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Carol Sutkus
Manager
South Coast Air Quality Planning Section
and
Kirsten King Kayabyab
Air Pollution Specialist
South Coast Air Quality Planning Section
California Air Resources Board
P.O. Box 2815
1001 "I" Street
Sacramento, CA 95814

Re: Comments on Proposed 2016 State Strategy for the State Implementation Plan

Dear Ms. Sutkus and Ms. Kayabyab:

SoCalGas appreciates the opportunity to comment on the Proposed 2016 State Strategy for the State Implementation Plan (SIP) that the California Air Resources Board (ARB) shared with the public in June 2016. We hope our comments are taken in the constructive manner we offer them, and also look forward to a follow-up meeting in person to discuss our concerns and ideas with you.

1. SoCalGas Supports the Proposed Federal Low-NO_x Standard

As detailed in the Mobile Source Strategy (MSS) published by ARB earlier this year,¹ to attain federal air quality standards for ozone California must achieve dramatic reductions in NO_x emissions from heavy-duty trucks. To achieve these reductions, California needs to accelerate its transition to near-zero emission heavy-duty trucks for California-based trucks as well as new federal, heavy-duty truck engine emission standard to address trucks which operate in the state that are not based here. The MSS notes, "About 60 percent of total heavy-duty truck VMT in the South Coast on any given day is accrued by trucks purchased outside of California, and are

¹ ARB, "Mobile Source Strategy," pp. 22, 83 (May 2016).
<http://www.arb.ca.gov/planning/sip/2016sip/2016mobsrsrc.pdf>

exempt from California standards. U.S. EPA [Environmental Protection Agency] action to establish a federal low-NOx standard for trucks is critical.”²

In 2015, Cummins Westport Inc. certified the world’s first heavy-duty engine at near-zero emission levels—90 percent below the existing federal standard, and certified to meet ARB’s lowest-tier optional near-zero emission standard and reduce GHGs by 15%. This “next generation” heavy-duty natural gas engine is now commercially available for transit bus, refuse, school bus, and medium-duty truck applications. Additional near-zero emission heavy-duty natural gas engines are expected to follow by 2018, addressing a wider array of medium- and heavy-duty on-road applications.

Two California Air Districts have petitioned the U.S. Environmental Protection Agency³ to implement an ultra-low heavy-duty engine emission standard for NOx. SoCalGas supports these requests for a new federal low-NOx truck standard, which are necessary to achieve air quality standards in California.⁴

2. SoCalGas Supports Continued Implementation of the Low Carbon Fuel Standard to Reach Our State’s Air Quality Goals

California has been known as the cradle for innovation and forward thinking in the areas of clean energy technology, and the Low Carbon Fuel Standard (LCFS) is an example of its success. Since its creation in 2010, the LCFS has been instrumental in creating price parity between alternative fuels and fossil fuels, such as gasoline and diesel. The effects are truly remarkable:

- 36% increase in the use of clean fuels
- \$650 million invested in clean fuel production
- 16.6 million tons of carbon pollution avoided
- \$1.6 billion in health costs prevented, and
- 6.6 billion gallons of petroleum have been displaced.⁵

There are not only statistical benefits but also benefits that cannot be measured. The LCFS has been the catalyst for companies and people to innovate in the energy sector. This program has been crucial in spurring the development of low-carbon fuels in California by providing clear market signals to producers that their investments in research and development will yield returns in the long-run. The LCFS has increased demand for alternative fuels, such as renewable natural gas, leading to new technologies to produce, deliver, and use that fuel. For example, in 2015,

² ARB, “Mobile Source Strategy,” p.46 (May 2016).

³ South Coast Air Quality Management District, “Petition to EPA for Rulemaking to Adopt Ultra-Low NOx Exhaust Emission Standards for On-Road Heavy-Duty Trucks and Engines,” p.12 (June 3, 2016). See also San Joaquin Valley Air Pollution Control, “Petition Requesting that EPA Adopt New National Standards for On-Road Heavy-Duty Trucks and Locomotives Under Federal Jurisdiction, June 22, 2016, at p. 1. “Begin formal rulemaking on the development of an ultra-low NOx exhaust emissions standard (0.02 g/bhp-hr) for on-road heavy duty engines.”

⁴ Attached for your review is the June 14, 2016, SoCalGas letter to the federal Environmental Protection Agency in support of the South Coast Air Quality Management District Petition to Adopt Ultra-Low NOx Emissions Standard, as Appendix A to these comments.

⁵ California Delivers webpage, “California’s Low-Carbon Fuel Standard Is *Working*,” <http://www.cadelivers.org/low-carbon-fuel-standard/>

encouraged by the increasing availability and decreasing price of alternative fuels, Big Blue Bus, the transit agency of the City of Santa Monica, switched its bus fleet to 100% renewable natural gas, reducing its fleet's carbon footprint by an estimated 8,000 tons per year.⁶ It's innovations like this that will help California achieve its ambitious air quality goals such as those set forth in the SIP.

