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Coalition for Renewable Natural Gas

November 12, 2021

The Public Utilities Commission of Nevada
1150 E. William St.
Carson City, NV 89701

Re: Docket No. 21-05002 – Investigation Regarding Long-Term Planning for Natural Gas Utility Service in Nevada

Dear Commissioners,

The Coalition for Renewable Natural Gas (RNG Coalition)[1] offers the following opening comments in response to the Public Utilities Commission of Nevada's (Commission) Investigation Regarding Long-Term Planning for Natural Gas Utility Service in Nevada (Investigation). The establishment of a forward-looking, long-term gas system planning process for Nevada's gas utilities is an essential step toward the realization of Nevada's decarbonization goals, and we commend the Commission's prudence in initiating this process.

Given the significant opportunity for renewable natural gas (RNG) to serve as a decarbonization strategy in Nevada's waste and energy sectors, our industry looks forward to achieving additional greenhouse gas (GHG) reductions and other environmental benefits in pursuit of Nevada's decarbonization and sustainability goals. Our comments herein outline overarching concepts related to the use of RNG and biologically-derived renewable hydrogen as part of Nevada's gas sector decarbonization strategy.

About the RNG Coalition and the RNG Industry

The RNG Coalition is the trade association for the RNG industry in the United States and Canada. Our diverse membership is comprised of leading companies across the RNG supply chain advocating 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 Nevada and across North America.

The RNG industry is nascent relative to other renewables industries but has shown extraordinary growth in recent years, driven by policies designed to promote environmental and economic goals—including but not limited to clean air, improved waste management, increased job development, energy independence, and resource diversity.

Between 1982 and 2011, 30 RNG projects were developed—most of which were incentivized by various state's renewable portfolio standard programs and underwritten by the monetization of renewable energy credits that RNG-sourced electricity generated under such programs.

Expanding rapidly throughout the last decade, there are now 194 operational RNG production facilities in North America with 252 under construction or in substantial development.[2] Most of the RNG projects

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

[2] Based on RNG Coalition's production facility data as of November 9, 2021: https://www.rngcoalition.com/rng-production-facilities

developed since 2011 have been incentivized by transportation decarbonization programs, including the Unites States Environmental Protection Agency's (U.S. EPA) Renewable Fuel Standard program[3] and California, Oregon, and British Columbia's Clean Fuel/Low Carbon Fuel Standards (CFS/LCFS). RNG is increasingly being used to decarbonize natural gas end-use applications in stationary sectors, marked by the emergence of new utility procurement programs such as Oregon's nation leading RNG procurement requirement.[4] Given the success of these programs in promoting decarbonization through RNG in a variety of sectors, we look forward to the opportunity to explore how best to utilize RNG in pursuit of Nevada's decarbonization goals.

Environmental Benefits of RNG

In planning the future of Nevada's gas system, RNG derived from biologic wastes deserves significant near-term attention as a well-proven, cost-effective technology available at commercial scale. There remain thousands of landfills, wastewater treatment facilities, and livestock operations where raw biogas (methane) is being flared, or worse, is uncollected and escaping fugitively into the atmosphere. Methane is a short-lived climate pollutant that—when assessed over a 20-year timeframe —is up to 84 times as potent as a greenhouse gas as carbon dioxide.[5] 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".[6]

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).[7] Moreover, these trends are underpinned by an expected 25% population increase of 2 billion people between now and 2050.[8] In tandem with waste reduction efforts, the development and utilization of waste-derived bioenergy will also be a primary solution for solving Nevada's (and the nation's) leading biogenic methane emissions sources—livestock manure management and landfilled organics[9]—and creating low carbon fuel.[10]

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[3] RNG has grown substantially thanks to the RFS program, making up over 95% of the lowest-GHG-emission cellulosic biofuel production category and generation of D3 RINs (given for fuels that create at least a 60% reduction in lifecycle greenhouse gases). For more information, see EPA's program summary: https://www.epa.gov/renewable-fuel-standard-program/renewable-fuel-annual-standards

[4] See Oregon Public Utilities Commission's adoption of RNG procurement rules under Oregon Senate Bill 98: https://apps.puc.state.or.us/orders/2020ords/20-227.pdf

