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Comments from Southern California Gas on Draft AB 1257 Report

Additional submitted attachment is included below.



George Minter
Regional Vice President
External Affairs & Environmental Strategy

555 W. Fifth Street, GCT 21C5
Los Angeles, CA 90013

tel: 213.244.2550
fax: 213.407.7400
email: GIMinter@semprautilities.com

California Energy Commission
Docket Office
1516 Ninth Street
Sacramento, CA 95814-5512

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RE: SoCalGas Comments on the Draft AB 1257 Natural Gas Report, Docket No. 15-IEPR-04

Dear Commissioners:

The Southern California Gas Company (SoCalGas) welcomes the opportunity to comment on the Draft Assembly Bill (AB) 1257 Natural Gas Report: Strategies to Maximize the Benefits Obtained from Natural Gas as an Energy Source (Report). We appreciate the time and effort the California Energy Commission (CEC) staff has spent working with subject matter experts in developing this report over the past two years.

As the first comprehensive look at the role of natural gas in California, it captures many of the issues and policy challenges faced by the natural gas industry and California consumers. However, there are additional opportunities for natural gas utilization that have not been explored in this Report, such as (1) recent advances in natural gas heavy-duty truck technologies; (2) opportunities for liquefied natural gas (LNG) in the off-road transportation sector; (3) Department of Energy's (DOE) recently issued definition of Zero Net Energy (ZNE) buildings; (4) the role both in state and out-of-state biomethane can play in meeting our greenhouse gas (GHG) reduction goals; (5) the potential for Power-to-Gas (P2G) to help integrate the electric and natural gas grid providing long-term energy storage and decarbonizing natural gas supplies; and (6) as a cost effective opportunity to reduce cancer risk in communities burdened by goods movement activities.

We continue to work with our customers and technology developers to identify clean technology solutions through our work in energy efficiency programs, customer education and outreach initiatives, and by supporting near-term and long-term technology development that can reduce

emissions and better meet our customers' changing energy needs. SoCalGas seeks to meet a range of customer needs, including serving traditional and new uses such as heating, power generation and transportation fueling, as well as continuing to leverage natural gas resources to deploy industry leading energy efficiency, conservation and emerging technology programs. We will build upon this tradition as we explore opportunities to develop "renewable" natural gas through research and demonstration projects to support the development of biogas and P2G technologies. Natural gas is our customers' preferred energy source to cook and heat their homes and water; the direct use of natural gas is more efficient and cost-effective than electricity when measured by source/primary energy (Appendix B-1). Distributed generation resources, like combined heat and power (CHP) systems, natural gas microturbines and fuel cells, can help manage load centers and our electricity demand and enhance the resiliency of the state's energy infrastructure. Natural gas can help move toward total-building-efficiency and ZNE while providing the comfort and convenience our customer's expect. While natural gas can help decarbonize the electricity sector with ultra-low emitting generation technology, new P2G as a storage technology and carbon capture/carbon-use technologies; we can also decarbonize the gas sector by growing our renewable gas supply in the future, just as the electric sector has grown its renewable supply of electricity in the past.

Diversity in the state's energy portfolio is also important for prudent risk management to support resiliency in the energy infrastructure as a climate adaptation strategy. As weather becomes more extreme from droughts, hurricanes and El Nino events, there have been too many lessons in the state's history and across the country that over reliance on one single energy source can create avoidable and unnecessary risks for the economy and public safety. For example, the Oakland firestorm of 1991 demonstrated why reliance upon electricity driven water pumps was disastrous. Hurricane Sandy provided another example where every system dependent on electricity was jeopardized from the refueling pumps at gasoline stations to the water pumps for putting out fires. Natural gas-powered fuel cells that kept many facilities operating in the midst of surrounding blackouts during the aftermath of Hurricane Sandy provides a real world example of the importance of diversification of our state's energy portfolio. Indeed, the aggressive move to develop micro-grids which can operate for a limited timeframe separate from the grid is further evidence that there is a need for a new, more dynamic model of the electric grid. Natural gas technologies, like CHP and fuel cells, are perfectly situated to support those developments. It is important to note that since the natural gas system is mostly underground it is very resilient to extreme weather events. The entire natural gas system was essentially intact after Hurricane Sandy, allowing residents with natural gas service to support back-up generators, cook and heat their homes.

The natural gas energy sector continues to create jobs and grow our economy. In California, the existing natural gas energy sector supports (directly and indirectly) more than 250,000 jobs and adds over \$36 billion to the state's economy. Natural gas infrastructure improvement projects offer significant job opportunities and contribute to the local and state economy. The manufacturing, industrial, and building sectors rely on natural gas as a low-cost energy source to run profitable

operations. SoCalGas alone employs more than 8,000 Southern Californians and in 2014, spent \$571.4 million with diverse suppliers encompassing 48.4 percent of SoCalGas' procurement. SoCalGas' natural gas energy efficiency programs have created approximately 8,000 jobs in California.

California's leadership on energy efficiency and the use of natural gas in the electric generation and transportation sectors are being embraced by other states as they move to natural gas as part of the solution to cost-effectively reduce GHG emissions. Policies that move California away from natural gas as part of our energy mix would put our state at an economic disadvantage—which could cost jobs and future investment. The CEC should embrace natural gas as an affordable and practical way to meet California's clean energy goals and develop plans to advance research on cleaner natural gas technologies and accelerate development of renewable natural gas (RNG) to meet our environmental goals. SoCalGas believes there is sufficient data available to clearly recognize the benefits of natural gas and support it as a clean energy solution in the final Report submitted to the legislature.

