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RNG Coalition Comments on 8-31 Renewable Natural Gas IEPR Workshop

Please see our comments attached.

Additional submitted attachment is included below.

September 14, 2021

Commissioner J. Andrew McAllister
California Energy Commission
715 P Street
Sacramento, CA 95814

Re: IEPR Commissioner Workshop on Renewable Natural Gas

Dear Commissioner McAllister,

The Coalition for Renewable Natural Gas (RNG Coalition)[1] offers the following comments in response to the California Energy Commission's (CEC or Commission) recent Integrated Energy Policy Report (IEPR) Commissioner Workshop on Renewable Natural Gas (RNG).[2,3]

As the organization that represents the RNG industry in North America, our goal is to ensure the sustainable development and utilization of RNG so that the benefits of waste-derived renewable gaseous fuels can be fully realized in California, and elsewhere. Consequently, we thank the Commission for creating the opportunity for a robust discussion at the workshop on a wide variety of RNG-related issues. The IEPR process will be a crucial venue in which CEC can articulate its long-term vision for a wide variety of clean energy technologies that will be critical to decarbonization in California—including the specific role of renewable gases (RNG and green hydrogen). Accordingly, the following is our industry's holistic viewpoint of the benefits and evolving role of renewable gases in California.

Environmental Benefits of RNG

Use of Renewable Gases is Necessary to Reach California's Greenhouse Gas Reduction Goals

In developing the IEPR, we recommend the Commission continue to consider the extensive body of literature historically produced or used by the California Air Resources Board (CARB),[4,5] CEC,[6] and other

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[1] http://www.rngcoalition.com/

[2] Notice and request for comments: https://efiling.energy.ca.gov/getdocument.aspx?tn=239327

[3] RNG workshop sessions 1 and 2: https://www.energy.ca.gov/event/workshop/2021-08/session-1-iepr-commissioner-workshop-renewable-natural-gas-rng-supply , https://www.energy.ca.gov/event/workshop/2021-08/session-2-iepr-commissioner-workshop-renewable-natural-gas-policy-approaches

[4] E3, *Achieving Carbon Neutrality in California.* https://ww2.arb.ca.gov/sites/default/files/2020-10/e3_cn_final_report_oct2020_0.pdf

[5] For example, the *Driving California's Transportation Emissions to Zero* study (April 2021) from the UC Institute for Transportation Studies states that, "RNG plays a valuable role in a comprehensive decarbonization policy: It yields a valuable energy product, as well as soil amendments, and reduces the uncontrolled emission of methane from decomposing organic matter." https://escholarship.org/uc/item/3np3p2t0 (See page 264.)

[6] For example, see pg. 35 of the California Energy Commission report entitled *The Challenge of Retail Gas in California's Low Carbon Future,* which finds that natural gas in California's residential, commercial, and industrial sectors is still ~1,000 tBtu in 2050 in the high-building-electrification case: https://ww2.energy.ca.gov/2019publications/CEC-500-2019-055/CEC-500-2019-055-F.pdf

non-Californian governmental agencies,[7] as well as academic publications that substantiate the necessity of renewable gaseous fuels in a decarbonized future. For example, Columbia University's Center on Global Energy Policy's recent study[8]—focused on the evolution of the gas system in a carbon neutral world—highlights the following:

> *"[R]etrofitting and otherwise improving the existing pipeline system are not a choice between natural gas and electrification or between fossil fuels and zero-carbon fuels. Rather, these investments in existing infrastructure can support a pathway toward wider storage and delivery of cleaner and increasingly low-carbon gases while lowering the overall cost of the transition and ensuring reliability across the energy system. In the same way that the electric grid allows for increasingly low-carbon electrons to be transported, the natural gas grid should be viewed as a way to enable increasingly low-carbon molecules to be transported."*

The RNG industry does not claim to be able to solve the daunting challenge of fully decarbonizing all current fossil fuel use alone, but we know that renewable gases will be a significant contributor to this effort, as well as helping to reduce the critical short-lived climate pollutant (SLCP) methane.