[5] Myhre, G. et al., *Anthropogenic and Natural Radiative Forcing*. https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf

[6] 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

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

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

[9] https://www.epa.gov/ghgemissions/overview-greenhouse-gases

[10] 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

RNG creates an incentive to better manage organic waste by providing an associated revenue stream for those who produce and handle that waste, such as municipalities and farmers. RNG production 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,[11] and AD converts nutrients into a form more accessible by plants than raw manure, allowing for an effective organic fertilizer.[12] Overall, recycling and using the by-products of waste through AD for RNG production processes creates a more sustainable and circular economy. Therefore, RNG derived from AD should be thought of as a no-regrets near-term solution to our organic waste problem, eliminating a dangerous short-lived climate pollutant and providing useful products, including 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, this Investigation 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.[13] 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.

The breadth of technological options for producing RNG and biologically-derived renewable 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[14] 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[15] created by Argonne National Lab, which is widely accepted among both regulatory agencies and the scientific community,

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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

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

[12] Id.

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

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

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

most notably by CARB in the LCFS.[16] 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 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.[17]

Within this Investigation 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.[18] 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 and biologically-derived renewable hydrogen (from organic waste feedstocks) creates the possibility for 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.

Air Quality Benefits of Pipeline Injection

Both CARB[19] and U.S. EPA[20] 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).[21] As an illustration of the local air quality benefits of pipeline-injected RNG, see **Error! Reference source not found.** below from a 2016 California-focused study from US EPA entitled *Evaluating the Air Quality, Climate & Economic Impacts of Biogas Management Technologies*.

[16] 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.

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

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

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

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

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

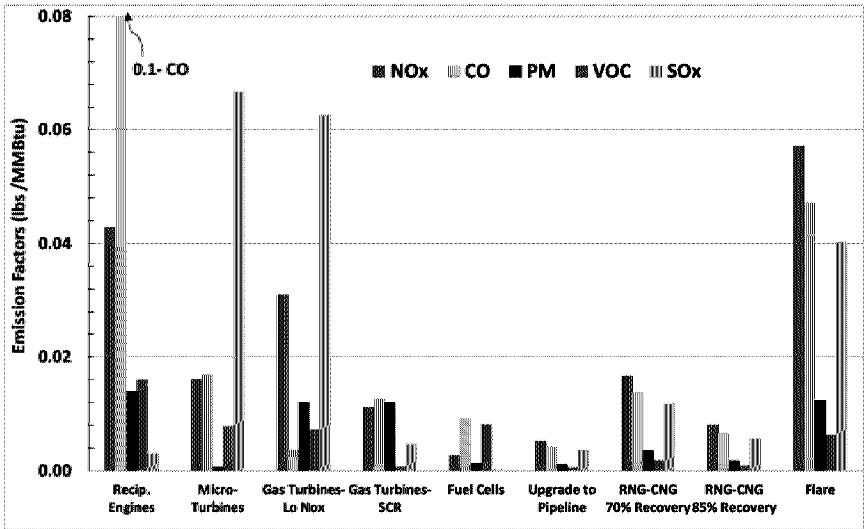

Figure 1. Pipeline-injected Biomethane Provides Local Air Quality Benefits

Use of Renewable Gases is Necessary to Reach Nevada's Climate Goals

Renewable gases—both RNG and hydrogen—are an important near-term decarbonization strategy for applications which currently utilize fossil-derived natural gas and, in the longer-term, will be necessary in applications that have certain reliability requirements, or which are not well suited to electrification.[22]

Studies conducted by Energy and Environmental Economics (E3) for a number of jurisdictions—including New York[23] and California[24]—also show RNG to be a necessary decarbonization strategy, even in high-electrification scenarios. E3's analysis conducted for New York in June of 2020 identified switching to low-carbon fuels as one of the four pillars of decarbonization "critical to achieving carbon neutrality" in New York State, with scenarios including an 8-18% pipeline blend of RNG,[25] showing widespread RNG use across sectors. E3's high-electrification scenarios consistently show significant demand for natural gas remaining through 2050,[26] which should be decarbonized using renewable gaseous fuels wherever possible pursuant to the goal of carbon neutrality. The role of RNG as a decarbonization strategy was also recently examined by the World Resources Institute, who published a paper illustrating how RNG

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[22] Bataille et al., *A Review of Technology and Policy Deep Decarbonization Pathway Options for Making Energy-Intensive Industry Production Consistent with the Paris Agreement.* https://www.sciencedirect.com/science/article/abs/pii/S0959652618307686

[23] E3, *Pathways to Deep Decarbonization in New York State.*
https://climate.ny.gov/-/media/CLCPA/Files/2020-06-24-NYS-Decarbonization-Pathways-Report.pdf

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

[25] See slide 5 of E3's "New York State Decarbonization Pathways Analysis," presented to the Climate Action Committee on June 24, 2020, here.

