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September 22, 2021

Rajinder Sahota, Deputy Executive Director
California Air Resources Board
P.O. Box 2815
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Subject: Comments on the 2022 Scoping Plan Update – Short Lived Climate Pollutants Workshop

Dear Deputy Executive Director Sahota:

Southern California Gas Company (SoCalGas) appreciates the opportunity to provide comments on the September 8, 2021 California Air Resources Board (CARB) 2022 Scoping Plan Update – Short Lived Climate Pollutants (SLCPs) Workshop. We recognize CARB's focused efforts in providing diverse presenters on technologies and existing programs to reduce SLCPs. Decisive action today is required because of the short lifespan of SLCPs and their powerful impact on global temperatures in the near-term. Taking advantage of cost-effective and available technologies and strategies now can be most impactful to further reduce SLCP emissions by 2030 and slow the rate of near-term climate change.

SLCPs can be used as an energy feedstock, can be reduced through clean fuels, and need to be properly accounted for in the greenhouse gas (GHG) inventories. SoCalGas's comments focus on these specific areas: (1) Carbon neutrality is achieved when GHG emissions are removed via sinks; (2) Utilizing waste streams and capturing methane can provide fuel diversity benefits; (3) A renewable natural gas (RNG) fuel technology pathway can reduce GHG emissions significantly and improve local air quality; (4) Reconciliation of methane leak emissions data are needed to ensure accuracy; and (5) Leak detection technologies can help mitigate potential hydrofluorocarbons leaks.

1. Carbon neutrality is achieved when GHG emissions are removed via sinks

At the August 17 Joint Legislative Committee on Climate Change Policies Hearing, Chair Liane Randolph stated:

> This scoping plan update will also require us to redefine our scope of sources and sinks in the framework of carbon neutrality…as we shift to the framework of carbon neutrality, we will expand the scope to include all sources, which means the emissions from natural and working lands and all sinks, which can be natural and working lands, carbon capture and sequestration for large emitters, direct air capture, and permanent storage of CO_2 from the atmosphere.[1]

One significant source of GHGs that has been overlooked in the Scoping Plan is the carbon dioxide produced by wildfires. Prior Scoping Plans have focused on reducing emissions from sources defined in the Assembly Bill 32 (AB 32) inventory, which focuses on fossil and industrial sources. Carbon released into the atmosphere from wildfires was not considered a significant component of atmospheric GHG emissions at the time because it was assumed then that, over the climatic cycle, this carbon did not significantly contribute to global warming because it would be sequestered back into vegetative re-growth.[2] A growing body of evidence now suggests, however, that carbon produced by wildfires is making significant contributions to the volume of GHGs in the atmosphere, both in the near- and long-term because of the intensity and duration of wildfires.[3] Figure 1 below illustrates the magnitude of wildfire emissions relative to "Assembly Bill 32 Inventory" emissions in 2018.[4,5] In fact, in 2018, wildfires emissions were nearly the same as emissions from the State's 15 million commercial and residential buildings.[6] In 2020, wildfire emissions were almost three times those in 2018.[7]

[1] Joint Legislative Committee on Climate Change Policies Hearing Materials, August 17, 2021, at minute 50:25. Available at https://climatechangepolicies.legislature.ca.gov/hearing-materials.

[2] "Wildfires, Greenhouse Gas Emissions and Climate Change," Future Directions International, September 24, 2020. Available at https://www.futuredirections.org.au/publication/wildfires-greenhouse-gas-emissions-and-climate-change/.

