



September 9, 2020

Rajinder Sahota  
California Air Resources Board  
1001 I Street  
Sacramento, California 95814

**RE: Comments on August 19<sup>th</sup> Workshop and *Achieving Carbon Neutrality in California: A Report by E3***

Dear Ms. Sahota:

The Coalition for Renewable Natural Gas (RNG Coalition) is a California-based nonprofit organization representing and providing public policy advocacy and education for the Renewable Natural Gas (RNG) industry.<sup>1</sup> We advocate for the sustainable development, deployment and utilization of RNG, so that present and future generations have access to domestic, renewable, clean fuel and energy in California and across North America.

The RNG Coalition respectfully submits these comments to the California Air Resources Board (CARB) in response to the workshop to discuss *Achieving Carbon Neutrality in California: A Report by E3*<sup>2</sup> (Draft E3 Report) held on August 19, 2020 (the Workshop) to identify scenarios California could take to reduce emissions from the fossil energy and industrial sectors to help achieve carbon neutrality by 2045.<sup>3</sup>

We strongly support the dialogue around developing a clear strategy to achieve carbon neutrality and believe that renewable gases will be a critical component of reaching that goal. These are complex issues that require strong coordination between CARB, the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC) to achieve the best possible policy outcome.

**We Support all Sustainable Methods of Producing and Using Renewable Gases**

The RNG Coalition supports the increased development, deployment and utilization of Renewable Gases (RG) regardless of the feedstock, indiscriminate of the competing technologies used to produce the RG, and for all sustainable end-use applications.<sup>4</sup> Our

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<sup>1</sup> For more information see: <http://www.rngcoalition.com/>

<sup>2</sup> [https://ww2.arb.ca.gov/sites/default/files/2020-08/e3\\_cn\\_draft\\_report\\_aug2020.pdf](https://ww2.arb.ca.gov/sites/default/files/2020-08/e3_cn_draft_report_aug2020.pdf)

<sup>3</sup> <https://ww2.arb.ca.gov/our-work/programs/carbon-neutrality/carbon-neutrality-meetings-workshops>

<sup>4</sup> Currently our organization focuses primarily on RNG derived from biologic wastes (often called biomethane or biogas that has been upgraded to meet pipeline specifications) but we also support all other sustainable methods of producing renewable gases, including hydrogen. Biomethane is a direct substitute for conventional natural gas that can be introduced to the gas system in significant volumes safely and quickly. This type of RG deserves

members need a clear and stable incentive framework in the near term to build biomethane production facilities (to reduce methane associated with organic wastes immediately), and a clear vision for a long term strategy—to shift these feedstocks toward hydrogen production with carbon capture and sequestration in the long-term, if necessary.<sup>5</sup>

Harmonizing the policy discussion around RG and focusing on how to develop successful drivers to stimulate stable market growth, regardless of end use, has long been a goal of the RNG Coalition. We strongly believe that renewable gases have the potential to significantly contribute toward achieving the State’s near-term and long-term greenhouse gas reduction goals, provide a cost-effective opportunity to help decarbonize existing natural gas infrastructure, and drive economic development.

At the workshop many commenters emphasized the importance of following through on the State’s existing smart strategies to use the biomethane resource (and other RGs) to maximize greenhouse gas (GHG) and criteria pollutant emission reductions. Recent growth in biomethane supply has been motivated by programs targeting RG use as a transportation fuel, however, vehicular consumption represents less than one percent of total gas demand in the United States and just slightly over one percent in California.<sup>6</sup> Therefore, expanding the use of RG to other sectors is also of significant interest to our members.

In prior GHG Scoping Plan cycles, transportation was viewed by CARB as a very attractive end use for biomethane and the relationship between promoting RNG use in natural gas vehicles and achievement of the state’s Short-lived Climate Pollutant (SLCP) reduction and air quality goals was well articulated.<sup>7</sup> If that strategy is shifting in any way in this Scoping Plan cycle, CARB should continue to provide coordination and leadership on this issue so that other agencies (CEC, 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 have not changed since prior Scoping Plan cycles:

- Society’s waste streams create significant methane (a critical short-lived climate pollutant) that must be dealt with in some fashion.

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significant near-term attention because the primary method of generating biomethane today—anaerobic digestion (AD)—is a well-proven cost-effective technology available at commercial scale.