In understanding RNG's role, it is important to consider both the well proven technology readiness level of various methods of making RNG today, such as Anerobic Digestion (AD), and the flexibility provided by RNG's full fungibility with all conventional gas applications. In the near-term, RNG can be added to the gas system to reduce methane from organic wastes immediately. In the long run, RNG can be directed to the end-uses where it is most needed, serving in tandem with technologies that require time to scale and achieve production cost reductions (e.g., electrolytic hydrogen, heavy duty electric vehicles), or that involve the turnover of long-lived capital stock (e.g., electrification of building space and water heating).

Successful efforts to reduce GHG emissions through the development and use of RNG—combined with increased attention by California's energy utilities, environmental groups, municipalities, waste management and agricultural firms to RNG and organic waste issues—has provided significant momentum toward real action on methane. Considering the timing of the suite of decarbonization strategies which must be deployed in tandem to meet California's ambitious climate goals, this iteration of the IEPR—in conjunction with CARB's current Scoping Plan Process—represents a critical opportunity to fully explore and articulate a strategy for the use of renewable gases. Simply put, if the Commission can achieve this objective, the State's near-term climate objectives will remain achievable. Any further delay in addressing methane emissions from organic wastes—or equivocating in the State's

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[7] For example, see: https://www.epa.gov/sites/default/files/2020-07/documents/lmop_rng_document.pdf
https://www.iea.org/reports/outlook-for-biogas-and-biomethane-prospects-for-organic-growth
https://e21initiative.org/wp-content/uploads/2021/07/Decarbonizing-NG-End-Uses-Stakeholder-Process-Summary.pdf
https://climate.ny.gov/-/media/CLCPA/Files/2020-06-24-NYS-Decarbonization-Pathways-Report.pdf

[8] Blanton et. Al, *Investing in the US Natural Gas Pipeline System to Support Net-Zero Targets*
https://www.energypolicy.columbia.edu/research/report/investing-us-natural-gas-pipeline-system-support-net-zero-targets?utm_source=Center+on+Global+Energy+Policy+Mailing+List&utm_campaign=38d4ab05a7-EMAIL_CAMPAIGN_2019_09_24_06_19_COPY_01&utm_medium=email&utm_term=0_0773077aac-38d4ab05a7-102456873

commitment to RNG as a climate reduction strategy—risks missing the near-term climate goals and reducing California's global leadership position on climate change.

RNG's Role in Achieving Methane Reductions from Organic Wastes

As consistently explained in Chapter 9 of the 2017 IEPR, CARB's Short Lived Climate Pollutant Reduction Strategy,[9] California Department of Resources Recycling and Recovery's (CalRecycle) analysis on progress toward SB 1383 waste reduction goals,[10] and the procurement target framework outlined in California Public Utilities Commission's (CPUC) SB 1440 whitepaper,[11] California has extensively considered the intersection between RNG's benefits in the waste, agricultural, and energy sectors in prior policy development. The urgency of addressing SLCPs specifically, with an eye toward the role of AD technologies, is also strongly supported by the Intergovernmental Panel on Climate Change's most recent report, which identifies "methane capture and recovery from solid waste management" as one of the best "short-term 'win-win' policies".[12]

Organic waste is a serious and growing issue, and climate and other environmental impacts from these wastes require an immediate and ongoing solution. Globally, municipal solid waste is expected to grow 69% from 2.01 billion metric tons (BT) in 2018 to 3.4 BT in 2050 (around 50% of which is organic waste).[13] Moreover, these trends are underpinned by an expected 25% population increase of 2 billion people between now and 2050.[14] In tandem with waste reduction efforts, RNG development and utilization will also be a primary solution for solving California's (and the nation's) leading biogenic methane emissions sources—livestock manure management and landfilled organics,[15] and creating low carbon fuel.[16]

