DOCKETED

Docket Number:	17-IEPR-10
Project Title:	Renewable Gas
TN #:	220207
Document Title:	SoCalGas Comments SoCalGas Comments on SB 1383 Renewable Gas Workshop
Description:	N/A
Filer:	System
Organization:	SoCalGas
Submitter Role:	Public
Submission Date:	7/14/2017 4:02:01 PM
Docketed Date:	7/14/2017

Comment Received From: SoCalGas
Submitted On: 7/14/2017
Docket Number: 17-IEPR-10

SoCalGas Comments on SB 1383 Renewable Gas Workshop

Additional submitted attachment is included below.

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July 14, 2017

California Energy Commission
Dockets Office, MS-4
1516 Ninth Street
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Subject: Comments on the IEPR Joint Agency Workshop on SB 1383 – Renewable Gas, Docket number 17-IEPR-10

Dear Commissioners,

Southern California Gas Company (SoCalGas) appreciates this opportunity to comment on the 2017 IEPR Joint Agency Workshop on Development and Use of Renewable Gas, Biomethane, and Biogas to Reduce Short-Lived Climate Pollutants (SLCPs), held on June 27, 2017. We appreciate the California Energy Commission's (CEC) recognition that the capture and use of methane will require the widespread development of renewable gas projects in California. Our comments and recommendations are summarized below and further explained in the following pages:

- As over 80% of California's methane emissions come from the agricultural and waste industries, putting organic waste streams to beneficial use in the form of renewable gas is critical to meeting climate change and air quality goals. California will need significantly more development and use of renewable gas to meet its goal of 40% reduction of methane below 2013 levels by 2030.

- Today, demand for natural gas as a transportation fuel is an important market pull for the development of renewable gas. This market will likely drive the immediate opportunity for renewable gas, but as the State's needs evolve, renewable gas can be used to decarbonize natural gas end uses in residential and commercial uses, as well as generate electricity.

- Combining renewable gas with low- and ultra-low-NOx engines provides the best opportunity for California to achieve its air quality and climate change goals in the on-road heavy-duty transportation sectors in the near term.

- Utilities can play a key role in the development of renewable gas resources by investing

in pipelines and other infrastructure needed to produce renewable gas, connect renewable gas projects to the gas pipeline system, and deliver this renewable gas to vehicles. A Renewable Gas Standard (RGS) could facilitate investment by California utilities in renewable gas resources and production, processing and pipeline interconnection facilities in California.

- In addition to these important organic waste pathways, California's long-term energy strategy will be best served by diversifying and maximizing the renewable gas resources available. One opportunity is the development of Power-to-Gas (P2G) facilities that not only expand the availability of renewable gas, but offer the benefit of helping to balance the electric grid by providing valuable long-duration storage of renewable electricity that would otherwise be curtailed.

I. Renewable Gas is Key to Achieving California's Climate Change and Air Quality Goals

As over 80% of California's methane emissions come from the agricultural and waste industries, putting organic waste streams to beneficial use in the form of renewable gas is critical to meeting climate change and air quality goals. The California Air Resources Board's (ARB) 2017 Climate Change Scoping Plan Update relies heavily on the SLCP Reduction Plan, which focuses on utilizing renewable gas from organic sources to achieve 32% of GHG reductions needed to reach the 2030 goals.[1] SoCalGas supports the goals of ARB's SLCP strategy of capturing biogas to be used as a transportation fuel, injected into natural gas pipelines, and/or used to generate on-site renewable electricity and heat.[2]

A. Renewable Gas Can Transform the Freight Sector by Reducing GHGs and NOx

The use of renewable gas in the goods movement and logistics industry is an opportunity to leverage existing technologies to reduce emissions. Combined with low and ultra-low-NOx engines, renewable gas provides the best opportunity for California to achieve its air quality and climate change goals in the near term. Increasing the use of renewable gas as a transportation fuel would not only reduce NOx and GHG emissions but would also reduce SLCP emissions such as methane (from organic waste streams) and black carbon by displacing diesel in heavy-duty (HD) vehicles.

Ultra-low-NOx engines for HD vehicles are the only commercially available product to be certified at or below the 0.02 grams per brake-horsepower-hour emission threshold for NOx. These engines can reduce NOx emissions by 90% compared to the cleanest diesel trucks on the road today, and GHG emissions by 60-400% when fueled with renewable gas, depending on the source. When sourced from dairy manure and organic waste diverted from landfills, the carbon intensity of renewable gas is rated as "carbon-negative," achieving greater than 100% GHG reductions, due to avoided methane emissions from dairies and landfills. Additionally, the use of natural gas also eliminates 100% of diesel particulate emissions.