We offer the following comments on a per chapter basis and have attached line-by-line suggested edits to the Report (Appendix A). Generally, the edits provide additional information for the CEC's consideration and, in some cases, clarifies or corrects any factual misrepresentations. SoCalGas hopes that the CEC takes into consideration the suggested edits for inclusion into the final version of the Report.

CHAPTER 2: Pipeline Safety and Natural Gas Infrastructure Improvements

On September 30, 2015, SoCalGas and San Diego Gas and Electric (SDG&E) filed an application with the California Public Utilities Commission (CPUC) to construct a 47-mile natural gas transmission line to replace the transmission function of existing Line 1600, a 1949 pipeline that under the Natural Gas Pipeline Safety Act of 2011 (AB 56) must be pressure tested or replaced. As proposed, the "Pipeline Safety & Reliability Project" will not only implement the utilities' Pipeline Safety Enhancement Plan (PSEP), which was approved by the CPUC in 2014; it will also simultaneously improve the reliability and resiliency of the natural gas system and provide additional operational flexibility to manage stress conditions by increasing system capacity. An additional section in the Report titled "Pipeline Safety & Reliability Project" has been included to account for this application addressing Line 1600. There have also been a few edits proposed to the section related to the Southern System Minimum Flow Requirement.

CHAPTER 3: Natural Gas for Electric Generation

SoCalGas is appreciative that the Report recognizes the gas-electric generation coordination issues and challenges with integrating the increasing number of renewable generation sources. The resulting issues create greater variation in gas demand that require operational flexibility of gas operators to be able to serve these dynamic loads and avoid curtailments.

However, SoCalGas disagrees with the inclusion of the summer 2015 curtailment events on the SoCalGas system as a partial reason for the Federal Energy Regulation Commission (FERC) Rule,¹ which was issued three months prior to the referenced curtailment events. Additionally, the summer 2015 curtailment events are not comparable in terms of industry and regulatory significance as the other events listed.

CHAPTER 4: The Role of Natural Gas as a Fuel for Combined Heat and Power Systems

SoCalGas appreciates the discussion on CHP in this section, agrees with the issues raised, and is encouraged by the steps suggested to remove the gaps in knowledge required to move the market forward. In addition to the multiple benefits mentioned in the Report, we would also like to add the following statement: “CHP is one of the most efficient ways to generate power from fossil fuel with certain configurations achieving overall system efficiencies greater than 80%.² CHP can also utilize renewable fuel in the form of site sourced biogas or pipeline nominated RNG.”

We support the CEC's statement that more studies are needed to quantify the benefits of CHP. Additionally, we recommend the report focus on two separate areas:

“1) Quantifying electric grid benefits such as reduction in peak demand, deferred transmission and distribution infrastructure investments, improved power quality and resiliency, with the purpose of creating the foundation to monetize the electric utility benefits of CHP and incentivizing the electric utilities to increase CHP deployment.

2) The effect of CHP deployment on California's economy with analysis on the net effect of lower energy costs and increased energy security for businesses utilizing CHP, reduced likelihood of those business leaving California, jobs creation, and tax revenue.”

Finally, all CHP efforts should be technology agnostic. CHP spans a broad range of prime mover technology with multiple size classes. These technologies should be allowed to compete on equal footing without policies that choose winners and losers.

As Commissioner Weisenmiller noted during the September 21, 2015 workshop on the Report, more analysis is needed to help properly monetize the many benefits of CHP. Furthermore, we suggest that these analyses be detailed enough to consider the CHP system size and be defined in terms of kilowatts of nominal electric generating capacity, building type, floor area, climate region, and seasonal load variations. The magnitudes, shapes, and interplay of buildings' thermal and electric end-use loads over the course of a year form the landscape to which various CHP prime mover outputs are fit. Because these components drive CHP adoption, analyses must take them into account.

¹ <http://www.ferc.gov/whats-new/comm-meet/2015/041615/M-1.pdf>

² <http://www.businesswire.com/news/home/20120822005895/en/GE-Houweling%E2%80%99s-Tomatoes-Unveil-Greenhouse-Combined-Heat#.Vgn2A9JViko>

CHAPTER 5: Natural Gas as a Transportation Fuel

For years, California has been a leader in energy and environmental policy, adopting the most aggressive emissions control measures in the nation. And while we've significantly cleaned up the air, we still have a long road ahead. Natural Gas Vehicles (NGVs) have the potential to help the state meet both near-term and long-term environmental and petroleum reduction goals, particularly in the heavy-duty vehicles sector. Reducing emissions and petroleum use within the transportation sector will be critical to meet air quality goals, climate change policy goals and achieve energy independence and stability for California. Since natural gas is not a petroleum product, the use of natural gas in transportation can play an important role in reducing the state's reliance on petroleum fuels. The transportation sector is responsible for 37% of statewide greenhouse gas emissions and over 80% of oxides of nitrogen (NOx) emissions in South Coast Air Quality Management District (SCAQMD) and San Joaquin Valley Air Pollution Control District (SJVAPCD).³

Meeting the federal ozone standards and particulate matter standards in Southern and Central California are the most significant air quality challenges for the state. Both regions have been deemed as extreme non-attainment areas for the ozone by the federal Environmental Protection Agency (EPA). There are two critical deadlines facing these regions – 2023 and 2031 – to meet federal ozone standards of 80 parts per billion (ppb) and 75 ppb, respectively.

