf?sfvrsn=2 (SCAQMD Goods), 2-3.
[18] SCAQMD, AQMD Air Quality-Related Energy Policy (September 2011), http://www.aqmd.gov/home/about/policies/aqmd-air-quality-related-energy-policy (SCAQMD Policy), 4; SCAQMD Blueprint, 4.
[19] SCAQMD Blueprint, 4.
[20] SCAQMD, Preliminary Draft, A Business Case for Clean Air Strategies (June 2015), http://www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/businesscasewp_prelim_061815.pdf?sfvrsn=2 (SCAQMD Business), 4-5.

grams/bhp-hr level of NOx emissions between 2015 and 2023. See Graph 1 "Near-Zero NOx Emissions for Heavy-Duty Truck Achievable through Technology Development" below. Additionally, increased financial incentives can encourage early adoption of near-zero emission natural gas technologies. SCAQMD has already begun monetary incentive programs that promote the market penetration of lower-emitting vehicles.[21]



Graph 1. Near-Zero NOx Emissions for Heavy-Duty Truck Achievable through Technology Development[22]

In the longer-term, SCAQMD plans to incorporate advanced low emitting technology to off-road equipment, rail, vessel, and air cargo transportation by supporting the use of renewable natural gas and other renewable fuels.[23] They recognize the importance of natural gas as part of this solution, including liquefied natural gas and hybrid systems for locomotives that can lead to NOx emissions levels lower than the current Tier 4 emissions standard.[24] SCAQMD will also further develop and demonstrate low emitting biogas technologies and other clean energy sources from biomass for transportation and
stationary sources.[25]

Natural gas is also part of SCAQMD's broader solution to reduce emissions. Throughout SCAQMD's Blueprint for Clean Air and successive white papers, they describe natural gas fuels and technologies that reduce emissions. To be successful, SCAQMD states that they must maximize compliance flexibility with multiple emission reduction methods and maintain a technology neutral approach.[26] Page 13 of SCAQMD's Draft Preliminary Business Case, Clean Air Strategies (Appendix D) states, "Diversity in fuel choices and zero and near zero emission technologies will help to maximize compliance flexibility, and at the same time, bolster innovation and promote cost

[21] SCAQMD Goods, 10
[22] Southern California Gas Company, Briefing for A Business Case for Clean Air White Paper Working Group: Natural Gas Near Zero Emission Technologies Near Zero-Emission Natural Gas Opportunities (October 2014), http://www.aqmd.gov/docs/default-source/Agendas/aqmp/white-paper-working-groups/business-case-socalgas-pres-final.pdf?sfvrsn=2, 4.
[23] SCAQMD Goods, 22.
[24] SCAQMD Blueprint, 7; SCAQMD Goods, 20.
[25] SCAQMD Policy, 9. Through various techniques, different sources of biomass can produce biomethane, biogas, electricity, alcohols, and Fischer-Tropsch fuels.
[26] SCAQMD Business, 13-16.

reduction through competition. A technology neutral approach also helps to provide greater regulatory certainty by not requiring businesses to commit to a specific fuel/technology."

4. Community-Scale Generation

SoCalGas supports the inclusion and advancement of community scale generation technologies. Natural gas powered combined heat and power technologies, including micro-turbines and fuel cells, can be integrated with solar PV to provide right-sized community scale distributed generation (DG) systems that avoid long-distance electrical transmission losses associated with the traditional grid. Additionally, a community scale DG system provides local energy reliability in case of power grid failure or excessive load demands because these systems can provide supply regardless of the time of day or variable weather conditions and could be called upon to support peak load demands. Community scale DG systems also provide increased access to those residential customers who would be unable to utilize rooftop solar.[27]

The Governor has set very ambitious goals for 2030 to reduce GHG emissions. It is critical at these early stages of policy planning that California adopts policies that are fuel neutral, support innovation and retain customer choice. We must study the different options for meeting these goals and not eliminate options before they are given an opportunity to develop.

SoCalGas appreciates the opportunity to provide comments on the Joint Agency Workshop on the Governor's EE Goals.

Respectfully submitted,

Tamara Rasberry /s/

[27] Many homes are not suitable for PV due to structural problems, fire code, roof orientation, and shading, which precludes participation for many customers. Multi-family dwellings are often entirely excluded as well.