[1] CARB Proposed Scoping Plan, (January 2017) Figure 2 p. 41
[2] Revised Proposed Short-Lived Climate Pollutant Strategy p. 66.

Currently, 60% of the natural gas used in California vehicles is already renewable, and we expect the use of renewable gas as a transportation fuel to approach 90% by 2018. As California makes important investments to transform the state's current SLCP emissions into highly beneficial renewable gas, the overall demand for this fuel will need to grow in order the absorb this additional supply – and accelerating the deployment of heavy-duty, ultra-low-NOx natural gas trucks is the best option to do this. With today's technology, they will provide much needed clean air benefits for California's communities by reducing NOx emissions by 90% or more compared to the traditional vehicles they replace. In California, from near-term organic waste pathways alone, there is potential to produce 90.6 billion cubic feet (Bcf) of renewable gas per year[3], which equates to roughly 600 million diesel gallon equivalent units.

1. Serving Disadvantaged Communities

Renewable gas pathways in transportation and building end uses can dramatically reduce emissions and benefit disadvantaged communities. Many disadvantaged communities in California are located near transportation corridors. As already noted, deploying ultra-low NOx engines fueled by renewable gas can reduce smog pollutants by 90% and particulate matter by 100%. In addition, compressed natural gas (CNG) stations distributing renewable gas would have a net positive benefit to communities, as the use of existing natural gas pipes would displace diesel delivery trucks. As numerous studies show the harmful health impacts of living near transportation corridors, it is critical that we immediately deploy technology solutions available today.

SoCalGas is also actively exploring extension of natural gas service to the San Joaquin Valley to lower the energy burden in disadvantaged communities and reduce particulate emissions. Most of these communities are located near agriculture, which is a significant source of the state's methane emissions. Converting these methane sources to renewable gas for pipeline injection would not only reduce emissions, but provide consumers access to lower carbon gas. Renewable gas will be more feasible and affordable transition for disadvantaged customers than electrifying end uses, as the state moves towards lower carbon energy.

B. Pipeline Injection is the Best Mode for Renewable Gas

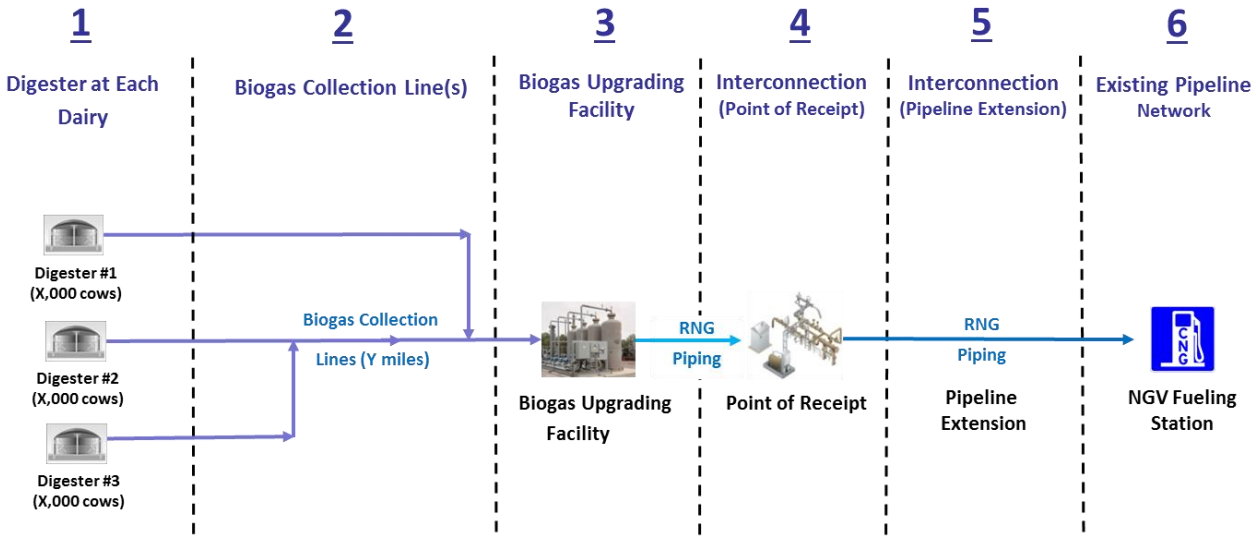
The necessity to capture fugitive methane emissions in California is made clear in SB 1383. Once these emissions are captured, they can be injected into the natural gas pipeline system, maximizing benefits by displacing existing combustion fuel with a local, renewable resource. Using the pipeline system will provide this resource access to the broadest market, enabling greater flexibility and maintaining long-term value.