To reduce ozone in these regions, the local air districts are focused on strategies to reduce NOx emissions, which is a pre-cursor to ozone. Heavy-duty vehicles are the largest contributor to NOx emissions in both SCAQMD and SJVAPCD. Therefore, it is critical for the state to move quickly to support heavy-duty vehicle technologies that can significantly reduce NOx emissions in the near-term and mid-term. With the recent California Air Resources Board (ARB) certification of the near-zero emission truck engine, moving natural gas into heavy-duty transportation becomes a key strategy to immediately reduce emissions from this high emitting sector.

The state can achieve GHG and NOx reductions through medium- and heavy-duty on- and off-road vehicles powered by near-zero emission natural gas engines.⁴ Converting heavy-duty vehicle fleets from diesel to natural gas can provide a way to meet California's goals without crippling the economy. Natural gas does not emit diesel particulate matter, and has 15% fewer GHG emissions than diesel vehicles.⁵ With the recent certification of the Cummins Westport Innovations (CWI)

³ 37% figure: California Air Resources Board (CARB). "2000-2012 California Greenhouse Gas Emission Inventory." CARB, May 2014. http://www.arb.ca.gov/cc/inventory/inventory_current.htm ; 80% figure: South Coast Air Quality Management District (SCAQMD). "Final 2012 Air Quality Management Plan." SCAQMD, February 2013, p. ES-9. <http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2012-air-quality-management-plan/final-2012-aqmp-february-2013/main-document-final-2012.pdf>

⁴ Gladstein, Neandross & Associates (GNA). "Pathways to Near-Zero-Emission Natural Gas Heavy-Duty Vehicles." GNA, May 19, 2014, p. 1. < http://www.gladstein.org/pdfs/On-Road_Pathways.pdf >

⁵ California Air Resources Board Low Carbon Fuel Standard, re-authorized on September 24, 2015: <http://www.arb.ca.gov/regact/2015/lcfs2015/lcfsregtext.pdf>
http://www.energy.ca.gov/low_carbon_fuel_standard/UC_LCFS_study_Part_1-FINAL.pdf

near-zero emissions engine, we have the opportunity to reduce NOx emissions by 90% from heavy duty trucks.⁶

The Report should include a discussion on the near-zero emission CWI engine, which was certified in the past two weeks with lower NOx and methane emissions. ARB established an Optional Low NOx Standard to incent engine development of trucks with emissions in the range of 0.02 to 0.1 grams per brakehorse power (g/bhp). The SCAQMD refers to 0.02 g/bhp as power plant equivalent emissions because electric vehicles may have zero tailpipe emissions but if full life cycle emissions are considered they are not zero emission. The near-zero CWI engine actually certified to emissions of 0.01 g/bhp, which means a natural gas truck or bus would have lower emissions than an equivalent battery electric truck.

The commercialization of this *game changing* technology for heavy-duty trucks and buses is a vital step in meeting our air quality goals and improving health in disadvantaged communities along the transportation corridors of California. CWI's first near-zero engine can be utilized by transit fleets, waste haulers and some regional goods movement trucks. This provides an opportunity for transit and waste hauling fleets in Southern California to continue using compressed natural gas (CNG) buses with even greater environmental benefits- achieving emission levels below electric buses and trucks. Commercialization of this technology also provides opportunities for transit districts in the Central Valley and Northern California to transition to cleaner fleets today, as many of the Southern California transit agencies have already done. All of these fleets can move to near-zero levels with the acquisition of the new CWI engine. Further, with the use of increasing volumes of RNG, the transit sector has the potential to drive the carbon intensity of its emission **below** electric buses. We can do this in the next several years, and not wait 20 years – a generation – before we begin to realize these emission reductions.

CWI is also working on applying the same technologies to a larger engine, which can be commercialized for the goods movement sector in the next 12-18 months. Goods movement is an important economic driver in Southern California. Maintaining cost effective solutions for truckers will help the region remain competitive and meet stringent emissions goals.

SCAQMD and SJVAPCD have both indicated that the rapid commercialization of the near-zero engine technologies will play an important role in meeting the federal ozone standards. The state needs a plan in the immediate future for rapid deployment of near-zero engines in order to claim these benefits in the Ozone State Implementation Plan (SIP) that will be submitted to the EPA next summer. In fact, ARB and SCAQMD have publicly urged EPA to adopt a lower NOx standard for all heavy-duty trucks in order for the state to meet the ozone standard.⁷

⁶ <http://www.cumminswestport.com/press-releases/2015/near-zero-nox-emissions-isl-g-natural-gas-engine-proprietary-technology-capable-of-reducing-nox-emissions-by-90>

⁷ Comments made by Mary Nichols and Barry Wallerstein at the EPA meeting in Long Beach on August 18, 2015. <http://www.gpo.gov/fdsys/pkg/FR-2015-08-03/pdf/2015-19004.pdf>

In addition, ARB has reflected deployment of low emission, low-carbon fueled trucks, such as low NOx, RNG fueled trucks as part of their 2014 Scoping Plan Update on how to meet the 2020 GHG reduction goals.⁸ Ryan McCarthy from ARB noted that heavy-duty natural gas vehicles will also play a role in meeting the 2030 targets for GHG and petroleum reductions during the Joint Agency Symposium on Petroleum Reductions.⁹ The CEC report should include references to these important policy statements by the air districts and ARB as drivers for the need to invest in trucks and infrastructure to deploy the near-zero engine.