3. ARB's Advanced Clean Transit Proposal Should Be Revised to Employ a Performance Based Approach

Multiple stakeholders including California transit agencies and SoCalGas strongly support a performance-based, rather than technology-specific, approach to developing the next generation of clean transit in California.⁷ Whatever technologies are pursued by transit agencies it seems very likely that incentive funding will be a critical element of a successful program. Flexibility is another key element. Flexibility that allows transit agencies to use near-zero and/or zero emission technologies coupled with renewable fuels.

A. Near-Zero Emission Natural Gas Buses Fueled by Renewable Natural Gas Can Improve Air Quality Now

Recent analyses from the Los Angeles County Metropolitan Transportation Authority and Santa Monica's Big Blue Bus clearly show the multiple benefits of allowing California transit agencies to use near-zero emission natural gas buses fueled by renewable natural gas for the foreseeable future. These benefits include significant NOx emission reductions, weighty greenhouse gas reductions (GHG), meeting the transit agency's duty-cycle needs, and considerably lower costs. Put more succinctly, providing this flexibility to transit agencies will achieve the same emission reduction benefits much sooner and for significantly less cost than the ARB staff proposal. This near-zero engine technology and renewable natural gas are available to be deployed starting this year. We have attached copies of these analyses for your review as Appendices B and C.

B. SoCalGas Is Concerned About a Disconnect Between ARB Board Member Comments and ARB Staff Direction on Advanced Clean Transit Proposal

For SoCalGas and many other stakeholders, there is a dramatic disconnect between ARB Board Member public comments in the fall of 2015 and earlier in 2016 and ARB staff's comments and lack of action to revise the Advanced Clean Transit proposal. At the ARB Board public meeting on February 18, 2016, at least two Board Members, Chair Mary Nichols and Professor Daniel Sperling, expressed concern that the Advanced Clean Transit proposal could negatively impact transit service. At the same time, they continued to express support for increasing the use of zero emission technologies in buses but clearly communicated that they no longer believed regulation was the right way to achieve this. Staff has continued on a path to *require* zero emission transit

⁶ Press Release, "Big Blue Bus, Fueling a Renewable Future One Bus at a Time," July 15, 2015.

<http://www.bigbluebus.com/Newsroom/Press/Big-Blue-Bus,-Fueling-a-Renewable-Future-One-Bus-at-a-Time.aspx>

⁷ SIP, Advanced Clean Transit, p. 53.

buses throughout the State by a date certain.⁸ Given this disconnect between board member public comments and staff actions, it is both confusing and misleading to include the Advance Clean Transit program in the MSS and the SIP until it is revised to include a performance-based approach and address the concerns raised by ARB Board Members.

4. Incentive Funding for Heavy-Duty Engines Results in Immediate Air Quality Improvements

As discussed above, SoCalGas supports a new federal standard of 0.02 NO_x g/bhp-hr for heavy-duty vehicles, as evidenced by our letter supporting the South Coast AQMD's petition to the federal Environmental Protection Agency requesting that very standard for a 2023 implementation timeline. (Please see our attached Appendix A.) What is needed urgently, between now and 2023, is a robust incentive program to deploy this existing near-zero technology throughout the entire heavy-duty transportation sector as both the ARB MSS and the South Coast Air Quality Management District's (SCAQMD) Draft Air Quality Management Plan⁹ acknowledge and support.

The MSS and the SIP both do a very good job of describing the critical need for significant incentive funding to achieve needed emission reductions from heavy-duty trucks. Achieving improved air quality requires more than just addressing long-term climate change goals, and when solutions are available to effectively address multiple environmental goals simultaneously, they should be prioritized by policymakers. Upgrading the existing population of heavy-duty trucks operating in California is an area where such co-benefits can be achieved cost-effectively and in the near-term. According to ARB's EMFAC (also known as "emissions factors") database, these trucks are responsible for nearly 40% of on-road NO_x emissions, and nearly 15% of on-road GHG emissions, making them a high-impact subject for improvement.