Today's maximum benefits come when renewable gas is used to replace diesel transportation fuel – increasing GHG and NOx reduction benefits. However, as the state's needs evolve,

[3] "The Feasibility of Renewable Natural Gas as a Large-Scale, Low Carbon Substitute" Amy Myers Jaffe, University of California Davis, June 2016

pipeline access allows this renewable gas to be flexibly delivered to decarbonize natural gas end uses in both the residential and commercial sectors. As California implements additional programs to decarbonize the residential energy market, directing renewable gas to residential appliances can provide similar benefits at a comparable or lower cost than all-electric homes utilizing solar photovoltaic (PV) systems[4]. Using renewable gas in the home removes the need to electrify end uses, which would be costly to ratepayers and create feasibility challenges. As 90% of homes in Southern California use natural gas, decarbonizing existing pipeline infrastructure with renewable gas is a more feasible GHG-reduction strategy than electrification, and it promotes customer choice, energy diversity, and resilience for California's communities.

To accommodate the development of renewable gas resources in California, important infrastructure investments are needed. The diagram below illustrates an example of the components necessary to transform dairy manure from an SLCP source to a pipeline-injected renewable energy resource, and is indicative of the facilities needed more broadly to advance renewable gas in-state.



Nationally, production of renewable gas has increased twenty-fold in the last decade, due to the value of renewable gas as a transportation fuel.[5] Much of this gas is being used in California to support our GHG reduction initiatives, like the Low Carbon Fuel Standard (LCFS). However, a very small minority of this gas is actually being produced in California today due to the typically lower cost of development in other states. Policies need to be considered to help promote in-state development of pipeline renewable gas. Such policies will support the development of local energy resources and prioritize these job-creating, economy-activating investments for California's communities. Utility ratebased investment in this infrastructure should be a primary

[4] Renewable gas in a mixed-fuel home would provide lower upfront costs (5-10%), smaller solar PV sizes (-.4-0.7 kW) and modest homeowner annual cost savings. Navigant Consulting, Inc. 2017. "Strategy and Impact Evaluation of Zero-Net-Energy Regulations on Gas-Fired Appliances." Report prepared for Southern California Gas Company. March 7, 2017.

[5] http://www.eesi.org/files/Johannes_Escudero_052317.pdf

policy consideration, as it can offset portions of these costs to stimulate the production of California renewable gas and meet the SLCP reduction goals of SB 1383.

II. Utility Role in Advancing SB 1383

SB 1383 recognizes that renewable gas will play a primary role in meeting California's SLCP and GHG reduction goals. It specifically identifies the need to establish policy recommendations for the development and use of renewable gas, and develop cost-effective strategies, including infrastructure development and procurement policies, that will encourage the production of renewable gas to meet those goals.

A. Maximizing Value of Dairy Pilot Projects through Utility Engagement

In addition to directing the development of policies to promote the in-state development of renewable gas, SB 1383 directs the implementation of at least 5 pilot projects to demonstrate the capture and conversion of dairy methane to pipeline-injected renewable gas. SoCalGas looks forward to working with the California Department of Food and Agriculture (CDFA), the California Public Utilities Commission (CPUC), ARB, and CEC to implement these projects. Natural gas utilities can play an instrumental role in developing key infrastructure to jump-start this solution and demonstrate the viability of utility ratebased investment to accelerate the development of in-state renewable gas.

Specifically, as part of SB 1383's dairy pilot implementation, SoCalGas recommends that the biogas collection lines, upgrading facility, point of receipt, and interconnection pipeline extensions be considered for utility investment for at least a portion of these projects. This activity can help maximize the success and transparency of these demonstration projects. These pilot projects will serve as important data sources; they should be leveraged to inform the development of broad renewable gas policies that will help address multiple SLCP emissions sources in California, and drive markets forward to decarbonize the pipeline.