The Low Carbon Fuel Standard (LCFS) identifies RNG from existing organic sources, such as dairy waste, landfills, and waste water treatment as the lowest carbon intensity fuels available, even lower than hydrogen. Today, we are seeing RNG used in California for the transportation sector. For example, Waste Management uses RNG produced at its Altamont facility to fuel its waste hauling fleet in that region. Clean Energy provides RNG at their CNG and LNG stations throughout California. A review of the LCFS reporting tool shows that RNG as a percentage of total natural gas used in the transportation sector has increased dramatically in the past year. The state needs to look at policies and incentives to promote more development of RNG in the state. Support for heavy-duty natural gas vehicles is a key to this development. The transportation sector can be an important catalyst for building the renewable natural gas market.

The CEC is compelled to examine policies that will support the rapid deployment of the near-zero emissions engine technology in the on-road goods movement sector. This technology can play an important role in meeting California's petroleum reduction goal, GHG reduction goal and most importantly NOx emissions reductions that are vital to SCAQMD and SJVAPCD meeting the federal clean air standard. This technology and the resulting NOx emission reductions are achievable today. For example, CWI with the support of CEC, SCAQMD and SoCalGas has moved quickly to develop the first engine that can be used in transit, hauling and regional goods movement sectors. With a focused incentive and technology program, we can expand this technology to the heavier truck sectors and make a substantial improvement in air quality for the most at-risk members of our communities.

Sustainable Freight and Transport Sector Opportunities

LNG is an ideal choice to replace diesel and bunker fuel for the goods movement industry, especially for marine and rail operators. Using LNG to reduce GHG and criteria pollutant emissions has been discussed by the rail and marine industries as well as the ports. This is not required through regulation- it is being driven by the benefit from the fuel price differential between natural gas and diesel. Nationally and internationally, we have seen an increase in the number of LNG-fueled vessels in the marine sector, as well as LNG-fueled engine pilot programs by railroads. SoCalGas has had discussions with the Ports of Long Beach and Los Angeles about the possibility of utilizing

⁸ <http://www.arb.ca.gov/cc/scopingplan/document/updatedscopingplan2013.htm>

⁹ <http://www.arb.ca.gov/cc/pillars/transportation/mccarthyppt.pdf>

LNG as a multi-sector transportation fuel, and natural gas as an energy source, at the ports. The Port of Long Beach identified this as a potential strategy in their Energy Island proposal.¹⁰

This opportunity is only marginally addressed in the Report and we request that staff supplement the Report by adding information we provided in Appendix A to the final version of the Report. Additionally we request that specific information be included on the funding and research needs to develop and demonstrate “...large natural gas engines with advanced technology for railroad locomotives (starting with switch engines servicing the ports) that can also be utilized for large off-road vehicles such as earthmovers and mine trucks.....”¹¹ The report should also include a focus on reducing NOx emissions by investing in natural gas transportation technologies and fueling infrastructure.

State policy should also consider the advantages that switching from diesel to natural gas can have in the off-road and marine sectors will have for improvement of cancer risk in nearby communities affected by goods movement. The Office of Environmental Health Hazard Assessment (OEHHA) Air Toxics Hot Spots Program Risk Assessment Guidelines Version 8.0 published in March 2015, shows natural gas has a significant advantage over diesel. SoCalGas calculated two examples of the difference between cancer risk from just switching from diesel to natural gas. In the case of a marine engine transiting near a port terminal, the calculation of the change in absolute residential cancer risk from just fuel switching (diesel to natural gas) shows that the diesel risk is 314 times the natural gas risk. In the case of locomotives, using an example of arrival and departure trains (1 train/day; 4 hours/train at 50% load), the calculation of the change in absolute residential cancer risk from fuel switching (diesel to natural gas) shows that the diesel risk is 107 times the natural gas risk. We wish to point out that no specific facility was examined in our sample calculations, and no inference about actual risk at a specific facility can be derived from just this tier 2 screening level analysis information (Appendix B-2).

CHAPTER 6: Natural Gas Use for End-Use Energy Efficiency Applications

SoCalGas offers additional challenges facing the adoption of natural gas energy efficiency in California that were not included in the Report. Currently, the CPUC generally limits the Investor-Owned Utilities (IOUs) to offering incentives to customers for above-code energy efficiency opportunities. Given the high cost of equipment, the low cost of natural gas, and the amount of customers below the current aggressive California building and appliance codes, limiting incentives to above-code energy efficiency is often not enough for customers to implement comprehensive energy efficiency. Pacific Gas and Electric (PG&E) commissioned research studies addressing the

¹⁰ Port of Long Beach Press Release, “Energy Island, The Port’s Power Plan,” June 25, 2015, <http://www.polb.com/news/displaynews.asp?NewsID=1464>

“The Port will explore options that include liquefied natural gas (LNG) as fuel for ships and locomotives, hydrogen generation, fuel cell technology and related infrastructure. This goal builds on existing progress the Port has made under its Clean Trucks Program and Technology Advancement Program to support drayage trucks that run on LNG, compressed natural gas, and hydrogen fuel cell technology.”

¹¹ Page 52 of the Report

amount of energy efficiency potential available to bring existing buildings to code; they concluded that 67% of eligible energy savings potential in commercial buildings due to-code opportunities.¹² In order for California to achieve its aggressive energy efficiency goals, policies must be enacted to allow for customer incentives to bring buildings to, and above code.