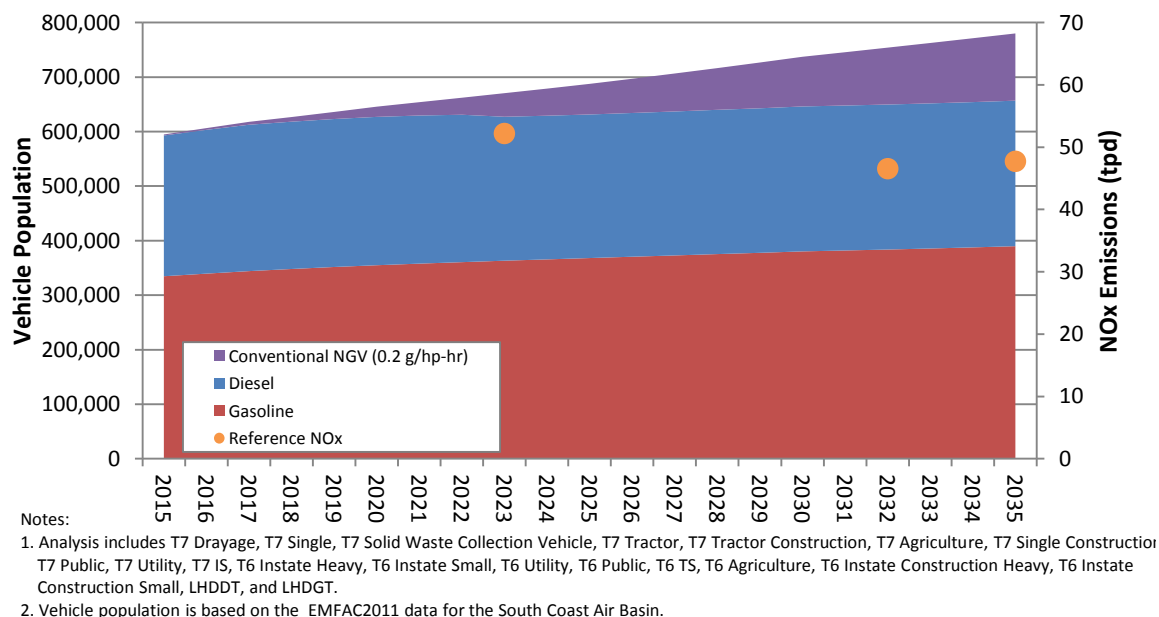
SoCalGas has conducted significant research into the efficacy of investing in near-zero natural gas heavy duty trucks to help local air districts and the State meet air quality and other goals.¹⁰ Below shows the penetration of such trucks into the South Coast Air Basin market based upon market forces at the current NO_x emission rate of 0.2 grams of NO_x per brake horsepower hour.

⁸ See, for example, "Discussion Draft for Battery Electric Bus Operations," from April 7, 2016, Advanced Clean Transit Workgroup Meeting, at <http://www.arb.ca.gov/msprog/bus/ratesanddemand.pdf>.

⁹ South Coast Air Quality Management District, Draft 2016 Air Quality Management Plan, Appendix IV-A, "Stationary and Mobile Source Control Measures," June 2016, p. IV-A-8, "Incentives Programs Measure."

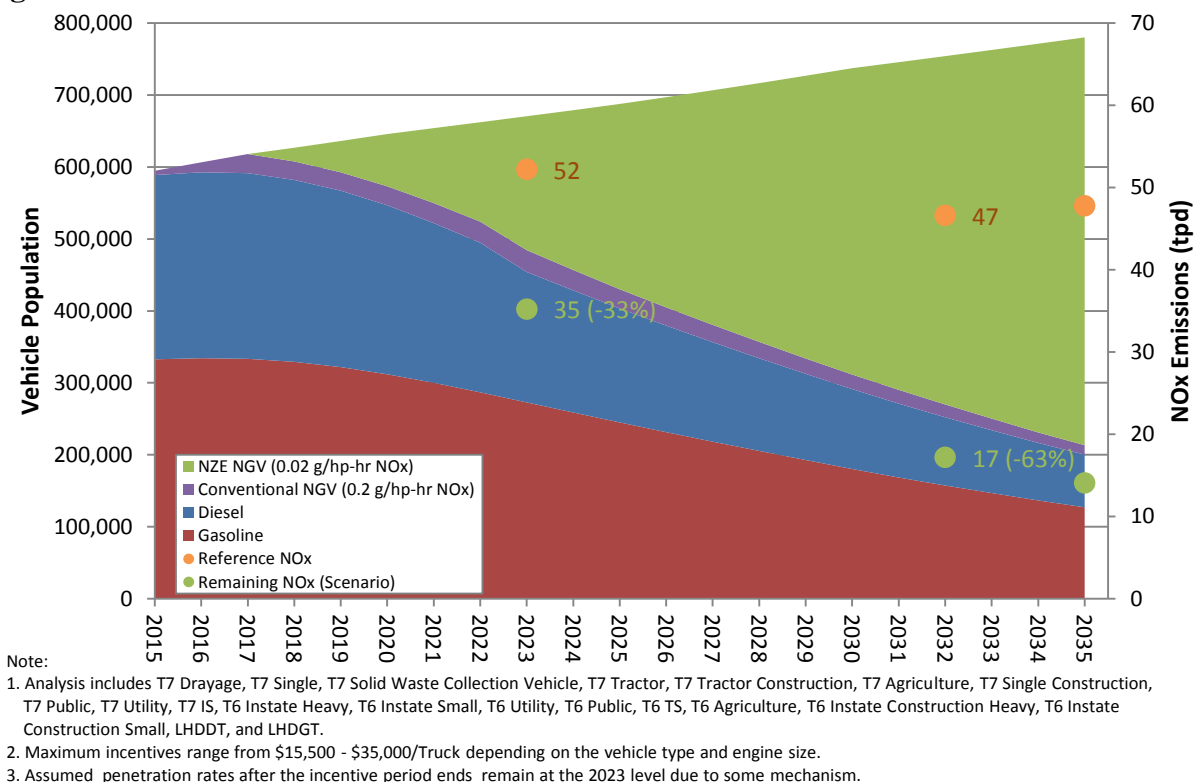
¹⁰ For further discussion and full explanation of assumptions for these Figures, please see "Near-Zero Emission (NO_x) Natural Gas Truck Opportunities in the South Coast Air Basin," prepared by Environ International Corporation, December 2014, attached as Appendix D to these comments.