[26] 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

fills a unique niche as part of a broader low-carbon technology portfolio.[27] Moreover, a key finding of a recent study published by the New York City Mayor's Office of Sustainability[28] was that "in addition to providing a solution for buildings that do not electrify, a low carbon gas network improves overall system reliability by offering optionality and flexibility within the energy system".[29]

The electric industry has reached similar conclusions. The Electric Power Research Institute has reported that low-carbon fuels, like RNG, will be critical means of decarbonizing the economy.[30] In addition, studies commissioned by the New York Independent System Operator emphasize that dispatchable generation, possibly relying on RNG, will be required to maintain electric reliability in the long-term.[31,32]

RNG is Complementary to Methods Which Reduce GHGs Through Gas Demand Reduction, Such as Efficiency and Electrification

The RNG industry does not claim to be able to solve the daunting challenge of fully decarbonizing all gas consuming sectors alone, but we know that RNG can—and should—be a significant contributor to this effort. In understanding RNG's role, it is important to consider both the well proven technology readiness level of technologies that make RNG, such as Anerobic Digestion (AD), and the flexibility provided by RNG's full fungibility with all conventional gas applications. 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) or that involve the turnover of long-lived capital stock (e.g., electrification).[33]

End-use electrification is also an important solution in achieving carbon neutrality, based on its ability to conceivably serve various applications (using 100% carbon neutral supply in the long term). We recognize that one outcome of this Investigation will likely be to facilitate increased electrification of natural gas and other fuel-served end-uses. However, these electrification goals do not preclude the use of RNG and renewable hydrogen as significant long-run energy sources.

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[27] World Resources Institute, *Renewable Natural Gas as a Climate Strategy: Guidance for State Policymakers.* https://www.wri.org/publication/renewable-natural-gas-guidance

[28] New York City Mayor's Office of Sustainability, *Pathways to Carbon-Neutral NYC: Modernize, Reimagine, Reach.* https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/Carbon-Neutral-NYC.pdf

[29] Iid, page xvii.

[30] Electric Power Research Institute, *Powering Decarbonization: Strategies for Net-Zero CO2 Emissions.* https://www.epri.com/research/products/000000003002020700

[31] Brattle Group, *New York's Evolution to a Zero Emission Power System: Modeling Operations and Investment Through 2040.* https://www.nyiso.com/documents/20142/12610513/Brattle%20New%20York%20Electric%20Grid%20Evolution%20Study.pdf/6a93a215-9db3-d5a0-6543-27b664229d3e

[32] Analysis Group, *Climate Change Impact and Resilience Study – Phase II: An Assessment of Climate Chance Impacts on the Power System Reliability in New York State.* https://www.nyiso.com/documents/20142/16884550/NYISO-Climate-Impact-Study-Phase-2-Report.pdf/e9214fd4-9c52-036d-b92b-15f282e686e6

[33] We strongly support the language in the Proposal as an appropriate and necessary starting point for planning this decarbonization process.

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

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, the Commission 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.

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.[34] Figure 1 illustrates our organization's vision of how RNG can best help with decarbonization in the near-, mid-, and long-term.