RNG provides an incentive to better manage organic waste by providing an associated revenue stream for those who produce and handle the waste, such as municipalities and farmers. RNG production

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[9] https://ww2.arb.ca.gov/sites/default/files/2020-07/final_SLCP_strategy.pdf

[10] https://www2.calrecycle.ca.gov/Publications/Details/1693

[11]https://www.cpuc.ca.gov/uploadedFiles/CPUC_Website/Content/Utilities_and_Industries/Energy/Energy_Programs/Gas/SB1440_Staff_Proposal_FINAL.pdf

[12] IPCC, 2021. Climate Change 2021: The Physical Science Basis. Chapter 6. Short-Lived Climate Forcers. https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_Chapter_06.pdf

[13] https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html

[14] https://www.un.org/development/desa/en/news/population/world-population-prospects-2019.html

[15] Manure management and landfills make up 47% of California's methane emissions and 26% of U.S. methane emissions. See: https://ww3.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_2000-18ch4.pdf and https://www.epa.gov/ghgemissions/overview-greenhouse-gases

[16] The consulting firm ICF estimates that 65% of landfills with gas collection systems in place, 60% of landfills without collection systems in place, 80% of EPA candidate landfills, 60% of technically available animal manure, 50% of wastewater treatment plants with a capacity of over 3.3 MG/D, and 70% of food waste available at $100/dry ton can be turned into RNG by 2040. Just these AD-ready feedstocks would produce approximately 1,425 t/Btu of RNG, covering approximately 8.4% of 2019 U.S. residential, commercial, and industrial natural gas demand (16,948 t/Btu). Additional renewable gas volumes could also be produced through non-AD processes. See: https://gasfoundation.org/wp-content/uploads/2019/12/AGF-2019-RNG-Study-Full-Report-FINAL-12-18-19.pdf and https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm

through anaerobic digestion of materials such as food waste, animal manure, and wastewater also yields valuable by-products. After the elimination of pathogens, digested solids can be recycled for productive uses such as animal bedding,[17] and AD converts nutrients into a form more accessible by plants than raw manure, allowing for an effective organic fertilizer.[18] Overall, recycling and using the by-products of waste through AD for RNG production processes creates a more environmentally responsible and sustainable circular economy. Therefore, RNG derived from AD should be thought of as a no-regrets near-term solution to an organic waste problem that also eliminates a dangerous short-lived climate pollutant and produces useful products, such as energy.

The RNG industry's existence is predicated on our ability to improve management practices and reduce methane emissions from organic waste, and to produce a uniquely circular and flexible source of renewable energy. To maximize the benefits of RNG development across all sectors, the IEPR should continue to build and expand upon these important cross-sector strategies.

Carbon Intensity of RNG

All commercially available methods of producing RNG from organic waste feedstocks have excellent greenhouse gas performance, exemplified by carbon intensity (CI) modeling employed by California's LCFS program.[19] Moreover, some RNG projects capture and destroy a greater amount of GHG (as measured on a tons of carbon dioxide equivalency basis) than are emitted during the fuel's combustion, making it one of the few fuels available commercially today with a carbon-negative impact (i.e., better than carbon-neutral), in some cases.

This breadth of technological options for producing RNG (and green hydrogen) means that the GHG impact of resources can vary substantially. For this reason, the RNG industry has long advocated for employing metrics to assess the GHG emissions from each energy production pathway. We believe that a lifecycle analysis (LCA) is the most appropriate method of doing so because it accounts for all greenhouse gas emissions benefits and disbenefits[20] from a given RNG production pathway. These various emissions steps are then combined to produce a CI score for each production pathway. A common tool for calculating RNG CI scores is the GREET model[21] created by Argonne National Lab, which is widely accepted among both regulatory agencies and the scientific community, most notably by CARB in the LCFS.[22] While it would be technically possible to produce RNG with a higher CI than conventional natural gas—due to methane leakage, energy consumption, or other factors—the large RNG facility

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[17] U.S. EPA. (2020, August 18). The Benefits of Anaerobic Digestion.