[3] *Id.*

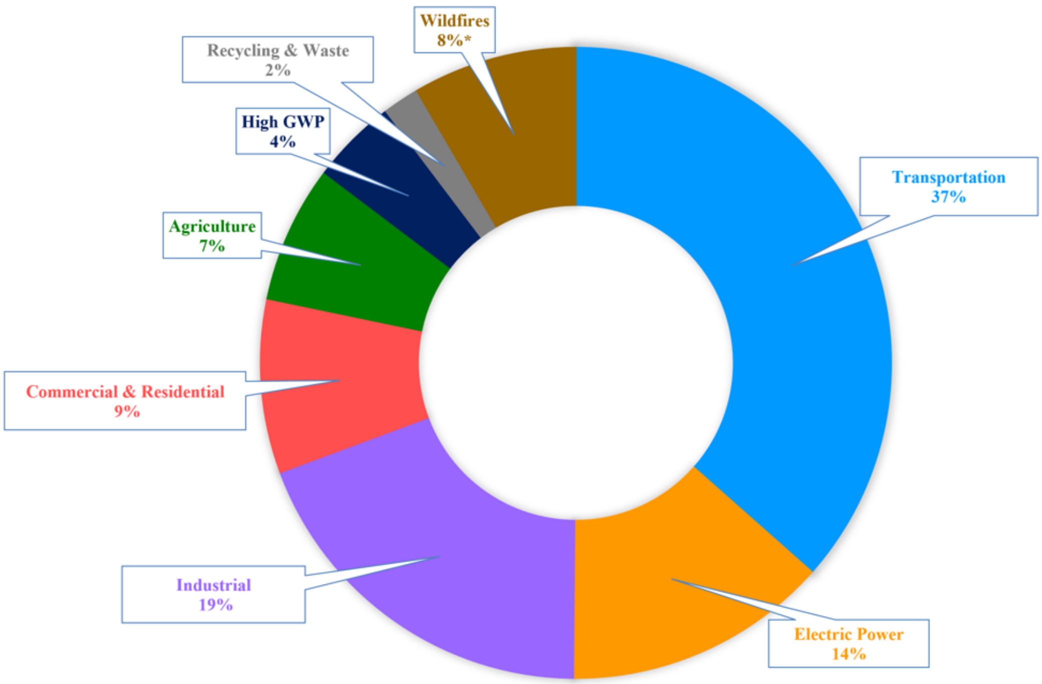
[4] "California Wildfire Emission Estimates," CARB. Available at https://ww2.arb.ca.gov/wildfire-emissions.

[5] "Current California GHG Emission Inventory Data," CARB. Available at https://ww2.arb.ca.gov/ghg-inventory-data.

[6] "California's Housing Future: Challenges and Opportunities Final Statewide Housing Assessment 2025," February 2018. Available at https://hcd.ca.gov/policy-research/plans-reports/docs/sha_final_combined.pdf.

[7] *Id.*

Figure 1. 2018 California GHG Emissions by Sector, Including Wildfire Emissions[8]



To achieve the 2030 milestone of carbon neutrality, we suggest that the 2022 Scoping Plan include all inventories, sinks, and sources (such as wildfires), rather than just focusing on the AB 32 inventory. "Wildfires in California are occurring more often and are more destructive than ever. Fifteen of the 20 most destructive wildfires in the State's history have occurred since 2000; ten of the most destructive fires have occurred since 2015. The State's fire season is now almost year-round."[9] Higher temperatures create conditions where wildfires are more likely for longer periods and will burn with greater intensity with less capacity of regeneration of vegetation. The resultant carbon dioxide emissions from the wildfires then contribute to higher temperatures (*e.g.*, global warming). Thus, if this major source of emissions is unaccounted for, the calculus of carbon neutrality may be incorrect, and the foundation of future policies and rulemaking may fall short.

2. Utilizing waste streams and capturing methane can provide fuel diversity benefits

California is relying on SLCP reductions for one-third of all emission reductions needed to meet the 2030 goal set by AB 398 (Chapter 135 of Statutes 2017).[10] Planning for this level of transformation across the economy will require multiple clean energy pathways and policy support that leverages private sector investments to accelerate emissions reductions. There is tremendous

[8] "California Wildfire Emission Estimates," CARB. Available at https://ww2.arb.ca.gov/wildfire-emissions. Note that wildfire emissions have been added as a sector.

[9] "Use of Back-up Engines for Electricity Generation During Public Safety Power Shutoffs Events," CARB. Available at https://ww2.arb.ca.gov/resources/documents/use-back-engines-electricity-generation-during-public-safety-power-shutoff.

[10] CARB 2022 Scoping Plan Update – Short-Lived Climate Pollutants Workshop Recording, at 8:49 – 8:55. Available at https://www.youtube.com/watch?v=aAZFRdBc58g.

opportunity to significantly reduce SLCP emissions by capturing methane from organic waste and creating RNG. California generates an enormous volume of woody and cellulosic waste from forest thinning and other vegetation removed for wildfire mitigation, agricultural waste, and urban wood waste. Much of this waste biomass is burned in controlled burns or wildfires, which emits black carbon and further contributes to global warming.[11]

According to the California Forest Carbon Plan, converting biomass to energy cuts both particulate matter and methane emissions by 98 percent compared to open burning.[12] Capturing methane from waste streams can help achieve critical climate change objectives since most methane emissions in the State come from the dairy and livestock sector (54 percent) and landfilled organic waste (22 percent).[13] The State's SLCP Reduction Strategy relies heavily on bioenergy to reduce black carbon and methane emissions from the decay or burning of organic waste. California's Department of Resources Recycling and Recovery's (CalRecycle's) regulations to implement SB 1383 (Lara, Chapter 395, 2016) similarly rely heavily on bioenergy to put diverted organic waste to beneficial use.