<sup>5</sup> As recommended by Laurence Livermore National Labs in *Getting to Neutral: Options for Negative Carbon Emissions in California*, [https://www-gs.llnl.gov/content/assets/docs/energy/Getting\\_to\\_Neutral.pdf](https://www-gs.llnl.gov/content/assets/docs/energy/Getting_to_Neutral.pdf)

<sup>6</sup> [https://www.eia.gov/dnav/ng/ng\\_cons\\_sum\\_dcunusa.htm](https://www.eia.gov/dnav/ng/ng_cons_sum_dcunusa.htm)

<sup>7</sup> For example, page 125 of the *Short-Lived Climate Pollutant Reduction Strategy* states that, “Using renewable natural gas as a transportation fuel can result in significant potential revenue streams and reduce criteria pollutant emissions from the transportation sector. Prioritizing the use of biomethane as a transportation fuel may increase costs relative to scenarios that focus solely on methane mitigation. However, important environmental, health, and economic benefits may be most realized in disadvantaged communities by prioritizing pipeline injection of renewable natural gas.” [https://ww2.arb.ca.gov/sites/default/files/2020-07/final\\_SLCP\\_strategy.pdf](https://ww2.arb.ca.gov/sites/default/files/2020-07/final_SLCP_strategy.pdf)

- 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.

The Draft E3 Report reinforces the need to maximize the use of biomethane and shows that RG can supply a meaningful portion of total energy demand, both in the near term and in later years such as 2045. As the report is finalized, we ask that E3 clearly articulate how the blend of biomethane (and hydrogen) relates to total gaseous fuel demand across the scenarios in each year, as they have done in similar prior work.

### **Pipeline-Injected Biomethane Has the Best Local and Lifecycle Criteria Pollutant Performance**

We note that the end-use sectors for the biomethane resource has shifted in the Draft E3 Report, relative to prior work from E3.<sup>8</sup> In general, it appears that use in transportation has been reduced, and the resource shifted more toward power and industrial end uses. We continue to believe that 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 of other low-carbon technologies).<sup>9</sup>

Both CARB<sup>10</sup> and United States Environmental Protection Agency<sup>11</sup> (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).<sup>12</sup> As a reminder of the local air quality benefits of pipeline-injected biomethane, see Figure 1 below from a 2016 California-focused study from US EPA entitled *Evaluating the Air Quality, Climate & Economic Impacts of Biogas Management Technologies*.

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<sup>8</sup> E3 has produced a series of related work using the PATHWAYS model, much of which was funded by CARB and the CEC. This series includes: The [2017 Scoping Plan](#) Pathways Analysis, [Deep Decarbonization in a High Renewables Future: Updated Results from the California PATHWAYS Model](#) (June 2018), [Residential Building Electrification in California](#) (April 2019), [The Challenge of Retail Gas in California's Low Carbon Future](#) (April 2020) and [SB 100 Joint Agency Report: Charting a path to a 100% Clean Energy Future, Draft Results](#) (September 2020). All of this work shows that that shows the complementary nature of biomethane-derived-RNG and other low-carbon technologies, but the work does not consistently select the same best end-use sector for the biomethane resource.

<sup>9</sup> We strongly support the 2017 CEC Integrated Energy Policy Report 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, available here: <https://efiling.energy.ca.gov/getdocument.aspx?tn=223205>

<sup>10</sup> <https://ww2.arb.ca.gov/sites/default/files/2020-07/dairy-emissions-matrix-113018.pdf>

<sup>11</sup> <https://nepis.epa.gov/Exe/ZyPDF.cgi/P100QCXZ.PDF?Dockey=P100QCXZ.PDF>

<sup>12</sup> For example, when low-NOx natural gas vehicles displace emissions from diesel vehicles.