One of the major challenges with the development of renewable gas today stems from the uncertainty in long-term demand needed to drive investment to these projects. This problem is not dissimilar to the recent renewable electricity generation challenges that were largely ameliorated by the development of the Renewable Portfolio Standard (RPS). The RPS created long-term demand through utility procurement, providing the necessary market certainty to allow for adequate investment.

Currently, the gas procurement activities the California utilities perform on behalf of their customers are driven by the core tenet of providing the lowest-cost energy available. We absolutely agree with this optimization, however, this approach ignores the external environmental value that integrating renewable energy can deliver. Instituting policies that enable the procurement of a limited amount of renewable gas by California's utilities can unlock this value for California, driving stability to the renewable gas market that will be critical for meeting GHG and SLCP reduction goals.

SoCalGas is already exploring ways that we can deliver renewable gas to our customers, including bringing renewable gas to our natural gas vehicle (NGV) fueling stations in the near future by leveraging the cost-offsetting value that Renewable Identification Numbers (RINs) and LCFS credits currently provide. As we develop more insight about these transactions and renewable gas market conditions, we will be looking to offer renewable gas directly to core customers who are interested in reducing GHGs.

B. Renewable Gas Resource Availability

Quantifying California's renewable gas resource potential is often discussed whenever policy conversations around decarbonizing the natural gas pipeline arise. Several studies have been conducted on this topic that display a variety of results, typically driven by how resource availability is assessed and what feedstock sources are included. A recent study that explored the viability of four primary, near-term, anaerobic digestion pathways (dairy, wastewater, landfill, and organic municipal solid waste sources) in California concluded that up to around 90 Bcf per year (Bcf/y) of renewable gas is potentially available.[6] This equates to around 5% of CA's projected total natural gas throughput in 2030. Other studies include additional resources, such as forest and agricultural waste, which could theoretically increase the in-state production potential to over 160 Bcf/y, or around 10% of CA's projected total natural gas throughput in 2030. When we consider some of the high-range estimates of California's renewable gas production potential from organic resources, including purpose-grown energy crops and resources that may be harder or more expensive to access, theoretical estimates have been as high as 340 Bcf/y or more, equivalent to around 20% of CA's projected total natural gas throughput in 2030.

It is crucial to note that these estimates only include *in-state, organic resources*. Considering that more than 90% of the natural gas used in California today is imported from out-of-state, it would be doing a disservice to California to establish energy strategies and policies that don't consider availability of out-of-state or alternative resources. When we look at the nationwide renewable gas production theoretical potential, it has been estimated that enough renewable gas to replace 5 to 8 times California's total natural gas throughput in 2030 could be developed pending supportive policy, market and technological advancements. Although these out-of-state resources may provide less local environmental and economic benefits for California, because GHG emissions are a global issue, renewable gas produced out-of-state will provide critical benefits in our fight against climate change. Including these resources in the renewable gas development strategy can help maintain affordability while enabling California to reach ever-higher percentages of renewable gas throughput.

In addition to these important organic waste pathways, we could also expand renewable gas in-state by developing power-to-gas (P2G) facilities. P2G is discussed more fully in Item III below, but it is worth noting here that the technology has the capability to produce renewable gas in-state above-and-beyond what organic sources can provide. It could provide the potential to increase the percentage of renewable gas in its pipelines after the most economic organic sources have been developed. This would reduce the need to import renewable gas from out-of-state, promoting economic development in communities across California.

[6] "The Feasibility of Renewable Natural Gas as a Large-Scale, Low Carbon Substitute" https://www.arb.ca.gov/research/apr/past/13-307.pdf

While there is significant variability in studies of the theoretical feasibility of renewable gas resources, both in-state and out of state, the practical market potential studies indicate that renewable gas can compose 5% of California's core gas throughput by 2030[7]. This is an achievable goal that would serve as an important first step to meeting the state's climate goals of decarbonization. By way of illustration, achieving 5% renewable gas of core throughput in the SoCalGas service territory alone is the equivalent of the total decarbonization of more than 20% of heavy duty goods movement trucks on the I-5, CA-99 and I-710 freeways by 2030, for GHG emissions reduction of 1.2 million MT each year. 5% renewable gas of core gas throughput is an achievable goal with meaningful impacts that should be seriously considered.