RNG production is a technologically feasible pathway to convert a significant portion of the State's organic waste streams, especially if thermochemical processes are applied on a large scale. RNG or biomethane is produced from raw biogas typically derived from organic waste streams such as dairy manure, landfill gas, municipal organic waste (*e.g.*, food scraps, lawn clippings, and animal and plant-based material), agricultural waste, forest debris, and wastewater treatment byproducts. According to a 2020 Lawrence Livermore National Laboratory study, this waste biomass is widely available across California as shown in Figure 2 (below). In fact, approximately 56 million bone-dry tons of waste biomass is available annually statewide.[14] To place this into perspective, if the biomass waste was converted into electricity, it could support roughly 20 percent of the State's total electricity load.[15]

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[11] "CARB, Short-Lived Climate Pollution Reduction Strategy," adopted March 2017, at 40, Table 5. Available at https://www.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf.

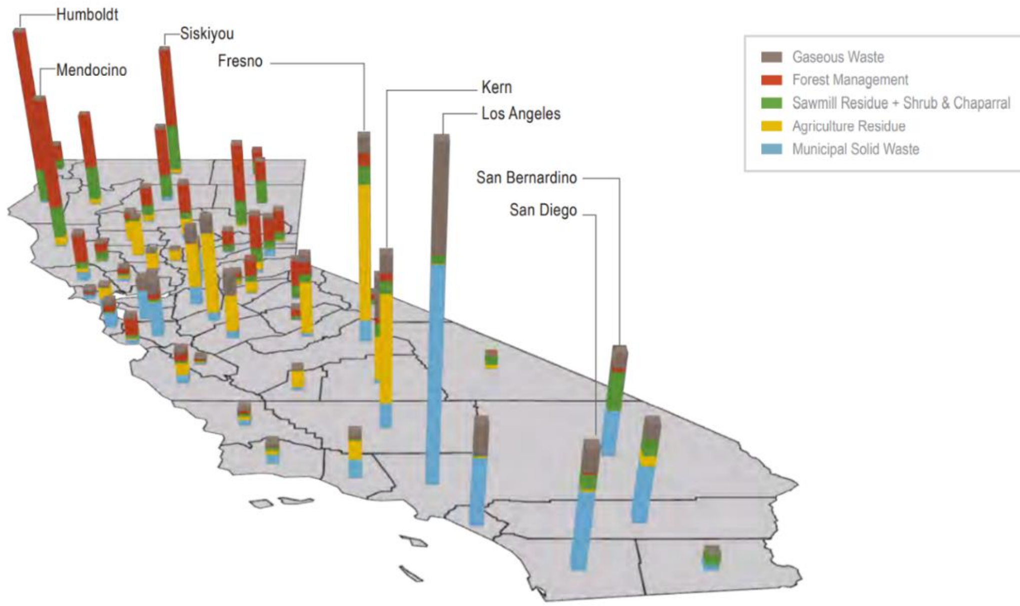
[12] "California Forest Carbon Plan: Managing Our Forest Landscapes in a Changing Climate," CalFire, California Natural Resources Agency, and CalEPA, May 2018, at 131. Available at https://resources.ca.gov/CNRALegacyFiles/wp-content/uploads/2018/05/California-Forest-Carbon-Plan-Final-Draft-for-Public-Release-May-2018.pdf.

[13] "Short Lived Climate Pollutants Public Workshop," CARB, June 2021. Available at https://ww2.arb.ca.gov/sites/default/files/2021-06/carb_sp_kickoff_june2021.pdf.

[14] "Getting to Neutral," Lawrence Livermore National Laboratory, August 2020, at 4. Available at https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf.

[15] Using the energy unit conversion factors of 1 bone-dry tons fuel produces 10,000 lbs of steam which can generate 1 MWh. Conversions are available at https://wood-energy.extension.org/energy-unit-conversion-factors/. CEC's California Energy Demand 2020-2030 Revised Forecast available at https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2019-integrated-energy-policy-report/2019-iepr (states the statewide electricity total is 260 TWh).

Figure 2. Assumed Contributions of Waste Biomass Across Counties and Resource Types[16]



Technologies are commercially available today to turn waste into RNG. In fact, repurposing biomass power plants with these technologies could eliminate almost all criteria air emissions and "provide a concentrated carbon dioxide stream that can be utilized to create more RNG or other by-products. Such a facility would provide a closed loop production system with very low net emissions while creating a storable renewable energy product that can be used like natural gas, delivered through the pipeline, with a very small carbon footprint."[17] Further, when waste is digested in biogas systems and the digestate effluent is returned to agricultural fields and spread like manure, the result is the agricultural nutrients, like nitrogen, phosphorous and potassium are returned to the soil.[18] This is an improvement compared to sewer discharge of waste where soil nutrients and carbon are lost.