[18] Id.

[19] See information on LCFS Pathway Certified Carbon Intensities: https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities

[20] For example, benefits may include avoidance of upstream emissions while disbenefits may include leakage, energy usage, and non-CO_2 combustion emissions.

[21] See more information about Argonne National Lab's GREET model: https://greet.es.anl.gov/

[22] GREET can easily be modified to provide CI scores for stationary uses of RNG, as is required in other jurisdictions' RNG utility procurement program. For example, the California Public Utilities Commission (CPUC) required Southern California Gas Company and San Diego Gas and Electric to use a modified version of GREET to measure the Carbon intensity of procured RNG. See CPUC Decision 20-12-022 dated December 17, 2020.

sample included under California's LCFS illustrates that this is not the current practical reality at real-world RNG facilities in the U.S. today.[23]

Within the IEPR and other planning exercises, it is important to recognize that as the nation's electricity grid sees an increased amount of zero-carbon electricity generation, the CI for all RNG pathways which utilize grid electricity as a primary input to gas cleanup will decrease.[24] This means that the RNG pathways which are currently low-carbon (due to the use of grid electricity and conventional natural gas in gas processing and transport) will move increasingly toward zero-carbon as their upstream energy inputs are derived from a greater and greater share of renewable electricity, and those which are currently carbon negative will produce even greater benefits.

Moreover, the implementation of carbon capture and sequestration in tandem with RNG to create biologically-derived green hydrogen creates the possibility of every production facility to serve as a carbon-negative emissions sink. Modeling CI based on these important interactions clearly illustrates both the immediate and long-term benefits of RNG deployment, and the use of such a framework in a consistent fashion across all policies promoting RNG will provide an incentive for RNG producers to maximize their greenhouse gas benefit.

Articulating the Near-Term, Mid-Term and Long-Term Role of Renewable Gaseous Fuels Within the IEPR

In prior IEPR cycles, transportation was viewed by CEC as a very attractive end use for biomethane derived from AD of organic wastes, and the relationship between promoting RNG use in natural gas vehicles and achievement of the state's Short-lived Climate Pollution (SLCP) reduction goals was well articulated.[25] We understand and accept that this strategy may be shifting in this IEPR cycle. However, the CEC should continue to provide coordination and leadership on this issue so that other agencies (CARB, CPUC, etc.) remain harmonized on how sustainable RNG growth can best be incentivized across all sectors and shifted toward the highest and best use over time.

The key facts about biomethane from AD of organic wastes have not changed since prior IEPR cycles:

- Society's waste streams currently create significant methane that must be dealt with in some fashion.
- Using this methane from organic wastes productively, rather than flaring it, both reduces direct emissions of methane from the waste sector and also displaces fossil fuel carbon dioxide emissions in other end use sectors.
- Conventional natural gas use remains both a significant source of GHG emissions and a critical source of energy in California.
- The reliance on fossil fuels (especially conventional natural gas) is impossible to fully eliminate even in the mid-to long-term through demand-side actions alone.
- Supply-side promotion of renewable gaseous need not compete with demand reduction programs (including electrification) until such a time when fossil fuel demand is dramatically reduced below current levels.

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[23] RNG Coalition does not support the utilization of RNG produced through high-CI methods.

[24] In a similar fashion, electrolytic hydrogen production will continue to become cleaner over time.

[25] For example, see the 2017 and 2019 IEPRs.

Further, many long-term studies of decarbonization agree that the use of renewable gases is essential but disagree about which sector will most need RNG to decarbonize in the long run.[26] Because of these facts, at the workshop we attempted to articulate a nimble vision of how RNG can best help with decarbonization in the near-,mid-and long-terms as shown in Figure 1.