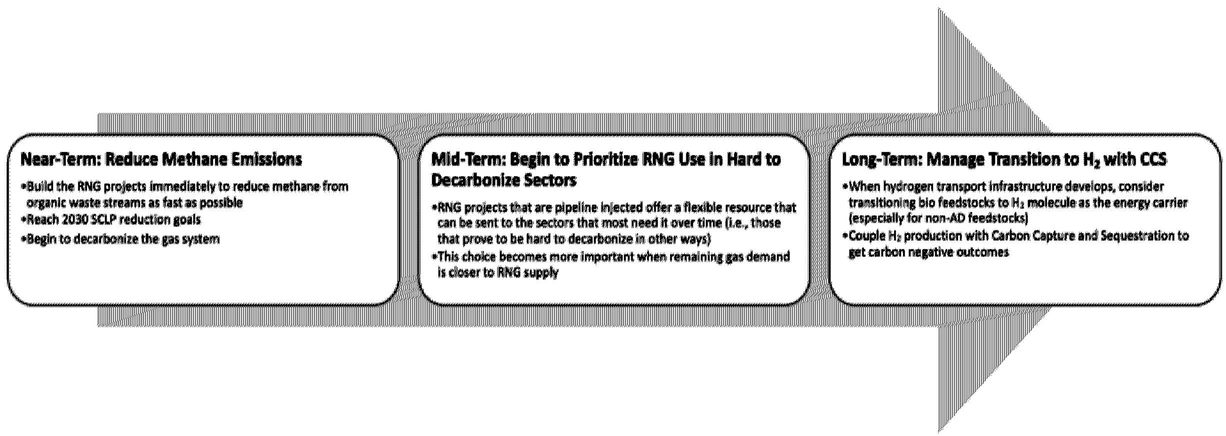

Figure 2. Strategies for RNG Deployment Must Be Prepared to (and Should) Shift Over Time

In the near-term, we must remain focused on the buildout of AD systems that can reduce methane emissions and improve organic waste management, 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.

Finally, in the long-run, hydrogen (from organic waste feedstocks in this context) may become the dominant gaseous energy carrier to ensure 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).

Gas Planning Design Considerations Pertaining to RNG

A Long-run Integrated Resource Plan for Gas is Emerging as an Essential Step to Manage Decarbonization

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[34] 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

Nevada's efforts to explore the future of the gas system are not being conducted in isolation. Many other jurisdictions are wrestling with the same challenging questions and finding that an integrated planning process is needed—due to a dynamic landscape involving shifts in gas system load (and peak demand) caused by changing weather patterns driven by climate change, development of alternative strategies to supply low carbon heat, changes in the power sector, and technological evolution in supply methods and locations of both conventional geologic and renewable gases.

Although many other jurisdictions are beginning to explore these issues in earnest, we are not aware of a perfect model for Nevada to replicate, which makes this Investigation an important opportunity for the Commission to provide leadership on these issues. That said, some important studies conducted recently about gas planning in other jurisdictions do deserve attention,[35] and have applicable lessons for the Nevada conversation.

The Investigation Should Consider How Changes to the Gas System Will Benefit from (and/or Impact) RNG Projects

As this process progresses—in tandem with the ongoing real-world deployment of decarbonization technologies—the Commission should consider the need for clear insight and guidance as to where renewable gas projects should be constructed and interconnected. If a portion of the gas system is to be taken out of service (or planned capacity not built) at some point in the future, project developers need to be well aware of this potential outcome, so that they do not plan to interconnect their project to that portion of the system, and so that RNG can be most efficiently directed to its desired end-use.

Conclusion

The RNG Coalition thanks the Commission for its efforts in initiating this Investigation and working toward adopting a framework which will enable Nevada to achieve economy-wide carbon neutrality. Our industry views such a long-term gas planning process as a critical step in assessing the potential for RNG and biologically-derived renewable hydrogen to contribute to GHG reduction goals in Nevada. Furthermore, this Investigation presents the perfect opportunity to explore the best mix of RNG, efficiency, electrification, and other technologies in order to maximize energy system reliability and the most efficient and responsible management of our natural resources in achieving carbon neutrality.

[35] Thinktanks have begun to conduct multiple studies on these issues globally. For example, in the California context, Gridworks has published two reports entitled *California Gas System in Transition* and *Gas Resource and Infrastructure Planning for California*, available here: https://gridworks.org/initiatives/cagas-system-transition/ Stakeholders in the European Union have also conducted a multitude of studies on the issue. For a good summary see: Cătuţi et al., *The Future of Gas in Europe: Review of Recent Studies on the Future of Gas*, available from: https://www.ceps.eu/wp-content/uploads/2019/08/RR2019-03_Future-of-gas-in-Europe.pdf

Sincerely,

/S/

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