We are aware that current legislation, AB 802, is designed to address this issue by allowing utilities to record improvements up to code as part of the energy efficiency programs. The legislation has passed both the California Assembly and the California State Senate and is awaiting the Governor's signature. We were very supportive of AB 802 and are hopeful that it becomes law to be applied beginning next year. Furthermore, we believe AB 802 must become state law in conjunction with Senate Bill (SB) 350 to ensure that the energy efficiency target and other policy changes outlined in SB 350 are achievable and we are certain that natural gas savings can play an important role. It is also imperative that all legitimate energy savings be allowed to be incentivized and counted by the CPUC to meet the intent of both AB 802 and SB 350. If implemented properly, AB 802 along with SB 350 will take a noteworthy step towards achieving long-term energy savings and help meet climate change emission reduction goals along with criteria pollutant co-benefits such as NOx reductions.

With regard to NOx reductions, low NOx central furnaces are mandated under SCAQMD Rule 1111 with due dates of April 2015 for condensing furnaces and October 2015 for non-condensing furnaces. Manufacturers have been developing new central furnace products to meet the new emission requirements in SCAQMD over the last several years. SoCalGas jointly funded four research projects with SCAQMD to develop these new products. While all the research projects were successful technically in meeting the new NOx regulations, commercialization is still pending but the new products should be in the market within the next year. Manufacturers have several options in this regulation, including paying a mitigation fee for the next several years that allows them to continue to sell older higher polluting units. There is also a sell-through provision that allows a manufacturer to sell older products over the next nine months if the units are already in stock in California. The new products may or may not meet energy efficiency rebate requirements – the focus of the research and development was on reducing NOx emissions.

In the section "Technology Considerations- Cost Effectiveness," information regarding the cost of a standard tank water heater has been modified. Per the Title 24 Residential Instantaneous Water Heaters (IWH) Case Report (Appendix B-3), Table 21, the total cost is \$946 (\$518 for the equipment and \$428 for installation for new construction), not \$2,000 as is listed in the Report.

CHAPTER 7: Natural Gas Use for Zero Net Energy Buildings

SoCalGas has supported California's energy goals by promoting energy efficiency, driving advancements in natural gas equipment and low emissions technologies, as well as investing in

¹² PG&E Comments on April 28, 2015 CPUC workshop on energy efficiency baseline choices (Rulemaking 13-11-005)

advanced technologies in renewable natural gas and distributed generation. We are supportive of ZNE and thank the case authors for addressing this important goal in the Report.

AB 1257 specifically states that the CEC is to “identify strategies to maximize the benefits obtained from natural gas...[and determine] the role that natural gas can play in the development of zero net energy buildings, as appropriate.”¹³ However, this chapter does not have any specific natural gas recommendations to drive ZNE buildings. On page 69, the report acknowledges the opportunities for “offsetting the residual natural gas usage, such as through uses of waste heat, including CHP, or potentially through the use of renewable gas resources...” Still, the report only identifies electrification as a potential means of reaching ZNE goals.

There are many issues that the CEC must weigh before making such a broad sweeping policy change –source efficiencies, cost-effectiveness, and user preferences for natural gas appliances, as well as how low carbon fuels, such as renewable natural gas, can help the state meet its GHG goals.

California and ZNE buildings

There has been an important change in the ZNE discussion on a federal level, since the release of the Report. The report should be augmented to add the new federal definition of ZNE, provided in Appendix A, in order to unify ZNE stakeholders within our state and across the nation.

Challenges in California

During the ZNE workshop on May 1, 2015, SoCalGas shared preliminary results of a study by Navigant Consulting, titled: *Strategy and Impact Evaluation of ZNE Regulations on Gas-Fired Appliances Phase I Technology Report*.¹⁴ The final report has been provided as Appendix B-4 for your reference and a summary of the findings have been added to Chapter 7 of the Report.

Gaps in Knowledge and Research

This chapter should expand its focus on research and development for both current and future natural gas opportunities in ZNE buildings such as high efficiency appliances, fuel cells, combined heat and power and renewable natural gas. Also, we encourage staff to develop a clear action plan on how to address research, policy, timing, and funding for natural gas in the ZNE home given the importance of the next code development cycle.

CHAPTER 8: Natural Gas and Biogas as Low Emissions Resources

The Sempra utilities have been looking at the long-term role for natural gas in a low carbon energy mix. We engaged Energy + Environmental Economics (E3) to look at: *Decarbonizing Pipeline Gas to*

¹³ Assembly Bill No. 1257, CHAPTER 749, available at:

http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1257

¹⁴ Navigant Consulting, *Strategy and Impact Evaluation of ZNE Regulations on Gas-Fired Appliances Phase I Technology Report*, March 2015

*Help Meet California's 2050 Greenhouse Gas Reduction Goal.*¹⁵ In the scenarios explored in this study (Appendix B-5), there would be deep decarbonization of the natural gas supply. By 2050, more than 50% of our natural gas supply can come from biomethane, also known as RNG. On this premise, 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 as cooking, and existing space and water heating; and certain industrial end uses, such as process heating.
- Decarbonized gas in the form of P2G can play an important role integrating variable renewable generation by producing gas, and then storing it in the existing pipeline distribution and storage infrastructure 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.