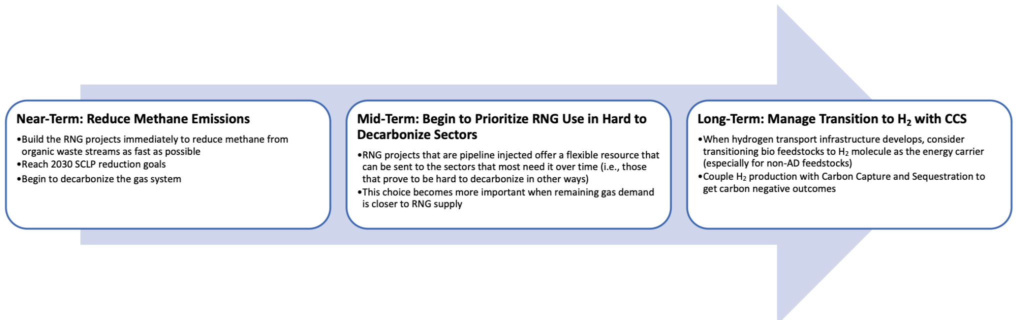

Figure 1. Strategies for RNG Deployment Must Be Prepared to (and Should) Shift Over Time

In the near-term, we must remain focused on the buildout of AD systems that can reduce methane, for the reasons discussed above. In the mid-term pipeline-injected biomethane projects offer the best optionality to switch the gas between end uses over time, as the highest and best use might conceivably change based on the success or failure of other low-carbon technologies.[27] We discuss the outlook for RNG use in each sector in more detail below.

Finally, in the long-run production of hydrogen from biomass feedstocks may need to become the dominant gaseous energy carrier to be sure that carbon capture and sequestration negative-GHG opportunities are maximized to *remove* emissions from the atmosphere (because, unfortunately, society remains on a path to exceed the sustainable GHG budgets articulated by the IPCC). Below we articulate some concepts related to the mid- and long-term portions of the strategy shown in Figure 1.

Pipeline-Injected Biomethane Has the Best Optionality Over Time (and the Best Local and Lifecycle Criteria Pollutant Performance)

A key benefit of RNG is its ability to be used in a flexible manner wherever current natural gas demand exists, while retaining the option to target certain applications more specifically in the long run. To this end, CEC should fully consider all possible RNG end-uses in the near-term, as well as begin to develop a framework to determine what end uses may be most appropriate in the mid- to long-term.

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[26] WRI 2020, Renewable Natural Gas as a Climate Strategy: Guidance for State Policymakers https://static1.squarespace.com/static/53a09c47e4b050b5ad5bf4f5/t/60ad57a35aaa6563fbc3e508/1621972901032/2020_Dec+World+Resources+Institute_Renewable-natural-gas-climate-strategy.pdf

[27] We strongly support the 2017 IEPR statement that, "…determining the best destination for renewable gas is not one size fits all; the best end-use outcome can depend on a variety of factors, including feedstock, location, and timing. Priority end uses of renewable gas may evolve as California approaches 2020, 2030, and 2050 goals; as markets transform; and technologies advance. However, the state must seek near-term priorities and the most cost-effective solutions at this time to ensure achieving the 2030 SLCP reduction goals." See page 256 of the 2017 IEPR.

Residential and Commercial Sectors

A near-term policy (or policies) that begins to decarbonize all gaseous end-uses should be a considered within this iteration of the IEPR. RNG procurement programs for core gas customers (largely in residential and commercial buildings) in a manner consistent with CPUC's recent whitepaper[28] represent an excellent starting point for this crucial aspect of promoting RNG use because these customers classes may want to purchase RNG[29] and can likely afford to do so without suffering any significant adverse impacts.[30] As discussed above, such programs will be a necessary component of meeting California's 2030 methane reduction targets and waste diversion goals outlined by SB 1383.