Figure 1.



If we look a little further into the future – two years at most – we believe a 12L heavy-duty natural gas engine that would produce 90% less NOx per brake power hour, at 0.02 grams, will be commercially available. Engines that size could support ultra-low NOx heavy-duty trucks used for drayage and long hauls common in the freight sector. If purchases of such ultra-low NOx natural gas trucks were supported by incentive funds, market penetration of such trucks would be expedited, **leading to a 33% NOx emission reduction by 2023 and 63% NOx emission reductions by 2031 in the South Coast Air Basin alone.**

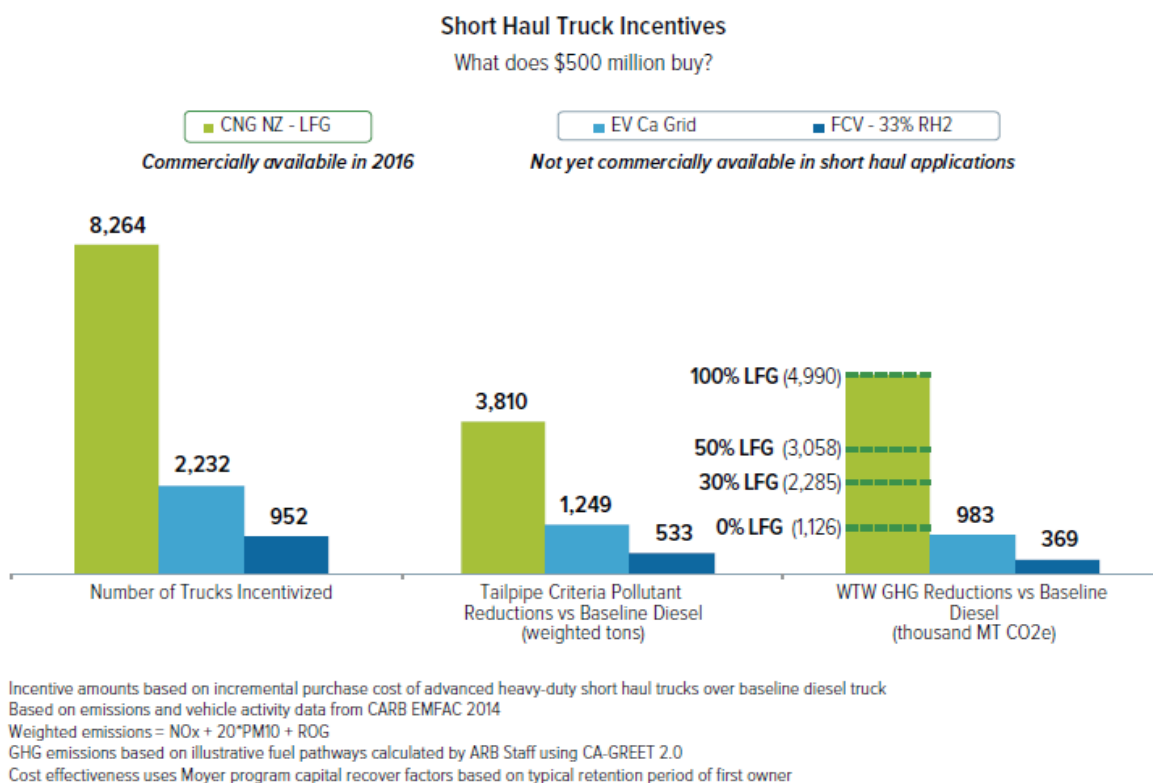
Figure 2.



As discussed at length in the *Game Changer Technical Whitepaper* by Gladstein, Neandross and Associates, upgrading these traditional heavy-duty trucks with advanced near-zero emission natural gas vehicles (NGVs) can provide a cost-effective solution to help meet our climate change and air quality goals in the near term.

Figure 3¹¹ below demonstrates the relative impact incentives supporting heavy-duty NGVs can have compared to alternative choices – which may not be available for several decades. For example, providing incentives for near-zero emission heavy-duty NGVs fueled with renewable natural gas (RNG) can have three times the tailpipe criteria pollutant reduction and five times the “well-to-wheels” GHG reduction benefits as the next best alternative. Additionally, growing the demand for RNG as a vehicle fuel for California’s goods movement sector will promote the development of RNG production facilities, which often present an opportunity to mitigate atmospheric emissions of methane at landfills and dairies. Coupled with the near-term availability of this technology, these leveraged impacts make supporting the adoption of heavy-duty NGVs through the SIP and other state actions a clear choice.

Figure 3.