Use of RNG can provide fuel diversity benefits because it can be used as a drop-in fuel.[19] RNG can be deployed where it is needed via the existing gas pipeline infrastructure without the need for

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[16] "Getting to Neutral," Lawrence Livermore National Laboratory, August 2020, at 4. Available at https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf.

[17] "Low-Carbon Renewable Natural Gas (RNG) From Wood Wastes," GTI, February 2019, at 65. Available at https://www.gti.energy/wp-content/uploads/2019/02/Low-Carbon-Renewable-Natural-Gas-RNG-from-Wood-Wastes-Final-Report-Feb2019.pdf.

[18] "Producing Biomethane and Renewable Natural Gas (RNG) from Farm and Food-Based Biogas Systems," Ontario Ministry of Agriculture, Food and Rural Affairs, February 12, 2021. Available at http://www.omafra.gov.on.ca/english/engineer/facts/biomethane.htm.

[19] "Landfill Methane Outreach Program (LMOP): Renewable Natural Gas," United States Environmental Protection Agency, July 14, 2021. Available at https://www.epa.gov/lmop/renewable-natural-gas#:~:text=1%20Fuel%20diversity%20benefits.%20Use%20of%20RNG%20increases,at%20a%20landfill%20or%20anaerobic%20digestion%20%28AD%29%20facility.

equipment or infrastructure changes.[20] It can also be available 24 hours a day and does not have intermittency challenges that other renewable energy sources such as solar or wind have. Renewable gases produced from biomass can thus be integrated into the gas grid to support the gas system and the electricity system by providing flexible generation power and long-duration storage, thus providing a renewable source of electricity that supports grid reliability. RNG can play a significant role with industry, particularly, hard-to-decarbonize sectors, as a "drop-in" zero-to-low carbon fuel for natural gas end-uses. These low carbon fuels can also power backup generators and microgrids.

3. An RNG fuel technology pathway can reduce GHG emissions significantly and improve local air quality

RNG is currently helping California reduce SLCPs and criteria air pollutant emissions as a transportation fuel in near-zero emission heavy-duty trucks. As noted in CARB's presentation during the workshop, 45 percent of the methane emissions in California are fugitive emissions from landfills and dairy manure. [21] CARB's proposed approach (noted during the workshop) to reduce SLCP emissions is to capture and direct this 45 percent into end uses such as transportation, electricity generation, industrial heating, among others. CARB's Low Carbon Fuel Standard program[22] has already certified several viable pathways for the conversion of fugitive methane emissions from landfills and animal waste into RNG that can be used to operate optional low NO_X natural gas heavy-duty trucks. Today, the use of RNG in the heavy-duty transportation sector is achieving greater GHG emission reductions than electric vehicles. To put in perspective, last year as a transportation fuel, RNG lowered GHG emissions equivalent to taking about 760,000 passenger vehicles off the road or reducing CO_2 emissions from approximately 394 million gallons of gasoline consumed.[23] Transitioning heavy-heavy duty (HHD) trucks from diesel fuel to RNG trucks can provide significant reductions in fugitive methane emissions from landfills and dairy manure. Switching to Optional Low NO_x RNG HHD trucks is the most cost-effective and technologically feasible pathway to obtain appreciable GHG reductions over the next decade, starting today.

The following comparative analyses of a Class 8 HHD truck powered by diesel, RNG, and electricity shows that a Class 8 Optional Low NO_X HHD RNG truck can generate greater reductions in lifecycle (well-to-wheel) GHG emissions than a battery electric (BE) truck when replacing a diesel truck. Further, clean fuels like RNG would eliminate tailpipe CO2 emissions since these fuels are plant/biogenically-based.

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[20] "Energy Systems," Intergovernmental Panel on Climate Change (IPCC), at 536. Available at https://www.ipcc.ch/site/assets/uploads/2018/02/ipcc_wg3_ar5_chapter7.pdf.

[21] CARB 2022 Scoping Plan Update – Short-Lived Climate Pollutants Workshop Presentation on September 8. Available at https://ww2.arb.ca.gov/sites/default/files/2021-09/carb_presentation_sp_slcp_september2021_0.pdf.

[22] "Low Carbon Fuel Standard," CARB. Available at https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard.