With respect to current levels of demand for natural gas in the residential and commercial sectors, current[31] and prior CEC analysis shows continued gas demand in these sectors will remain for many years.[32] The building codes adopted by the Commission in the 2022 cycle,[33] while world-leading in ambition, do not change this near-term reality. RNG procurement on behalf of utilities' residential and commercial customers should be incentivized generally, and viewed as a near- to mid-term solution as part of the decarbonization strategy for many of these applications. This does not preclude the use of other strategies (e.g., electrification) to satisfy residential and commercial applications in the long term, and the RNG should ultimately be directed to its highest and best end use over time. When, and if, gas demand can indeed be fully eliminated from the residential and commercial sectors other end uses for the low-carbon RNG (in the sectors discussed below) will be found.

Transportation

Since the inception of California's Low-Carbon Fuel Standard (LCFS), the RNG industry has demonstrated its ability to fuel natural gas vehicles (NGV)—more recently, near-zero emission NGVs[34]—and mitigate GHG emissions in a way which is extremely beneficial from both a climate and criteria pollutant perspective. Indeed, based on the current carbon and criteria emissions profile of RNG, NGVs fueled by RNG will likely be the cleanest available technology from a climate perspective in the foreseeable future in many heavy-duty applications, and therefore should be considered by CEC as an important technology now and into the future as it pertains to this iteration of the IEPR. In 2021, RNG in California's transportation sector has reached a unique milestone in that the average pathway carbon

[28] Initiated by SB 1440.

[29] https://3degreesinc.com/resources/renewable-natural-gas/

[30] See the PUC White Paper for a discussion of possible rate impacts.

[31] https://www.energy.ca.gov/event/workshop/2021-08/iepr-commissioner-workshop-natural-gas-market-and-demand-forecasts

[32] See pg. 35 of the California Energy Commission report entitled *The Challenge of Retail Gas in California's Low Carbon Future,* which finds that natural gas in California's residential, commercial, and industrial sectors is still ~1,000 tBtu in 2050 in the high-building-electrification case: https://ww2.energy.ca.gov/2019publications/CEC-500-2019-055/CEC-500-2019-055-F.pdf

[33] https://www.energy.ca.gov/news/2021-08/energy-commission-adopts-updated-building-standards-improve-efficiency-reduce-0

[34] Which reduce criteria pollutants

intensity (CI) is carbon negative on a lifecycle basis.[35] Furthermore, as described previously, the carbon intensity of all RNG resources continues to decrease based on upstream energy and other CI inputs.

Accordingly, given the ability to produce carbon-negative electricity and green hydrogen from biological feedstocks, we believe RNG will continue to play a valuable role in the transportation sector in near-zero emission NGVs and ZEV applications. Additionally, we urge CEC to include potential pathways for renewable electricity and green hydrogen production from biological feedstocks targeting ZEV end uses—including those which produce carbon-negative emissions, via CCS or otherwise—within the IEPR.

Industry

RNG and renewable hydrogen will be important long-term options for any applications that are better served by gaseous energy rather than electric energy. Given the high heat and tight temperature control requirements for some industrial applications, industrial decarbonization is unlikely to be achieved through electrification alone. Therefore, renewable gaseous fuels should not be seen as secondary to electrification in industrial end uses.

To this end, it will be crucially important for CEC and CARB to further assess how renewable gas use can best be incentivized for non-core gas customers (such as the large users in the industrial sector). This could be accomplished either through expansion of the LCFS to cover a limited set of non-transportation end uses of gas, expansion of SB 1440 to include all utility and non-utility suppliers of gas (including those that primarily serve non-core customers), or through new industry-specific policies.[36] Designing policies for large industrial gas users may be more challenging because of concerns about economic and emissions "leakage" should out-of-state competitors not face similar requirements. However, from the RNG industry's perspective it's critical that a clear vision be presented in this iteration of the Plan on which tools will be relied upon—and how they will interact—to fully decarbonize gas supply to all end uses in the state.