As noted by the ARB in their MSS, incentive funding is critical to deploying zero emission and near-zero emission heavy duty trucks. “Given the timing and the overlay of current regulatory programs, technology deployment by 2023 must come primarily through incentive

¹¹ Game Changer, Technical White Paper, Next Generation Heavy-Duty Natural Gas Engines Fueled by Renewable Natural Gas, May 3, 2016, Figure 4. http://ngvgamechanger.com/pdfs/GameChanger_FullReport.pdf

mechanisms.”¹² ARB specifically references the need to incentivize near-zero heavy-duty trucks:

In the case of heavy-duty vehicles, combustion is likely to remain a dominant technology through 2031 based on the maturity of current technologies. Thus, the assessment focused on expanded deployment of low-NOx trucks. Under this approach, the population of trucks meeting a low-NOx standard in the South Coast would increase by approximately 150,000, totaling over 430,000 trucks by 2031. **These technologies are anticipated to be available, but will require substantial incentive funding to achieve this additional level of enhanced deployment.**¹³

As a result, a detailed discussion of an incentive funding plan for achieving the goals and objectives set forth in the SIP would be appropriate in the final version.

5. Renewable Natural Gas Can Transform the Mobile Sector by Reducing GHGs

SoCalGas supports ARB’s Proposed Short-Lived Climate Pollutant Strategy (SLCP) of capturing biogas to be used as a transportation fuel, injected into natural gas pipelines, and used to generate on-site renewable electricity and heat.¹⁴ Increasing the use of RNG as a transportation fuel would not only reduce methane emissions from organic waste streams, but also reduce black carbon by displacing diesel in older, conventionally fueled heavy-duty vehicles. Using RNG with a near-zero emission engine can further reduce GHG emissions by 50-80% depending on the source of biogas.

A. Addressing RNG Technology and Market Barriers

There are multiple technology and market challenges associated with injecting biogas into pipelines. SoCalGas strongly supports the ARB’s goals to address these challenges and build market certainty and value for RNG.

We commend ARB for publishing a provisional LCFS Carbon Intensity for dairy biogas that includes the benefit of avoided methane emissions. We believe this is a good first step towards enhancing the project economics to produce RNG from dairy waste and to use it as transportation fuel. We would support further initiatives to incentivize the capture and use of biogas, particularly by offsetting infrastructure costs. Facilities that connect to the pipeline system are necessary for California to meet its climate change and air quality goals, and provide for the most long-term flexibility for this valuable renewable resource.

- **Overcoming RNG Interconnection Challenges:** The SLCP points to the challenge of interconnecting distributed sources of renewable energy onto the electricity grid or pipelines. High project startup costs, including the costs of connecting to the pipeline

¹² Mobile Source Strategy, released by ARB May 2016, at p. 43.
<http://www.arb.ca.gov/planning/sip/2016sip/2016mobsrsrc.pdf>

¹³ Mobile Source Strategy, released by ARB May 2016, at p. 44 (emphasis added).

¹⁴ California Air Resources Board, Proposed Short-Lived Climate Pollutant Strategy, released April 2016, p. 66.
<http://www.arb.ca.gov/cc/shortlived/meetings/04112016/proposedstrategy.pdf>

system, are one of the inherent challenges of RNG project development, regardless of feedstock. Interconnection with the pipeline system gives RNG access to the broadest market possible, facilitating the most diverse and flexible utilization opportunities and hence most dynamic and effective incentive strategies to encourage methane capture to achieve the objective of the SLCP.¹⁵ Additional regulation providing for energy infrastructure investment by California regulated utilities is necessary to accept and transport RNG, and ultimately should be recoverable in rates.

- **Dairy Biogas for Freight Vehicles:** ARB identifies several programs to accelerate project development and emissions reductions at dairies. At SoCalGas, we are conducting education and outreach to developers to help accelerate RNG projects in this and other sectors. As discussed above, SoCalGas has assisted project developers with assessing high-level costs and feasibility for projects like the Kern County Dairy Biogas Cluster, which would help advance the development of California's sustainable freight transportation system. In addition, the project would directly benefit the economically disadvantaged communities adjacent to these dairies and transportation corridors traveled by trucks fueled with RNG by SLCP emissions, improving air and water quality, and boosting economic growth. Extending natural gas infrastructure to these disadvantaged communities in conjunction with dairy-RNG pipeline interconnections could also present an opportunity to transition diesel and propane end-uses to cleaner burning natural gas appliances and vehicles, with the potential added benefit of NOx emission reduction.
- **Emissions from Conventional Combustion Engines:** In February 2008, the SCAQMD adopted new standards,¹⁶ which require biogas engines to meet the same emission limits as natural gas fueled engines. These requirements are the cleanest in the nation and apply to all biogas fueled engines (numbering approximately 66 engines in July 2010). According to a technology assessment¹⁷ conducted by the agency in 2010, uncontrolled biogas engine emissions approximated 0.93 tons per day (tpd) of NOx and 0.44 tpd of volatile organic compounds (VOCs) prior to the February 1, 2008 amendments. Once these biogas emissions are controlled as required by Rule 1110.2, the emissions reductions generated from biogas engines will be approximately 0.69 tpd of NOx and 0.16 tpd of VOC. All new biogas engine installations must also meet these natural gas equivalent emission standards. Such treatment of biogas would likely improve air quality in other areas of the state as will occur in the South Coast Air Basin.