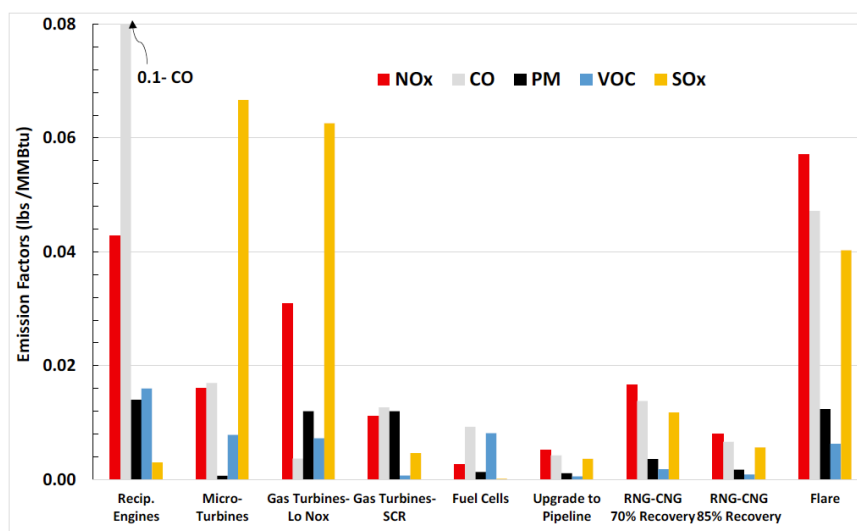


Figure 1. Pipeline-injected Biomethane Provides Local Air Quality Benefits

## Programs Driving the Use of Renewable Gases Should be Built Around Harmonized Lifecycle Greenhouse Gas Performance Metrics

It is useful to design policies that allow for multiple GHG abatement options to compete directly to help minimize the cost of reaching our decarbonization goals. California has established world-leading policies that create competition across a variety of greenhouse gas reduction options. For example, both the Low Carbon Fuel Standard (LCFS) and the Renewable Portfolio Standard (RPS) are technology-neutral, market-based programs that have successfully reduced greenhouse gas emissions.

However, a key difference between these two programs for biomethane is that the LCFS uses a full lifecycle accounting framework to evaluate the greenhouse gas impact of each source of low carbon energy while the RPS currently has an eligibility threshold that, once met, essentially treats all megawatt hours of renewable energy equivalently.

The Draft E3 Report correctly recognizes the potential benefits of biomethane in power generation, stating that, "...dispatchable biomethane enables the Balanced and Zero Carbon Energy scenarios to achieve zero emissions electricity generation..."<sup>13</sup> However, the current incentive structure in California's RPS will not incent biomethane use in power generation because it does not correctly value either dispatchability of RG or the net GHG benefits provided by biomethane.<sup>14</sup>

The lifecycle accounting in the LCFS program has many years of proven success in incenting biomethane (and other low carbon biofuels). The same concepts could be used to create a

<sup>13</sup> Draft E3 Report, page 55.

<sup>14</sup> CPUC has begun to explore the use of lifecycle accounting for biomass used for power generation in the BioMAT program. This work should be harmonized with CARB's LCFS lifecycle work to create consistent incentives across sectors. See: <ftp://ftp.cpuc.ca.gov/energy/BioMAT/Brief%20-%20Draft%20LCA%20Calculator.zip>

harmonized policy to promote renewable gas use in other sectors.<sup>15</sup> Closely evaluating time-dependent avoided emissions created by renewable resources in conjunction with this lifecycle analysis would help reward the dispatchable nature of RG-to-power.

CARB, the CPUC and CEC, should examine if LCFS-like GHG accounting can be used as the backbone to promote RG in power applications (per SB 100, De León, 2018) and to direct pipeline use (per SB 1440, Hueso, 2018).<sup>16</sup> If harmonized with the LCFS, such accounting would help clarify relative incentives to use RG across transport, power, building, and industrial applications.

### **Preliminary E3 Modeling May not Fully Capture all GHG Benefits of Maximizing RG Use**

The Draft E3 Report may not fully capture all of the GHG benefits of maximizing the use of the renewable gas supply. In Figure 22 on page 61 of the Draft E3 Report, methane (and N<sub>2</sub>O) emissions from the waste and manure management sectors appear to make up more than 12 million metric tons (MMT) of carbon dioxide equivalent (CO<sub>2</sub>e) of the approximately 30-34 MMT of emissions remaining in 2045, with approximately 8 MMT remaining from waste and 4 MMT remaining from agricultural manure.

We fail to see why these sectors should still be contributing ~27% of the remaining emissions in 2045 if the use of biomethane (or hydrogen derived from the same feedstocks) is truly being maximized across the scenarios. CARB's 2017 GHG emissions inventory<sup>17</sup> shows 10.8 MMT from the waste sector (8.5 from landfills, 0.4 MMT from composting, and 1.9 from wastewater).