[23] "Decarbonize Transportation with Renewable Natural Gas," RNG Coalition and NGV America, April 2021. Available at https://ngvamerica.org/wp-content/uploads/2021/04/Decarbonize-Transportation-with-RNG-Updated-April-16-2021.pdf.

Table 1 (below) shows that one Model Year (MY) 2024 Class 8 Optional Low NO_X RNG HHD truck can reduce lifecycle (well-to-wheel) GHG emissions by approximately 760 metric tonnes of carbon dioxide equivalent (MT CO_2e) of over its ten-year lifetime as compared to its diesel counterpart, which is equivalent to taking almost 17 passenger vehicles off the road annually.[24] These GHG reductions are greater than those that can be achieved by replacing the diesel truck with a BE truck.

Table 1. Class 8 HHD Trucks Well-to-Wheel GHG Emission Estimates for MY 2024

Greenhouse Gas	**Units**	**Diesel Truck**	**Optional Low NO_x Natural Gas Truck**	**Battery Electric Truck**
Tailpipe Emissions[25,26]				
CO_2 Emissions	MT/truck	614	0	0
CH_4 Emissions	MT/truck	0.00108	0.704	0
N_2O Emissions	MT/truck	0.0967	0.112	0
BC Emissions	MT/truck	0.00211	0.00026	0
Tailpipe CO_2e Emissions	MT/truck	645	51	0
Upstream Emissions				
Upstream CO_2e Emissions	MT/truck	225	54	175
Total CO_2e Emissions	**MT/truck**	**869**	**105**	**175**
Reduction of CO_2e Emissions Compared to Diesel	MT/truck	--	764	694
Percent Reduction of CO_2e Emissions Compared to Diesel	-	--	**87%**	**80%**

The tailpipe emissions of CO_2, methane, and black carbon were obtained from EMFAC2021 for a T7 Tractor Class 8 in California for Calendar Years 2024-2033. Lifetime emissions were integrated over an assumed vehicle lifespan of 10 years and activity level of 43,500 miles per year, based on the US EPA's definition of HHDT useful life,[27] and CARB's Low-NOx Omnibus Regulation.[28] Upstream emission factors were calculated using the CA-GREET3.0 model for diesel and electricity generation. The electricity grid mix inputs to the model were adjusted based on California Energy Commission data for the current year and projections with renewables comprising 47 percent in 2023 and growing to 81 percent in 2037. RNG upstream carbon intensities were obtained from the LCFS program pathway lookup tables for the following RNG feedstocks: landfill gas, food wastes and animal waste/dairy digester gas. A weighted average of

[24] "Greenhouse Gas Equivalencies Calculator," US EPA, March 2021. Available at https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.
[25] "Direct Global Warming Potentials: CO_2, CH_4, and N_2O GWP values," IPCC, 2007. Available at: https://archive.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html.
[26] "California's Black Carbon Emission Inventory," CARB, 2015 Edition. Available at: https://ww3.arb.ca.gov/cc/inventory/slcp/doc/bc_inventory_tsd_20160411.pdf.
[27] *See* § 86.004-2 Definitions of the Code of Federal Regulations. Available at https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-86/subpart-A/section-86.004-2.
[28] "Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments," CARB, August 27, 2020. Available at https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/hdomnibuslownox/res20-23.pdf.

the carbon intensities is calculated based on the LCFS sales volumes in 2019-2020 before being used in these calculations.

Further, Table 2 (below) shows that the total cost of ownership for an Optional Low NO_X RNG truck is approximately 50 percent lower ($480,000 versus $1,019,000) than a BE truck[29] needed to replace a MY 2024 diesel Class 8 HHD truck. Transitioning diesel Class 8 HHD trucks to Optional Low NO_X RNG trucks is more cost effective in reducing GHG emissions than a transition to an equivalent number of BE trucks. An RNG pathway for HHD trucks is estimated to cost -$107/MT CO_2e compared to a battery electric pathway that is estimated to cost $658/MT CO_2e. These cost numbers do not account for the additional dollars that may be necessary to spend to upgrade the electric grid to support a zero-emission vehicle transition in the transportation sector.