B. Renewable Natural Gas and Transportation

The LCFS identifies RNG from existing organic sources as the lowest carbon intensity standard pathway available, even lower than the current electricity mix or hydrogen. When sourced from dairies and organic waste diverted from landfills, the carbon intensity of RNG is rated as "carbon-negative," due to avoided methane emissions from dairies and landfills.

¹⁵ The California Public Utilities Commission has taken an initial step by authorizing the natural gas utilities to recover a portion of interconnect costs from ratepayers in D.15-06-029.

¹⁶ South Coast Air Quality Management District Rule 1110.2 adopted on February 1, 2008.

¹⁷ South Coast Air Quality Management District Interim Report on Technology Assessment for Biogas Engines Subject to Rule 1110.2 (July 9, 2010).

As detailed in *Game Changer Technical Whitepaper* by GNA (referenced above), a heavy-duty natural gas engine is now commercially available which meets ARB's lowest-tier optional near-zero emission standard at 0.02 g/bhp-hr NOx.¹⁸ When paired with RNG, this technology will provide a commercially proven, broad-based, and affordable strategy to immediately achieve major reductions in emissions of criteria pollutants, air toxins, and GHG. As ARB has identified that heavy-duty electric and fuel cell electric vehicles will not be available in the next several decades,¹⁹ RNG provides the single best opportunity for California to achieve its air quality and climate change goals in the on-road heavy-duty transportation sectors. Equally important, major reductions of cancer causing toxic air contaminants can immediately be realized in disadvantaged communities adjacent to freeways and areas of high diesel engine activity, where relief is most urgently needed.

The most powerful driver to produce RNG in today's market is to fuel natural gas vehicles (NGVs), where RNG can support both California's LCFS and the Federal Renewable Fuel Standard (RFS) programs. According to the LCFS program, in the last half of 2015, the majority of NGV fuel in California was RNG – a huge success for this program, but an indication that RNG supply is approaching parity with demand. Growing the NGV market in California is not only an impactful and cost effective way to significantly reduce NOx and GHG emissions, but will also be critical to increasing the demand for RNG as the existing market becomes increasingly saturated.

In conclusion, by developing appropriate policies and incentives, we have the opportunity not only to simultaneously reduce SLCP, GHG, and criteria emissions, but also replace a significant amount of statewide natural gas usage with biomethane, or RNG, by leveraging and using organic waste resources which would otherwise be discarded and emitted as SLCPs. It is critical to make additional pipeline RNG production incentives available to cultivate the development of these renewable resources and leverage existing pipeline systems, electric generation facilities, NGV refueling infrastructure, and combined heat and power and distributed generation opportunities.

C. SoCalGas Encourages ARB and Other Stakeholders to Examine the Impact of These Policies on the Emerging Biofuels Industry

The policies being pursued in these plans can result in significant growth in both the renewable natural gas industry and in the renewable diesel industry. Both fuel types offer GHG and NOx emissions reductions, and policymakers should enact programs which will promote multiple choices for operators, with incentives appropriately aligned with performance in meeting emissions reduction goals. The following should be considered in implementing these policies:

¹⁸ Game Changer Technical White Paper, Gladstein, Neandross & Associates, May 3, 2016.
http://ngvgamechanger.com/pdfs/GameChanger_FullReport.pdf.

¹⁹ See ARB Technology Assessment: Medium and Heavy Duty Battery Electric Trucks and Buses, October 2015, available at http://www.arb.ca.gov/msprog/tech/techreport/bev_tech_report.pdf and ARB Technology Assessment: Medium and Heavy-Duty Fuel Cell Electric Vehicles, November 2015, available at http://www.arb.ca.gov/msprog/tech/techreport/fc_tech_report.pdf.

- Renewable diesel has an important role in reducing GHG emissions. Renewable diesel has also shown in testing that NOx emissions may be reduced when used as a replacement fuel in existing trucks, allowing the use of renewable diesel to be directly attributable to meeting the Clean Air Act compliance goals of the MSS, as well as the state's GHG goals. (Briefings with our consultants indicate that the studies relied upon to substantiate these impacts should be updated, and we commend ARB for committing to do this.)
- Near-zero emission natural gas trucks, when fueled with renewable natural gas, can also meet both the Clean Air Act attainment goals for the state, and help meet the state's GHG goals. For near-zero emission natural gas trucks, the dramatic 90% reduction in NOx emissions is a result of an advanced engine technology – which will deliver this emission reduction regardless of whether it is fueled with traditional natural gas, upgraded biogas, or renewable natural gas. Because of the need for new engine technology with this pathway, up-front buy down incentives will be required to encourage the adoption of this advanced technology. Without incentives to encourage purchase of the 0.02 g/bhp-hr engines, operators would purchase the less expensive 0.2 g/bhp-hr engines instead, and there would be no NOx emission reductions gain. ARB is currently requiring renewable natural gas use for all near zero emission trucks under the incentive programs being proposed, a commendable and attainable goal under today's market conditions, consistent with the integrated planning approach for GHG and criteria pollutant reductions. Because of this linkage created by these incentive programs, i.e., near-zero emission trucks receiving incentives must use renewable natural gas, there will be significantly more demand for renewable natural gas production. As a result of these multiple requirements for near-zero emission trucks, more drastic air quality and environmental benefits will be achieved with this approach.