Power

Given California's carbon neutrality goals in the power sector there should be a clear place for all renewable resources which can be carbon neutral or carbon negative on a lifecycle basis. One potential role for biogas, RNG, and green hydrogen would be to serve as a replacement for fossil-derived resources in combustion-based generation, however, these resources can also be used to produce electricity through chemical processes in fuel cells. Accordingly, CEC should also consider within the IEPR the various pathways for RNG- and green hydrogen-to-power for all available carbon neutral technologies and feedstocks.

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[35] See information on LCFS Pathway Certified Carbon Intensities: https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities

[36] Such as the type of program envisioned by SB 596 (2021, Becker) which would incentivize carbon reduction in the cement sector from a variety of technologies, including RNG. See: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220SB596

Air Quality Benefits of Pipeline Injection

Both CARB[37] and United States Environmental Protection Agency[38] (US EPA) studies have shown that pipeline injection of biomethane reduces criteria pollutants both locally (relative to a case where the biogas is flared or used in most on-site power generation equipment) and on a lifecycle basis (with additional emission reductions possible depending on end use).[39] As a reminder of the local air quality benefits of pipeline-injected RNG, see Figure 2 below from a 2016 California-focused study from US EPA entitled *Evaluating the Air Quality, Climate & Economic Impacts of Biogas Management Technologies*.

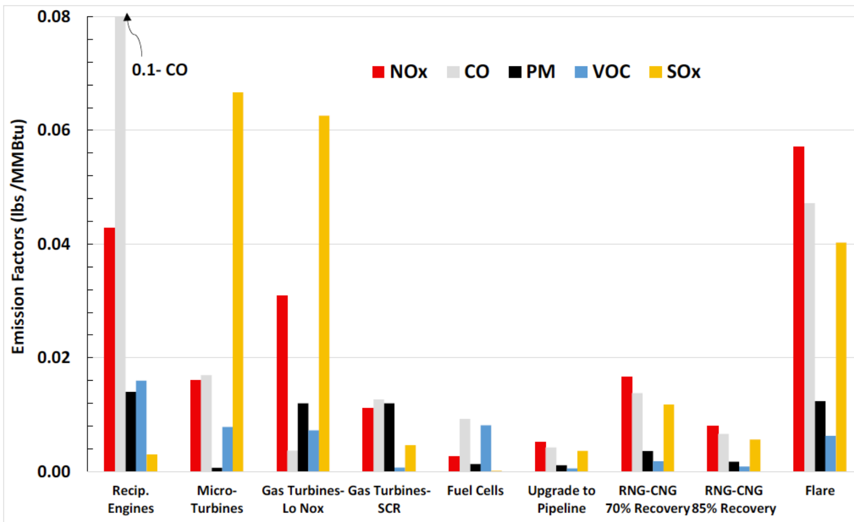

Figure 2. Pipeline-injected Biomethane Provides Local Air Quality Benefits

Foundational RNG Policy Considerations

Developing a comprehensive vision for the future of renewable gas will necessarily incorporate experience from California's existing RNG programs[40] while reflecting the most current understanding of the interplay between various energy transition strategies. To fully capture the cross-sectoral benefits and GHG accounting complexities of RNG, we recommend that CEC consider the following recommendations within the IEPR.

Consider the need for increased carbon reductions through 2045 in line with the Statewide Economy Wide Goal of Carbon Neutrality

As part of this exercise, it will be crucial for CEC to incorporate more aggressive carbon reduction targets from 2031 through 2045. This accelerated goal will necessarily bring additional attention to reducing SLCPs, including methane, which pose the most immediate problem in as climate chance accelerants.

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[37] https://ww2.arb.ca.gov/sites/default/files/2020-07/dairy-emissions-matrix-113018.pdf

[38] https://nepis.epa.gov/Exe/ZyPDF.cgi/P100QCXZ.PDF?Dockey=P100QCXZ.PDF

[39] For example, when low-NOx natural gas vehicles displace emissions from diesel vehicles.