In the electric generation sector, natural gas will have a long-term and significant role to decarbonize electricity generation through the production of zero or near-zero carbon energy resources and smaller scale resources and deploy this renewable methane at a later time to scalable natural gas technology to aid in managing the intermittency of renewable sources like wind and solar. Production of renewable methane from excess renewable energy generation offers the opportunity to aid in balancing the grid when other renewable electricity resources are not available. Instead of shutting off or offloading excess renewable generation as is presently done, this strategy creates a new and cost-effective beneficial use for this valuable, imbalanced resource to create zero or near-zero carbon energy that can be stored in existing natural gas infrastructure and delivered on demand.

By developing appropriate policies and incentives we have the opportunity to displace a significant amount of our statewide natural gas usage with biological methane, or renewable natural gas, leveraging and reusing resources from landfills, wastewater treatment facilities, dairies, agricultural waste, urban waste, and woodland waste that would otherwise be discarded as waste. One major challenge lies in determining the most cost effective and efficient way to deliver biomethane into the pipeline. Additionally, non-arable land, recycled and other non-potable water could be used to grow switch grasses and algae that would be used to produce additional

¹⁵ 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.

biomethane, creating economic value and further reducing the carbon intensity of California's natural gas supply. Further study is needed to understand the optimal development of all of these potential biomethane resources which can provide significant environmental benefits. It is critical to make additional pipeline biomethane production incentives available to cultivate the development of these renewable resources.

SoCalGas is actively working to support each of these short-, mid-, and long-term clean energy solutions to reduce GHG emissions as part of our continued leadership in the natural gas research and development sector. For example, SoCalGas has signed an agreement with the National Renewable Energy Lab (NREL) to analyze the California Independent System Operator (CALISO) grid constraints and determine where there will be deployable electricity in the future to site power to gas facilities. CALISO's "duck curve," shows the future of when generation will occur and predicts times with excess generation capacity and not enough demand, presenting an opportunity to implement P2G to create much needed zero or near-zero carbon energy storage medium.

SoCalGas continues to work towards clean hydrogen pathways, including P2G, that can produce zero or near-zero carbon emissions. Understanding and leveraging natural gas opportunities in California's energy future will aid in managing the grid, storing energy, and decarbonizing the energy economy. This is the long-term future. Additionally, information is provided below on opportunities for P2G.

The Sempra utilities appreciate the CEC's analysis of the GHG potential benefits with the development of biomethane resources within California: it is valuable and well put together. Since GHG issues are global, it would be beneficial to consider the potential for biomethane development within and beyond California; how the California market may help catalyze out-of-state development to reduce GHG emissions; and how to provide the most economical access to biomethane resources for Californians. The assessment of biomethane resource potential and economic and environmental benefits of various feedstocks and pathways can help inform policy decisions regarding supply chain incentives and subsidies, but more research is needed to quantify these supply-side factors as well as end-use needs and benefits to inform additional demand-side incentive policies.

Several studies have been conducted to estimate the technical potential for biomethane production, and the results are somewhat varied. Selecting a single study to represent this potential may not be reasonable at this time. The Sempra utilities suggest that the biomethane resource potential outside of California be included in this report as they have already proven beneficial to the state in their support the LCFS program and can continue to provide important value to Californians beyond the transportation sector.

As the draft report mentions, a leveraged GHG reduction opportunity exists to reduce anthropogenic methane emissions in some applications, namely in the manure management sector. The LCFS program custom pathway methodology provides a mechanism to assign some value for the additional GHG benefits this biomethane can provide to the state, however, additional grants and subsidies may be necessary and justified to enable these highly beneficial projects which

directly address currently unmitigated anthropogenic methane emissions. We ask staff to point this out in the report.

We suggest that the following statement, *“Recent changes in the regulation of biomethane pipeline injection will need to be tested by real development and demonstration of upgrading equipment that can produce biomethane gas of consistent quality before this uncertainty can be overcome”*¹⁶, be deleted from the Report or be modified. An existing biomethane project at a wastewater treatment facility in Point Loma has been meeting the current SoCalGas Rule 30 requirements and has been successfully injecting into the pipeline, fulfilling the post-AB 1900 revised pipeline gas quality requirements. There still may be a need to commercially demonstrate upgrading technologies for landfill gas, although several vendors state that they are able to meet these requirements.

Although the CPUC Decision (D.) 15-06-029 established a limited interconnection incentive for biomethane producers to deliver biomethane to the utilities’ pipelines, there is still a large need for additional incentives to enable this market. Expanding the incentives available for the development of both generation and pipeline delivery facilities for biomethane would be a successful and appropriate application of cap and trade funding.

*“At this time there is not industry consensus on the best use of biomethane.”*¹⁷ This statement seems to imply that there could be industry consensus for a single “best” use for biomethane. However, we do not believe this is the case, and even if there were a single “best” case it would be market-dependent and could change over time. Considering the changing market, we need to support pipeline injection of biomethane so it can always be directed to the greatest need/value.

Renewable Natural Gas Jobs Creation

The Renewable Natural Gas Coalition (RNGC) has indicated that biomethane projects result in the creation of more jobs per year average (11.5) than any other renewable energy technology. In developing biomethane projects at the 200 candidate sites (located at landfills, wastewater recovery facilities and from the agricultural sector), more than 20,000 direct and indirect jobs would be created in 42 counties in California. A copy of RNGC’s *Biofuels Initiative* overview has been provided for reference and proposed inclusion in the final version of the Report (Appendix B-6).