C. Enabling Long-term Utility Infrastructure and Procurement Investment

As will be demonstrated by the dairy pilot projects, utilities can play a key role in the development of renewable gas resources by investing in the infrastructure needed to produce renewable gas and connect the projects to the gas pipeline system. Some infrastructure investments, like the pipeline interconnection and biogas collection lines, should be ratebased by utilities, as suggested for consideration by AB 2313 and as consistent with the utility's historic role in supporting meaningful new advancements in state policy. Utility ratebased investment in additional infrastructure, like biogas upgrading facilities, can also provide important value to California by accelerating the state's ability to meet its 2030 environmental goals, and simplifying the investment needed by developers to transform our organic waste into renewable gas.

These concepts are not unprecedented. Under California's RPS, electric utilities have upgraded transmission infrastructure to support increasing levels of electricity from wind and solar, and can invest in renewable electricity generation projects that are competitive with other market offerings. These investments by the electric utilities have allowed California to stay ahead of schedule for meeting the RPS requirements.[8] Similarly, a Renewable Gas Standard and the ability to recover investment costs would drive investment in renewable gas production, processing, and pipeline interconnection.

Additionally, SoCalGas believes that the market stability a utility procurement requirement provides will be necessary to increase production, drive down costs over time, develop new gasification and other renewable gas technologies, and provide the volumes necessary to move renewable gas to the core market. This will drive greater GHG reductions without the massive disruption and investment that would be required of our customers in replacing existing equipment and appliances.

III. Power-to-Gas Supports GHG Reduction and Clean Energy Goals

Biogenic sources of methane are not the only renewable resources that can be used to decarbonize the state's natural gas supply. In addition to these important organic waste

[7] "The Feasibility of Renewable Natural Gas as a Large-Scale, Low Carbon Substitute" https://www.arb.ca.gov/research/apr/past/13-307.pdf

[8] California Energy Commission, http://www.energy.ca.gov/renewables/tracking_progress/documents/renewable.pdf

pathways, we can expand and diversify renewable gas supplies by developing P2G. P2G uses excess renewable energy—such as from solar or wind resources—to electrolyze water, creating green hydrogen.

This hydrogen can be used to store excess renewable energy indefinitely, and can be readily used in a variety of end uses, including renewable electricity, by injecting it into the natural gas pipeline. Pipeline-injecting this renewable hydrogen at a large scale requires a process called biomethanation. In this process, the hydrogen is combined with carbon dioxide and fed to a bioreactor in which organisms produce renewable methane, which is interchangeable with pipeline gas. It can be injected into the natural gas pipeline system and used in everything from home appliances to industrial processes, engines, and power plants.

P2G provides the opportunity to further decarbonize the natural gas system by creating renewable gas above-and-beyond what is available from biogenic sources alone. The technology is being demonstrated across Europe, especially in Germany, where the national environmental agency stated: "The essential component in the transition to a society that is almost completely greenhouse gas-neutral is to convert the power which will be produced entirely from renewables into hydrogen, methane and long-chain hydrocarbons."[9] While these projects in Germany are still just demonstrations, they show great promise for the potential to scale P2G systems to provide utility-scale energy storage. We are actively following their progress to learn valuable lessons that can be applied here in California.

The European P2G projects are not the only ones we're monitoring: SoCalGas teamed with the National Fuel Cell Research Center at the University of California at Irvine (UCI) to launch the first such project in the United States. An electrolyzer was installed at UCI that feeds its renewable hydrogen to the campus power plant. A second project with UCI involved a simulation of the campus microgrid, showing the fraction of renewable power used by the microgrid could increase from 3.5 percent to 35 percent by using a P2G strategy.

SoCalGas has also partnered with the U.S. Department of Energy's National Renewable Energy Laboratory for a biomethanation demonstration project located at their Energy Systems Integration Facility in Golden, Colorado. This project aims to accelerate the commercialization of P2G by further studying its efficiency and performance as a renewable energy storage strategy.

IV. Enhancing Safety and Reducing Emissions

SoCalGas is a leader in using new technologies that allow the company to detect and repair leaks more quickly than ever. Some of these technologies include: using infrared cameras to check for leaks after new pipelines are installed; special fiber optic cables that detect methane leaks and third-party damage to pipelines; infrared "point" sensors that can detect leaks smaller than those detectable by human senses; and employing algorithms that use our Advanced Meter system to identify unusual levels of natural gas consumption that could indicate a leak at customers' homes

[9] https://www.umweltbundesamt.de/en/press/pressinformation/a-greenhouse-gas-neutral-germany-is-almost-possible

or businesses. In August of 2016, SoCalGas began using innovative technology to capture natural gas released during pipeline replacement or safety maintenance and testing. This special process significantly reduces noise and emissions while saving natural gas for later use.