[40] As discussed above, CARB's LCFS program, in tandem with California's Renewable Portfolio Standard, have been some of the biggest historical drivers for our industry.

With more aggressive targets we expect RNG and waste-derived green hydrogen to serve as increasingly important decarbonization strategies in the IEPR.

Align GHG Accounting Across all Programs Promoting RNG

To fully capture the benefits and disbenefits of various energy resources, RNG use should be evaluated by CEC through the lens of lifecycle accounting in all sectors in which it may be used. This includes California's existing RPS and BioMAT programs, which we believe should ultimately be adjusted by CARB to better align with the LCFS and other emerging programs which utilize this prevailing methodology.

Consider All Renewable Gas Feedstocks

This iteration of the IEPR presents an important opportunity to examine all feedstocks that can be converted into renewable gases in the long run, some of which have large co-benefits. As described above, the state has closely looked at how some organic wastes can be treated through AD to reduce methane, but that is not the full universe of potential bio-feedstock for renewable gas production. While continuing the successful deployment of AD, the IEPR should also develop a framework to promote the utilization of organic wastes and residues that are not well suited to AD.

For example, the best long-run use of these materials may be to convert them to create either carbon-negative renewable hydrogen (when coupled with carbon capture and sequestration) or bioliquids, as outlined by the work done by Lawrence Livermore National Laboratory.[41] This process has the potential to facilitate several ancillary environmental benefits, including reducing wildfire risks and the negative impacts of openly burning agricultural waste. This would align with the work proposed in SB 18 (Skinner, 2021)[42] and the ongoing work by CEC[43] on the production of renewable hydrogen.[44] This strategy is particularly important given the essentiality of employing carbon-negative technologies to reduce global temperatures after carbon neutrality has been achieved.

Conclusion

In summary, based on the large variability in RNG feedstocks, project location, uncertainties surrounding emerging technologies, and the benefits of a storable and dispatchable resource in various sectors, the

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[41] LLNL, *Getting to Neutral: Options for Negative Carbon Emissions in California*, Baker et al., January, 2020, Lawrence Livermore National Laboratory (LLNL) https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf

[42] https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB18

[43] On July 1, CEC held a workshop to examine technology advancements to scale hydrogen production in California. This work is part of CEC's efforts to solicit information needed to develop the CEC's EPIC 4 Investment Plan and to develop a Hydrogen Roadmap and Strategic Plan for a Decarbonized California. At the workshop various experts and CEC staff explained and expressed support for a broad variety of pathways for producing renewable/green hydrogen—including pathways producing hydrogen from biological sources. https://www.energy.ca.gov/event/workshop/2021-07/electric-program-investment-charge-2021-2025-investment-plan-scoping

[44] In the long-run, H_2 production with CCS may be preferable as it avoid concerns about purpose-created methane but in the near-term gasification/pyrolysis projects should not be prohibited from producing methane if they can demonstrate strong CI performance.

highest and best use of the bioresources that can be converted to RNG is not yet known, but the fact that we must use these feedstocks constructively should no longer be in question. Given that the highest and best use of this low carbon resource will likely change over time with the evolution of our energy system, it remains important to continue to incentivize and develop well-coordinated programs to promote RNG use across all sectors in the near-term.

This iteration of CEC's IEPR, in tandem with other ongoing efforts such as the development of CARB's Scoping Plan, represents an important opportunity to reflect our most up-to-date understanding of the many technologies which will be necessary to decarbonize California. In particular, our industry is excited about the prospect of painting a clear picture for the use of RNG, green hydrogen, and CCS, and the various cross-sector interactions and benefits which these resources are uniquely positioned to create. We thank CEC for the opportunity to comment and for your ongoing work in developing the next iteration of this in-depth, world-leading report.

Sincerely,

/S/

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