Opportunity for Energy Storage: Power-to Gas (P2G)

Renewable natural gas from electrolysis, known as P2G is notably absent from the Report. Since California is faced with an increasingly urgent need to deploy utility-scale energy storage solutions to support the integration of a rapidly expanding supply of intermittent renewable power generation resources, we strongly recommend staff add the text provided in Chapter 8 of Appendix A.

¹⁶ Page 79 of the Report, section “Regulatory Issues”

¹⁷ Page 72 of the Report, section “Biogas and Biomethane Production”

In the P2G process, excess renewable energy is run through water to produce hydrogen gas. This hydrogen can be used in transportation, industrial, injected into the pipeline, or methanated. Today, 35 facilities in the European Union are being planned, constructed, or operating P2G facilities. It is referred to as a “system solution” because of the added benefits of helping to balance the grid and storage capacity. P2G or gas-to-power can be moved to other natural gas end uses, which all reduces carbon emissions.

SoCalGas is leading the nation in assessing P2G technologies and has two projects underway that employ three electrolyzers: a 7kw pilot unit, and two larger 60 kW and 150 kW electrolyzers. SoCalGas has a P2G research project at the National Renewable Energy (NREL) Laboratory in Golden, Colorado that is co-funded by the DOE, see Appendix B-7. The SoCalGas/NREL project team will use an existing 150 kW electrolyzer to convert electricity from simulated photovoltaic system into hydrogen and oxygen. The hydrogen and previously-produced CO₂ will be injected into a liquid media contained by a specially designed bioreactor containing single-cell “methanogens.” The methanogens will consume the hydrogen and CO₂ and produce methane. The synthetic methane will be converted back to hydrogen and used to produce electricity via a high-efficiency fuel cell. The demonstration at NREL will allow us to study the entire round-trip renewable electricity storage cycle. It will also increase our understanding on the best approach and application for creating and using synthetic natural gas in a carbon neutral energy cycle.

At the University of California, Irvine (UCI), SoCalGas is operating two electrolyzers that run on photovoltaic power generated on campus. This allows us to experiment and model the dynamics of integrating renewable power generation with energy storage in the form of hydrogen production. Under various experimental scenarios, the produced hydrogen is injected directly into a simulated pipeline grid, blended with natural gas and then injected into the pipeline, or injected into the campus pipelines and sent to the onsite power turbines. At UCI, we are also testing the potential impacts of hydrogen on natural gas system components and end-use equipment.

As a next step, we strongly believe that a 1 MW P2G energy storage system should be built as a pre-commercial pilot demonstration. Ultimately, systems as large as 50 MW will be required. To accomplish this we recommend:

1. Research Development and Demonstration (RD&D) funding targeting P2G technologies supported by collaborative efforts between CEC and DOE
2. A regulatory framework for monetizing the services that can be provided by P2G technologies
3. Incentives to encourage the first commercial P2G projects

Carbon capture and sequestration (CCS) is another opportunity to produce a zero carbon gas supply. Instead of just being sequestered, it can be combined with hydrogen to produce methane. The resulting methane injected into the pipeline is carbon free, resulting in a net-zero carbon gas supply.

CHAPTER 9: Greenhouse Gas Emissions and the Natural Gas System

The latest research on natural gas distribution system methane losses conducted by Washington State University (WSU), Appendix B-8, utilizes research grade direct measurements from pipeline leaks and emissions from meter and regulation equipment. This is the most robust study to date and relied on extensive sampling and methods superior to the studies of twenty years ago that resulted in the emission factors used in mandatory reporting programs under ARB and EPA. The estimated emission losses using real leak data and these new factors are consistent with internal engineering lost and unaccounted for gas studies and reflect the modernization of the distribution systems over the last two decades. Other studies by the Gas Technology Institute (GTI) show similar results falling within the uncertainty ranges of the measurements.

The historical reliance upon carbon isotope and/or methane/ethane ratios is not a reliable means to distinguish pipeline methane to naturally occurring petrogenic and/or biogenic sources which are extensive in southern California. Furthermore, flux rate measurements from mobile ambient detection equipment are not mature enough to account for the many variables to determine an accurate emission rate.

As methane emission quantification methods continue to be developed, it is critical that the inherent differences in operating systems are taken into account. During a CPUC Safety and Enforcement Division (SED) hosted workshop, SoCalGas proposed a flexible selection process which would quantify methane emissions based on system asset and activity specific factors which promote and understanding of operational constraints and company practices.¹⁸ Ultimately any methodology should allow for flexibility on selection process based on each utility's asset inventory, key activities, operational constraints and practices. Additionally, SoCalGas suggests using a using cap and trade price as a benchmark for a cost-effectiveness threshold in any quantification methodology.

As previously expressed in SoCalGas' comments submitted on June 15, 2015 as part of Docket No. 15-IEPR-04,¹⁹ screening tools aimed at early detection and identification of gross emissions sources could be effective at significantly and quickly reducing methane emissions. SoCalGas supports the development of methane mitigation/recovery technologies and continue to emphasize the importance of a thorough evaluation of control technologies and technological limitations; any evaluation should have a cost/benefit component.