Because of this double emission reduction benefit from both renewable diesel and renewable natural gas, policymakers should compare the varying outcomes of these policies and consider adopting incentives commensurate with the benefits achieved.

Specifically, ARB has proposed a measure, “Expand Use of Renewable Fuels,” which has as its objective, “Replace 50 percent of diesel demand with low emission diesel by 2031.” This measure would establish a state policy that could significantly bias the growth of the biofuels industry, limiting innovation in the alternative fuels markets. As we all know, this industry needs support to grow, especially to reach production levels anticipated in these plans for both renewable diesel and renewable natural gas. We must recognize that because there is a finite amount of investment funding available, it is critical to consider the implications of these policies on the growth and innovation of the nascent biofuels industry. Policymakers must examine the respective renewable biofuels technology, costs, energy consumption, feedstock impacts, near and long term environmental benefits, and the impact on the direction of growth of the renewable fuels industry generally.

The Energy+Environmental Economics (E3) consulting firm has performed studies that begin to examine some potential pathways to achieving our state's 2030 and 2050 environmental goals which can serve as a starting point for this examination. Last year E3 examined the impact of

supplementing an “Electrification” scenario, and an “Electrification” scenario with a “Low Carbon Gas” option, in order to improve the state’s ability to reach its 2030 GHG goals.²⁰ E3 concluded that one of the critical differences between a 100% Electrification compliance scenario and a scenario that includes Low Carbon Gas option would be choice of allocating biomass feedstock to the production of alternative fuels – namely bio and renewable diesel, and renewable natural gas. Fortunately, E3 also studied feedstock availability and found that less than 10% of the potential feedstock available nationally was necessary to produce the amount of renewable natural gas needed for their Low Carbon Gas option. However, due to the shared feedstock for the development of many biofuels, it is clear that it will be critically important to establish policies that don’t unilaterally support the development of single biofuels in order to maintain cost-effective energy diversity and achieve our statewide environmental goals. Below is a simple table summarizing some of the results of the E3 study:

	2015	2030 CARB Mobile Source Strategy	2030 E3 Electrification	2030 E3 Low Carbon Gas
ZEVs ^{1/} (millions of vehicles)	0.1	5 - 7.3	9.3	9.3
CNG and LNG trucks and buses (millions of vehicles)	0.00003	0.400	0.037 ^{4/}	0.359
Biogas (% of total gas system demand)	0%	<u>3</u> ^{3/}	2%	30% ^{5/}
Renewable Diesel (% of total diesel demand)	2% ^{2/}	55%	67% - 85%	3%
Statewide GHG Reduction (% Reduction from 1990 Levels)	2%	40%	40%	40%

^{1/} Includes BEVs, PHEVs, and FCVs

^{2/} Estimated renewable diesel share in 2013, based on reported LCFS compliance

^{3/} Almost all renewable fuels are liquids. Some renewable gaseous fuel, tied to incentive requirements

^{4/} E3 Electrification Scenario includes approximately 320,000 hybrid diesel trucks in the Alternative Fuel HD Sector

^{5/} RNG transportation demand as a percent of total system demand is approximately 17% in 2030, and is approximately 30% in 2050.

In addition, SoCalGas has also been examining the comparison in cost and energy use for producing various biofuels from this common feedstock, and should have information available for this discussion shortly. We encourage ARB, California Energy Commission (CEC), SCAQMD, San Joaquin Valley Air Pollution Control District (SJVAPCD), and other stakeholders to consider these important relationships, and the potential outcomes with respect to meeting our near and long term environmental goals of policies proposed in these plans on the growth and direction of the biofuels industry. We recommend that ARB and CEC establish this

²⁰ Energy+Environmental Economics (E3), *Decarbonizing Pipeline Gas to Help Meet California’s Greenhouse Gas Reduction Goal*, November 2014, released January 27, 2015.

http://origin-gps.onstreammedia.com/origin/multivu_archive/ENR/1241844-Decarbonizing-Pipeline-Gas.pdf

See also, “Study Finds Low-Carbon Gas Fuels NEW Option for Meeting California’s Greenhouse Gas Reduction Goals: Comparison of Electrification, Mixed Energy Solutions,” January 27, 2015.

<http://www.prnewswire.com/news-releases/study-finds-low-carbon-gas-fuels-new-option-for-meeting-californias-greenhouse-gas-reduction-goals-300026623.html>

work group in the near future so that it will be able to provide this vital analysis before adoption of these plans.