Therefore, we assume that the majority of emissions remaining in this category in E3's analysis are likely associated with methane from the breakdown of organic material stored in landfills. Prospective removal of organic materials from waste streams entering landfills will reduce these emissions and, as this material is removed from landfills, it can then be used to create biomethane in dedicated AD facilities. This organic diversion is a key near-term SLCP strategy that is taking an important step forward with the organic diversion requirements under development by CalRecycle, but significant additional infrastructure still needs to be built to process these organics and such infrastructure is not well incentivized today. Stand-alone AD facilities need additional support<sup>18</sup> if these near-term goals are to be achieved. In the longer-

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<sup>15</sup> Full lifecycle accounting also ensures that biomass resources that have poor greenhouse gas performance are disincentivized.

<sup>16</sup> SB 1440 bill text here:

[https://leginfo.legislature.ca.gov/faces/billVersionsCompareClient.xhtml?bill\\_id=201720180SB1440&cversion=20170SB144098AMD](https://leginfo.legislature.ca.gov/faces/billVersionsCompareClient.xhtml?bill_id=201720180SB1440&cversion=20170SB144098AMD)

<sup>17</sup> <https://ww2.arb.ca.gov/ghg-inventory-data>

<sup>18</sup> See: *Analysis of the Progress Toward the SB 1383 Organic Waste Reduction Goals*, August 2020

<https://www2.calrecycle.ca.gov/Publications/Download/1589>. In this recent analysis CalRecycle calls for a more than doubling of stand-alone AD capacity to process diverted organics by 2025 (see page 7). The also discuss the

term the same strategy could likely help reduce emissions from the waste sector, likely below the 8 MMT value modeled in E3's scenarios.

Conversely, it may be that E3 is estimating 8 MMT remaining in the waste sector in 2045 primarily due to organic material in landfills from legacy deposits of organics, which will continue to produce methane for ~50 years (in some cases).<sup>19</sup> However, if the capture efficiency of those landfills' gas collection systems could be improved by 2045,<sup>20</sup> the remaining emissions rate would be reduced significantly and additional RG could be created. This is a very feasible near-term abatement strategy and the additional RG potential resulting from such improved capture efficiency should be included in the supply curves used by E3 (if it is not already correctly captured), and/or properly accounted for in the remaining waste emissions in 2045 across all scenarios.

Similarly, CARB's 2017 emissions inventory shows 11.6 MMT from agricultural manure, of which the vast majority, 8.4 MMT is methane emissions associated with manure management through anaerobic lagoons at dairies. The dairies with existing lagoons are often the top candidates for AD projects, but the second largest line item in this inventory category (1.3 MMT) is dairy farms with liquid/slurry manure management, which could also potentially be avoided if this manure is used to create RG.<sup>21</sup>

California is just beginning to pursue these important near-term methane reduction strategies, and the 40% reduction in methane emissions targeted by the SLCP Reduction Strategy for 2030 should not be thought of as an endpoint for these approaches. There is no reason that if these RG strategies prove successful by 2030, they cannot be continued and accelerated to reduce emissions from these sectors further by 2045. If renewable gas production (either biomethane or, eventually, hydrogen) from these feedstocks is properly incented these sectors' emissions are likely to decline toward carbon neutrality along with the declines shown in the Draft E3 Report for other sectors. We request that additional attention be paid to properly capturing the positive lifecycle benefits of beneficial use of these organic waste materials as RG in the final E3 report, and that CARB continue to plan to fully incent these reductions both in the short and long term.

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challenges faced in financing such projects regardless of end use sector given the current policy framework (pages 25-30).

<sup>19</sup> For a description of how organic materials decay in landfills see *Sustainable Practices for Landfill Design and Operation* <https://www.springer.com/gp/book/9781493926619>

<sup>20</sup> One of our member companies, Loci Controls, has demonstrated technology that can dramatically improve capture efficiency, and thus boost RNG yields at landfills. This technology is only one example, and is just beginning to be implemented at RNG projects, but by 2045 it could cut waste emissions from legacy landfills significantly. See: <https://www.locicontrols.com/>

<sup>21</sup> Methane from manure from animals in pasture (across the entire ag sector) accounts for only 0.2 MMT, so this line item is unlikely to contribute significantly to the remaining emissions in E3's 2045 estimates.

## Support for Renewable Gases will not Impede Efforts to Promote Electrification

The RNG Coalition has long emphasized that our goal is not to oppose other alternatives that may help to accomplish the changes needed to meet the State’s ambitious climate goals—including electrification—where appropriate. E3’s most recent work continues the trend of recent studies demonstrating that these strategies are not in competition with each other and, in fact, both strategies must be maximized to achieve carbon neutrality.