As part of the Pipeline Safety Enhancement Plan (PSEP), SoCalGas has invested approximately $1.2 billion on improvements to distribution, transmission and storage systems. Since we launched PSEP in 2013, we've completed 156 miles of pipeline replacements and have replaced or upgraded over 100 pipeline valves with technology that allows them to be opened or closed remotely, or that automatically shuts off the flow of natural gas in the event of a large pressure drop.

In 2015, SoCalGas participated in a study with the Environmental Defense Fund (EDF) and Washington State University (WSU). The study found that methane emissions from local distribution systems range between .1 to .2 percent of the total natural gas delivered nationwide, compared to .5 percent reported to EPA in 2012. SoCalGas' distribution system's emissions rates are on the lower end of this range using the new emission factors from the study—0.12 percent of the total natural gas delivered to its customers.

SoCalGas continues to use industry-leading processes and technologies to enhance the safety and resiliency of our systems. For example, SoCalGas has installed numerous infrastructure and safety enhancements at its Aliso Canyon storage facility, and is working with the CPUC to implement these same enhancements at its three other underground storage facilities. In our pipeline system, all cast-iron pipes—known to have higher leak incidents—were replaced over two decades ago, and we continue to work on pipeline safety enhancements.

SoCalGas is committed to further decreasing our emissions by supporting efforts like SB 1371. We've committed to implementing a number of Best Practices, and in particular, eliminating our backlog of leaks. SoCalGas obtained approval of its leak repair plan in mid-2016 from the CPUC and is committed to repairing 50 percent of non-hazardous leaks by the end of 2017. We anticipate repairing all currently identified non-hazardous leaks by the end of 2018.

V. Call to Action - How Do We Get to 2030?

In summary, there several key policy evolutions that will help California accelerate its adoption of renewable gas as per SB 1383, and meet the 2030 GHG reduction goals:

- **Invest in pipeline and other facilities to produce renewable gas.** Much of the requisite infrastructure is related to pipeline transportation, gas processing and quality management, and gas measurement – all infrastructure that utilities are experienced at operating. Policies to enable utility ratebased investment in these facilities will hasten in-state renewable gas development and interconnection with the pipeline network.

- **Accelerate the market adoption of near-zero-emission heavy-duty natural gas trucks in California**. These trucks will not only enable us to meet our air quality goals more quickly and cost-effectively than other strategies, but they will also create an important, high-value demand for renewable gas that will send a strong signal to

developers to build out renewable production resources. Air agencies conclude that incentives are needed to cover current up-front cost premiums and catalyze adoption.

- **Deliver renewable gas to customers**. Today, renewable gas provides the most value when fueling heavy-duty trucks, reducing GHG emissions and cleaning our air. It can easily be deployed via pipelines to meet other needs in the future. Currently, however, gas utilities are restricted to purchasing the lowest-cost fuel for customers. Procurement mechanisms that allow gas utilities to purchase a measured amount of renewable gas at higher—but competitively-sourced—cost will maximize the delivery to key customers who want it: natural gas vehicle users and other forward-thinking customers who want to reduce their carbon footprint. Over the long-term, distributing renewable gas to core customers will maximize GHG reduction benefits while protecting customer choice.

SoCalGas looks forward to continuing to work with CEC, other state agencies, and industry stakeholders to help ensure successful implementation of SB 1383, and ultimately achieve California's 2030 GHG reduction goals. We thank you for this opportunity to comment, and look forward to additional dialogue as the 2017 IEPR is finalized. Please contact me if you have any questions or concerns about these comments.

Sincerely,

George I. Minter
Regional Vice President
External Affairs & Environmental Strategy

Attachments (filed separately):

1. Decarbonizing Pipeline Gas to Help Meet California's 2050 Greenhouse Gas Reduction Goal
2. Re-Assessment of Renewable Natural Gas
3. Economic Impacts of Deploying Low NOx Trucks fueled by Renewable Natural Gas
4. Game Changer Technical White Paper
5. Zero Emission Bus Options: Analysis of 2015-2055 Fleet Costs and Emissions
6. Evaluation of a proposal for reliable low-cost grid power with 100% wind, water, and solar