6. SoCalGas Encourages the Use of Natural Gas in Non-Road Heavy-Duty Related Engines

SoCalGas believes natural gas and renewable natural gas have an important role to play as transportation fuel for heavy duty engines in the non-road mobile sector. Specifically, natural gas can significantly reduce emissions in ocean-going vessels and locomotives, which are large contributors of air pollutants in our state and globally.²¹ SoCalGas is taking steps to lower such emissions. For example, SoCalGas is co-funding the demonstration of a Low NO_x Compressed Natural Gas-powered Switcher Locomotive at the San Pedro Bay Ports. In addition, SoCalGas has conducted analysis to evaluate the specific benefits of utilizing natural gas in heavy-duty non-road engines, and is pleased to share our findings here.

A. Ocean-Going Vessels Running on Liquefied Natural Gas Reduce Criteria Pollutants and Black Carbon Emissions

Emission estimates for an International Maritime Organization (IMO) Tier III diesel fueled 8,000 twenty-foot equivalent (TEU) ocean-going vessel (OGV) and a similar liquefied natural gas (LNG) OGV travelling from Los Angeles to Shanghai are shown in Table 1 of the attached Appendix E. Two different estimates were made for the diesel OGV - one before 2020 and the other for 2020 and beyond to capture the change in emissions resulting from the switch in fuel oil sulfur content to 0.5% required by IMO Regulation 14. The results show a reduction of 92% in PM₁₀, 85% in NO_x, >99% in SO_x, and 39% in black carbon prior to 2020. For calendar year 2020 and beyond, we see a smaller reduction in PM₁₀ of 69% due to the use of lower sulfur fuel oil; however, **reductions in black carbon emissions increase from 230 pounds per one-way trip (or 39%) to 330 pounds per one-way trip (or 49%).**

To understand the potential impact of such a fuel switch, consider a scenario of LNG OGVs increasingly replacing diesel OGVs for container cargo transport between Southern California and Asia. Southern California Association of Governments' (SCAG's) 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) estimates that the Ports of Los Angeles and Long Beach will handle around 36 million TEUs in 2035.²² More than 90% of this cargo (around 32.4 million TEUs) would be traffic to/from Asia.²³ If LNG OGVs started replacing diesel OGVs in 2020 and carried half of projected 2035 Asian cargo, black carbon emissions from OGVs would be reduced every year after introduction by up to approximately 340 tons/year by 2035.

²¹ SIP, p. 82, "Further Deployment of Cleaner Technologies: Off-Road Federal and International Sources."

²² SCAG, 2016 to 2040 RTP SCS - Transportation Goods Movement System Appendix, Adopted April 2016. Available at http://scagrtppscs.net/Documents/2016/final/f2016RTPSCS_GoodsMovement.pdf. Accessed May 2016.

²³ Fact sheets for Ports of Los Angeles and Long Beach. Available at: https://www.portoflosangeles.org/pdf/POLA_Facts_and_Figures_Card.pdf and <http://www.polb.com/about/facts.asp>. Accessed: May 2016.

B. LNG-Fueled Line-Haul Locomotives Reduce Black Carbon Emissions

Emission estimates for a 100 rail car double-stacked intermodal container train powered by three Tier 4 diesel locomotives and a similar train powered by three LNG locomotives travelling from Los Angeles to Chicago are provided in Table 2 of the attached Appendix E. Both locomotives (diesel and LNG) meet the USEPA Tier 4 standard; as a result, there are no reductions in PM₁₀ or NO_x for the LNG locomotives as compared to the diesel locomotive. We do however see a **thirteen pound per one-way trip or 87% reduction in black carbon emissions with the use of LNG in place of diesel.**

Consider a scenario of LNG replacing diesel for freight trains from Southern California to and from the Midwest (e.g., Chicago). Historically, about 40% of the intermodal container cargo coming into the Ports of Los Angeles and Long Beach went to the Midwest/Chicago by rail. These ports are projected to handle container volumes of around 36 million TEUs in 2035²⁴ of which around 12.8 million TEUs are estimated to be transported by on- and off-dock intermodal trains.²⁵ If we assume that 40% of these TEUs travel to Chicago/Midwest region and a 100% of these trains are LNG fueled in 2020,²⁶ black carbon emissions would be reduced every year after the fuel switch to approximately 85 tons/year by 2035.

For these reasons, SoCalGas would be pleased to partner with ARB to urge the federal EPA and the International Maritime Organization to speed their fuel requirements in these sectors and provide for improved air quality and lower GHGs and other emissions from these non-road sectors of air pollution.

Conclusion

SoCalGas is looking forward to reviewing the final SIP to be submitted to the federal government later this year, and is eager to help implement what we hope to be a cost-effective and flexible strategy to reach the State's ambitious air quality goals.

Sincerely,

Jerilyn López Mendoza

Jerilyn López Mendoza
Program Manager
Energy and Environmental Affairs

²⁴ SCAG. 2016 to 2040 RTP SCS - Transportation Goods Movement System Appendix, Adopted April 2016.

²⁵ Per 2016 to 2040 RTP SCS, approximately 35.5% (5-year average 2010 to 2014) of container volumes handled by the Ports of Los Angeles and Long Beach are transported by intermodal trains.

²⁶ It is assumed that the railroads would do a nearly complete fuel switch by major line to minimize duplicating fueling infrastructure.