Table 2. Lifetime Ownership Costs and Incremental Cost Effectiveness

Description	**Units**	**Diesel Truck**	**Optional Low NO_x Natural Gas Truck**	**Battery Electric Truck**
Total Cost of Ownership for Single Truck[30]	$	$562,149	$480,576	$823,411
Additional Capital Cost for Battery Electric Truck[31]	$	--	--	$195,779
Total Cost of Ownership	$	$562,149	$480,576	$1,019,190
Incremental Cost of Ownership	$	--	-$81,573	$457,041
	%	--	-15%	81%
Reduction in Lifecycle GHG Emissions Compared to Diesel	MT CO_2e	--	764	694
Reduction in Tailpipe NO_x Emissions Compared to Diesel	tons	--	0.97	1.18
Cost Effectiveness for GHG Reductions	**$/MT CO_2e**	**--**	**-$107**	**$658**
Cost Effectiveness for Tailpipe NO_x Reductions	**$/ton**	**--**	**-$83,935**	**$387,983**

Table 3 (below) shows that Optional Low NO_X RNG trucks can achieve almost the same reductions in tailpipe NO_X emissions as a BE truck when used to replace a Class 8 HHD truck.

[29] Genevieve Giuliano, et al., *Developing Markets for Zero Emission Vehicles in Short Haul Goods Movement: A Research Report from the National Center for Sustainable Transportation*, 2020. Available at https://escholarship.org/uc/item/0nw4q530. Note 1.4 BE trucks are needed to replace a diesel truck in calendar year 2024.

[30] "Ramboll Multi-Technology Pathways Study," WSPA, July 2, 2021. Available at https://www.wspa.org/resource/ramboll-multi-technology-pathways-study/. Note total costs of ownership for a single truck are taken from the study.

[31] Additional capital costs for Battery Electric Truck occur due to anticipated growth in the fleet when BEVs are used to replace conventional diesel trucks, per Giuliano et al. (2020). A factor 1.4 is applied to the BEV capital costs to reflect added costs due to fleet growth.

These optional low NO_X trucks are commercially available **today** and transitioning to them can result in the near-term NO_X reductions needed in the South Coast Air Basin and San Joaquin Valley Air Basin to achieve the upcoming federal Clean Air Act (CAA) ozone attainment deadlines in 2023 and 2031, as stated in SCAQMD[32] and San Joaquin Valley Air Pollution Control District's comment letters (SJVAPCD)[33] on CARB's Mobile Source Strategy (MSS).

Table 3. Class 8 HHD Trucks NOx Emission Estimates for MY2024

	Units	Diesel Truck	Optional Low NO_x Natural Gas Truck	Battery Electric Truck
Tailpipe NOx Emissions[34]	tons	1.18	0.21	0
Incremental Reduction of NO_x Emissions Compared to Diesel	tons	--	0.97	1.18
Percent Reduction of NO_x Emissions Compared to Diesel	-	--	83%	100%

As noted during the SCAQMD Board Retreat on September 16th and 17th, CARB's proposed funding for a multi-year ZEV package begins with an initial installment of $3.9 billion for the first three budget years, which is a little over a one-billion-dollar investment per year.[35] Table 4 (below) considers investing a billion dollars in Optional Low NO_X RNG trucks or BE trucks, and then calculates the emissions reductions compared to an equivalent number of diesel trucks, respectively. Because a BE truck cannot haul the same amount as a diesel truck (weight and range limitations), the calculations in Table 4 (below) assume that a single BE truck replaces only approximately 0.7 diesel trucks.[36] In addition, capital costs of BE trucks are greater than diesel trucks. Thus, a $1B investment in BE trucks will result in avoided diesel emissions from approximately 1,500 diesel trucks; approximately 2,000 BEVs would need to be purchased to replace 1,500 diesel trucks, in contrast to Optional Low NOx RNG trucks that can replace diesel trucks on a one-to-one basis. **An investment of a billion dollars in Optional Low NO_X RNG trucks in 2024 would deliver about 3 times more black carbon reductions (a health harmful carcinogen), almost 3 times more lifecycle GHG reductions, and almost 3 times more tailpipe NO_X reductions (needed to meet the federal Clean Air Act Requirements) as compared to**

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[32] SCAQMD Comment Letter on the 2020 Revised Draft Mobile Source Strategy dated May 14, 2021. Available at: https://ww2.arb.ca.gov/sites/default/files/2021-05/6-SCAQMD_Comment_RevisedDraft2020MobileSourceStrategy.pdf.

[33] SJVAPCD Comment Letter on the 2020 Revised Draft Mobile Source Strategy dates May 14, 2021. Available at: https://ww2.arb.ca.gov/sites/default/files/2021-05/8-SJVAPCD_Comment_RevisedDraft2020MobileSourceStrategy.pdf.