The Draft E3 Report shows that biomethane is an important strategy across all scenarios.<sup>22</sup> We understand from communications with CARB and E3 that total Biomethane use is 0.12 EJ in the High CDR scenario, and 0.16 EJ in the Balanced and Zero Carbon Energy scenarios, in 2045. This is equivalent to roughly 114-152 billion cubic feet (bcf) of gas per year or ~5-7% of current natural gas deliveries to California in 2018 (2,078 bcf).<sup>23</sup> This implies that policies to cut demand for gas through electrification (or other demand-reduction strategies) would have to reduce demand by 93% from 2018 levels before there would be any conflict between biomethane and electrification.<sup>24</sup> The same reasoning shows that what currently appears to be a small amount of RG compared to current natural gas demand can serve a much greater share of total gaseous fuel demand in 2045 (if the demand reduction strategies are successful).

Policies to support RG can be explicitly designed to also allow fair support for electrification—for example the LCFS is a key driver for both biomethane, hydrogen and electrification of vehicles<sup>25</sup>—or can, at a minimum, be designed so as not to be a barrier to such technologies. Conversely, ignoring RG near-term potential to focus only on electrification would be a missed opportunity to address methane emissions from organic wastes.

## Renewable Gas Recommendations for the Upcoming Scoping Plan Process

We believe this preliminary work by E3 and, eventually, by CARB in the upcoming Scoping Plan update is an excellent place to articulate a comprehensive RG strategy. We encourage CARB to do so in a way that holistically considers both near-term and long-term planning.

Specifically, in the near term, the Draft E3 Report should articulate that:

- *Although biomethane potential cannot displace all use of conventional gas today, California should continue to emphasize that addressing methane emissions from the*

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<sup>22</sup> [https://ww2.arb.ca.gov/sites/default/files/2020-08/e3\\_cn\\_report\\_aug2020.pdf](https://ww2.arb.ca.gov/sites/default/files/2020-08/e3_cn_report_aug2020.pdf) (see slide 12)

<sup>23</sup> [https://www.eia.gov/dnav/ng/ng\\_cons\\_sum\\_dcu\\_SCA\\_a.htm](https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_SCA_a.htm)

<sup>24</sup> These results are similar to prior work both by E3 and others. For example, Chapter 9 of the CEC’s 2017 Integrated Energy Policy Report found that the potential annual supply of biomethane from California feedstocks was between 82 and 351 bcf per year. A more recent update of supply potential from the consulting firm ICF found slightly greater technical potential from CA but does not shift the fundamental conclusion of no conflict with electrification. See: <https://gasfoundation.org/2019/12/18/renewable-sources-of-natural-gas/>

<sup>25</sup> <https://ww2.arb.ca.gov/resources/fact-sheets/advanced-clean-trucks-fact-sheet>



waste and agricultural sectors makes biomethane a critical near-term GHG reduction strategy.<sup>26</sup>

- *RG is being used to decarbonize transportation today, due to the LCFS, but could also be used in buildings and industry if similar policy support was provided. A renewable gas standard (or a similar policy) should be adopted to incent RG use across both core and non-core gas customers.*
- *As a storable and dispatchable source of renewable electricity biomethane likely has unique value in a highly decarbonized electric system in the long-term. This should be clearly recognized through the SB 100 process.*

In the next Scoping Plan:

- *RG should be fully integrated into core analyses to properly capture feedback effects and benefits from avoided methane in the waste and agricultural sectors.*
- *A clear RG strategy for use across all sectors should be articulated, focused on construction of RG projects and flexibility in RG supply rather than on determining the best long-term end use, which may shift over time based on the evolution of other technologies.*
- *The Scoping Plan should go beyond the status quo and recommend comprehensive new policies to ensure RG can help the State achieve its emission goals.*

## Conclusion

We appreciate the ongoing dialogue on carbon neutrality issues. We respectfully ask that CARB and other state agencies create a strong and stable policy framework that promotes the use of RG as one of many important options to help decarbonize California. Thank you very much for your consideration of these comments. Please do not hesitate to contact me directly with any questions or concerns.

Sincerely,



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<sup>26</sup> The “Least-Regrets Options” section on page 8 of the Draft E3 Report alludes to this saying, “achieving carbon neutrality by 2045 requires ambitious near-term actions around deployment of energy efficiency, transportation and building electrification, zero-carbon electricity, *and reductions in nonenergy, non-combustion greenhouse gas emissions* [emphasis added]” but the relationship to near-term biomethane deployment should be more clearly articulated.