¹⁸ SoCalGas: <http://www.socalgas.com/regulatory/R1501008.shtml>

¹⁹ http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-04/TN205034_20150615T173257_Tamara_Rasberry_Comments_SoCalGas_Comments_15IEPR04_Comments_to.pdf; (Attachment 1) http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-04/TN205034_201515T173257_Tamara_Rasberry_Comments_SoCalGas_Comments_15IEPR04_Comments_to.pdf; (Attachment 2) http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-04/TN205036_20150615T173725_Tamara_Rasberry_Comments_SoCalGas_Comments_15IEPR04.pdf

The Report references research underway by Lawrence Berkeley National Laboratory (LBNL) evaluating methane emissions indicating that tankless water heaters may be a significant contributor of methane emissions behind the meter in homes. SoCalGas urges the CEC to support residential leakage research in Southern California. The LBNL study sample size was limited to ten San Francisco Bay homes, representing a less than significant statistical data set. Additionally, the combustion appliance leakage results from the LBNL study appear high or artificially inflated in light of the limitations of the baseline data set.²⁰ The LBNL study also relied on field testing of homes which is highly variable and therefore may not be ideal for purposes of data gathering since there is a potential for inconsistent control variables and time constraints. SoCalGas is planning to review LBNL's methodology, including calibration data and flue back-pressure tests. We caution the CEC not to rely on limited regional data (Northern California) with limited statistical significance (ten homes) and apply it to the entire state. Furthermore, we know that focusing on "tailpipe" type emissions is not portraying the whole story and there should be a holistic analysis taking into account the efficiencies of equipment, duty cycles and the "source" of energy to compare apples to apples. We request the Commission defer reaching conclusions on this data until a thorough review of additional data more representative of statewide emissions is completed.

SoCalGas is actively pursuing activities and technologies to reduce methane leakage from the natural gas value chain and supports the focus on RD&D identified in the Report. However, we believe the Report should also recognize an important opportunity to reduce overall methane emissions for the state through the displacement of fossil natural gas by renewable natural gas. The ARB's Short Lived Climate Pollutants (SLCP) paper identifies statewide methane inventories.²¹ Methane leakage from the utilities is a small part of total methane emissions. By applying Environmental Defense Fund (EDF)/WSU emission factors, the emissions from the utility system are approximately equivalent to four (4), 10,000 cow, commercial dairy farms' annual emissions. The CEC and other policy makers are encouraged to consider implementation of additional RD&D and incentive funding to be directed towards the capture and utilization of renewable natural gas resources. A focus on these biological methane sources is particularly appropriate as part of the state's short- and mid-term investment strategy to address concerns about SLCP and overall GHG emissions inventories.

CLOSING

AB 1257 requires the CEC to *"identify strategies to maximize the benefits obtained from natural gas, including biomethane for purposes of this section, as an energy source, helping the state realize the environmental and cost benefits afforded by natural gas"* [emphasis added].²² *"The report provides an overview of natural gas issues in the state, the current status of the natural gas system, and identifies opportunities for additional research and information gathering."*²³ This is an important first step in

²⁰ As previously stated in comments submitted as part of Docket No. 15-IEPR-04 and as illustrated in Figures 7 and 8 of those comments; [http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-04/TN205034_20150615T173257_Tamara_Rasberry_Comments_SoCalGas_Comments_15IEPR04_Comments_to.p](http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-04/TN205034_20150615T173257_Tamara_Rasberry_Comments_SoCalGas_Comments_15IEPR04_Comments_to.pdf)
[df](http://docketpublic.energy.ca.gov/PublicDocuments/15-IEPR-04/TN205034_20150615T173257_Tamara_Rasberry_Comments_SoCalGas_Comments_15IEPR04_Comments_to.pdf).

²¹ http://www.arb.ca.gov/cc/shortlived/concept_paper.pdf

²² http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB1257

²³ Page 9 of the Report

implementing strategies to maximize the benefits of natural gas and realizing those environmental benefits in the near and long term future. SoCalGas looks forward to working with the CEC over the coming year to develop clear and actionable strategies to take advantage of and invest in opportunities to utilize natural gas' potential as a clean energy solution.

Decisions today are defining the course of our clean energy future in all sectors of our economy. Simply put, California has the unique challenges and opportunities presented by its comprehensive environmental targets that cannot be met by staying on the current course. There will always be *"ongoing regulatory initiatives [that] are being undertaken by various agencies in the state..."*²⁴, but this should not deter the CEC from taking the lead in affirming natural gas' role in the long-term energy mix as a clean and affordable way to reduce smog and greenhouse gas emissions and improve the health of all Californians.

SoCalGas supports expanded RD&D agendas for natural gas technologies. We believe the next step will be to prioritize these research opportunities and identify specific action plans to advance strategies for realizing the benefits of natural gas. An important first step will be an update of the Bioenergy Action Plan and the development of Action Plans deployment of near-zero heavy-duty trucks, as well as an Action Plan for research and policies to support natural gas in ZNE buildings.

We appreciate the opportunity to provide comments and input on the Report. California is our home and we share the CEC's goals to strive at the highest levels to preserve and take care of it. We embrace a big picture view and shall continue to work diligently to provide the safest, clean, most reliable and affordable service to 21 million people. We believe natural gas offers an affordable, clean and practical way to meet California's goals and look forward to continuing working together to develop Action Plans to align state policies and identify funding resources to advance cleaner natural gas technologies to meet the state's environmental goals, improve the health of our local communities through NOx, particulate matter and ozone emissions reductions, as well as global health through GHG reductions.

Please do not hesitate to reach out for more information.

Respectfully submitted,

/s/ George Minter

Regional Vice President

External Affairs & Environmental Strategy

Enclosure

²⁴ Page 11 of the Report