[34] Tailpipe emissions are obtained from EMFAC2021 for a T7 Tractor Class 8 in California for Calendar Years 2024 2033. Lifetime emissions are integrated over an assumed vehicle lifespan of 10 years and activity level of 43,500 miles per year, based on the US EPA's definition of HHDT useful life, and CARB Low-NOx Omnibus Regulation. Available at https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-86/subpart-A/section-86.004-2, and at https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/hdomnibuslownox/res20-23.pdf.

[35] SCAQMD Governing Board Meetings, Agendas and Minutes for September 16 and 17. Available at http://www.aqmd.gov/home/news-events/meeting-agendas-minutes.

[36] *See* § 86.004-2 Definitions of the Code of Federal Regulations. Available at https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-86/subpart-A/section-86.004-2.

BE trucks. This still does not account for the cost and implementation time of expanded electricity generation, transmission, and distribution. Even greater reductions can be achieved if the investment is made for vehicle incremental costs only.

Table 4. Potential Emission Reductions in Investing $1 Billion in MY2024 Class 8 HHD Trucks

Truck Technology		**Optional Low NO_x RNG Truck**	**Battery Electric Truck**
Capital Cost for Single Truck[37]	**$/truck**	**$192,719**	**$489,448**
Number of Trucks Purchased	--	5,188 (replaces 5,188 diesel trucks)	2,043 (replaces about 1,500 diesel trucks)
Reduction of BC Tailpipe Emissions Compared to Diesel[38,39]	MT	9.61	3.08
Reduction of Lifecycle GHG Emissions Compared to Diesel	MT CO_2e	3,963,507	1,419,337
Reduction of NO_x Emissions Compared to Diesel	tons	5,042	1,719

Recent strategies and rulemaking proposals released by CARB (such as the Revised Draft 2020 MSS, the Advanced Clean Trucks (ACT) Regulation)[40,41] focus on a 100 percent Zero Emission Vehicle (ZEV) fleet beginning as early as 2024.[42] As noted by stakeholders in CARB workshops and public meetings for these regulations, ZEV technology is **not** commercially available to meet the needs of all duty cycles of the Class 8 HHD truck today. This is further reiterated in SCAQMD's letter to Partners in Environmental Justice and Environmental Health dated August 3, 2021, wherein SCAQMD stated that "there are substantial challenges regarding whether the duty cycles for ZE Class 8 vehicles can meet business needs, and whether a service network is available for businesses that acquire these vehicles."

Hence, CARB's ZEV-centric approach, particularly for the HHD truck sector, does not result in the most health protective policy decision (greatest reduction of black carbon). Further, it prevents the potential reductions in NOx and GHG emissions that can be achieved today by optional low NO_X RNG vehicles. We request that CARB Staff working on the Scoping Plan Updates coordinate

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37 "Ramboll Multi-Technology Pathways Study," WSPA, July 2, 2021. Available at https://www.wspa.org/resource/ramboll-multi-technology-pathways-study/. Note the total capital cost for a single truck is taken from this study.

38 GHG emissions here include those contributed by black carbon. Values for black carbon and GHG reductions per truck are referenced from Table 1.

39 "California's Black Carbon Emission Inventory," CARB, 2015 Edition. Available at: https://ww3.arb.ca.gov/cc/inventory/slcp/doc/bc_inventory_tsd_20160411.pdf.

40 "Revised Draft 2020 Mobile Source Strategy," CARB, April 23, 2021. Available at https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf.

41 "Advanced Clean Trucks," CARB, 2021. Available at: https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks.

42 *Id.*

with CARB staff involved in the development of the MSS and HHD vehicle regulations to ensure that optional low NO_X RNG trucks are considered and included as part of the suite of fuel/technology pathways that CARB pursues to achieve the State's long term climate goals.

4. Reconciliation of methane leak emissions data are needed to ensure accuracy

It is vital to have accurate accounting of SLCPs, such as methane leaks from sources like oil and gas production, natural gas transmission and distribution, as well as landfills and livestock activities. During the SLCP workshop, CARB presented the chart shown in Figure 3[43] (below) indicating natural gas transmission and distribution systems contribute 72 percent while oil and gas production only contribute 22 percent of the total fugitive methane from California's "oil and gas systems."

Figure 3. Fugitive Methane Emissions from Oil and Gas Systems as Presented at the Workshop

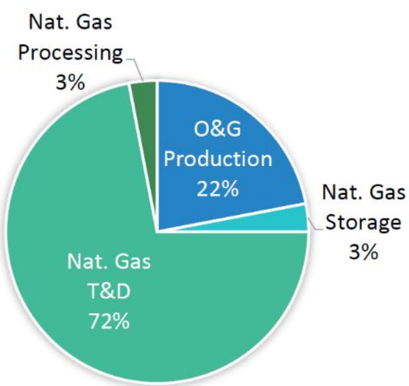
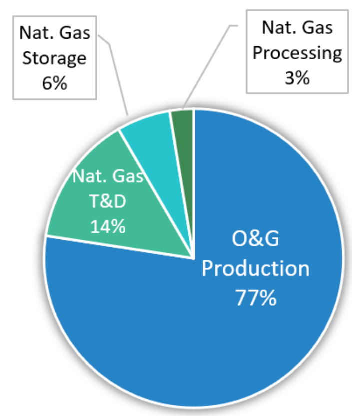


Figure 4. California Methane Survey Fugitive Methane Emissions from Oil and Gas Systems



The California Methane Survey,[44] which was partly funded by CARB, documents that natural gas transmission and distribution systems contribute a much smaller percentage than does oil and gas production. This survey used advanced remote sensing methods to detect and characterize anthropogenic methane emissions at a ninety-five percent confidence interval. Figure 4[45] (above) shows the same oil and gas system categories with actual measured data from the California Methane Survey,[46] but the category percentages are almost exactly opposite with oil wells and production at 77 percent while natural gas processing, natural gas storage and natural gas transmission and distribution including metering stations are just 23 percent.

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[43] CARB 2022 Scoping Plan Update – Short-Lived Climate Pollutants Workshop Presentation on September 8, at slide 18. Available at https://ww2.arb.ca.gov/sites/default/files/2021-09/carb_presentation_sp_slcp_september2021_0.pdf.

[44] "The California Methane Survey," CARB, July 23, 2020. Available at https://www.energy.ca.gov/publications/2020/california-methane-survey.

[45] "The California Methane Survey: Table 3-Summary of Emissions by Sector," CARB, July 23, 2020, at 23.

[46] *Id.*

We believe rapid, focused methane mitigation can complement economy-wide efforts to reduce carbon dioxide emissions, but for the 2022 Scoping Plan to accurately plan for reductions necessary for carbon neutrality, the correct SLCP baselines must be determined and discrepancies such as described above should be reconciled before modeling is completed.

5. Leak detection technologies can help mitigate potential hydrofluorocarbons leaks

Collecting accurate data on high global warming potential gases will be critical to meet carbon neutrality as more and more refrigerants are used. CEC Commissioner J. Andrew McAllister recently stated at an Integrated Energy Policy Report (IEPR) Building Decarbonization workshop that California is leaning on electrification to achieve decarbonization and the use of heat pumps is expected to grow.[47] The aggregate quantity of refrigerants being held in such equipment will increase and, consequently, hydrofluorocarbon (HFC) emissions are expected to increase.[48] To mitigate climate change impacts and reach the State's decarbonization goals, SoCalGas suggests that the State invest in research and development to better understand the magnitude of potential climate impacts of HFC leaks and partner with other agencies to explore potential HFC leak detection technologies. For example, SoCalGas's Aerial Methane Mapping program uses Light Detection and Ranging (LiDAR) technology integrated into a helicopter to identify methane emissions as a "plume of gas." This program allows us to proactively detect potential leaks as well as incomplete combustion that could be associated with gas-fired equipment. LiDAR technologies are not as effective at capturing HFC leaks, and relatedly, there is less data on the leakage rates of high global warming potential (GWP) gases associated with electric heat pumps, air conditioners, and refrigerators. More research is needed to help better understand and develop similar technologies that can detect and manage potential leaks of appliances using HFC.

[47] CEC Integrated Energy Policy Report Workshop on Building Decarbonization: Refrigerants and Embodied Carbon held on August 26, 2021. Available at https://energy.zoom.us/rec/share/Rs6K6vYSgS1rplYUpRL39OZt3QtSvHJX9xhmV5YA6wP0A2KXH2O1SOihfCJ7Bzk.piJsRQ2MUfDkNmrK.

[48] "Proposed Amendments to the Prohibitions on Use of Certain Hydrofluorocarbons in Stationary Refrigeration, Chillers, Aerosols, Propellants, and Foam End-Uses Regulation," CARB, March 19, 2020. Available at https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2020/hfc2020/appb.pdf.

Conclusion

CARB's focus on short lived climate pollutants is essential to achieve carbon neutrality. Not only do reductions in SLCPs support the urgent need to address our climate crisis, but also SLCP reductions result in direct public health benefits. Accordingly, it is critical to utilize existing and commercially available technologies to achieve SLCP emissions targets in the near-term. We appreciate CARB Staff's determination to get the data correct and propose clear, achievable, and practical policy solutions to reduce SLCP emissions.

Respectfully,

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