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September 14, 2021

The Honorable Siva Gunda
Commissioners, California Energy Commission
Docket Unit, MS-4
Docket No. 21-IEPR-05
715 P Street
Sacramento, California, 95814-5512

Dear Commissioner Gunda:

Electrochaea Corporation (Electrochaea) appreciates the opportunity to submit comments on the IEPR Commissioner Workshop on Renewable Natural Gas, a workshop to examine the role of renewable natural gas (RNG) as an energy source for California's clean energy future. Electrochaea is the provider of an industrial-scale technology for production of grid-quality renewable methane, which can replace any use of fossil natural gas, using a microorganism called an Archaea. Using our power-to-gas biomethanation technology CO₂ and renewable hydrogen are combined to produce renewable methane. Renewable natural gas, which can also be called renewable methane, can replace geologic natural gas, thereby significantly reducing GHG emissions, utilizing investment in existing gas distribution and storage infrastructure, and contributing to California's transition to a clean energy economy.

I. A RENEWABLE REPLACEMENT FOR NATURAL GAS SHOULD BE DETERMINED BY THE CARBON INTENSITY (CI) OF THE GAS AND NOT THE TECHNOLOGY USED TO PRODUCE THE NATURAL GAS SUBSTITUTE

The challenges of meeting national and State-wide climate goals have stimulated significant investments in innovations far beyond what might have been anticipated even a few years ago. Increasing the volume of renewable methane in the gas grid is an invaluable method of greening the gas economy, just as is occurring in the greening of the electricity grid with renewable sources of power such as wind and solar. Current technologies produce RNG from biogas, which can be sourced from locations such as landfills and dairies. The adoption of additional technologies for producing RNG, which do not require biogas as the primary source, can accelerate the availability of RNG and reduce CO₂ emissions. For example, power-to-gas technologies enable production of renewable methane from other sources of CO₂, such as that emitted during ethanol, cement and steel production, as well as from biogas.

In a presentation from the CEC, the following reasonable definition of RNG was given: "RNG is methane produced in a sustainable (renewable) manner", with additional conditions that RNG is a by-product of other processes, such as a waste product and can be obtained from

landfills, dairies, wastewater plants and agricultural waste¹. While such a definition accurately considers currently known technologies and feedstocks, it may limit investment in new technologies that offer RNG from other sources that deliver improved carbon intensity (CI) gas as can be demonstrated by a Life Cycle Assessment (LCA).

The Coalition for Renewable Natural Gas proposed at the RNG Workshop that the key metric for determining if a gas is renewable should be the carbon intensity (CI), which is the mass of CO₂e/MJ of gas delivered. A Life Cycle Assessment (LCA) approach should be used to evaluate the sustainability of the natural gas replacement product and to obtain the CI². Electrochaea concurs that a definition for RNG that incorporates the LCA approach to determine the CI value and the product composition without requiring a particular technology would be inclusive of new technologies which have the potential to substantially increase the amount of RNG that can be delivered in California. Using an LCA approach, we expect that key concerns will be addressed, especially: (1) fossil energy inputs will be minimized, (2) leaks of methane in the process will be accounted and (3) transportation distance will be minimized.

Using a definition for RNG that does not prescribe a specific technique for the production of renewable methane will increase the availability of RNG for use and storage in California. The policy direction of the Commission should recognize the potential of alternative paths and contributions by establishing standards for achievement of goals, rather than prescribing how the goals will be achieved.

II. POWER-TO-GAS IS A SOLUTION FOR RNG ACQUISITION THAT IS READY FOR COMMERCIALIZATION

Electrochaea has demonstrated in three pilot plants that power-to-gas based biomethanation is an efficient means to produce renewable methane from multiple sources of CO₂: biogas and pure CO₂. When using biogas as a source, the biomethanation process replaces the traditional upgrading process of biogas to RNG, while essentially doubling the amount of methane available for delivery to the gas grid and preventing CO₂ release into the environment. When using pure CO₂ as a feedstock, nearly every CO₂ molecule is combined with hydrogen to produce methane. Electrochaea's two industrial-scale pilot plants have injected renewable methane into commercial gas grids in Switzerland and Denmark, and Electrochaea has worked with the National Renewable Energy Laboratory (NREL) on a research reactor in Golden, Colorado, supported by a grant from Southern California Gas Company

Recently, Maine-based Summit Utilities announced their award of a US Department of Energy grant to re-deploy the NREL biomethanation plant, based on Electrochaea's technology, to a dairy biogas operation in Maine. As Summit President and CEO Kurt Adams explained³, "With this grant from the Department of Energy, we will develop the first field deployed power-

¹ <https://efiling.energy.ca.gov/getdocument.aspx?tn=239521>

² <https://efiling.energy.ca.gov/getdocument.aspx?tn=239537>

³ <https://pingree.house.gov/news/documentsingle.aspx?DocumentID=3828>

to-gas system in the United States by combining green hydrogen and captured carbon. This will create a carbon negative energy source that can be used to keep homes warm and industries running while reducing emissions.” The achievement of national and State-level goals for greenhouse gas reduction will benefit from policy direction and incentives that enable commercial-scale projects of this sort to serve the State of California.

III. INCENTIVES FOR INCREASED RNG USE BEYOND TRANSPORTATION AND IN THE ENTIRE CALIFORNIA ECONOMY

California’s leadership in climate policy should immediately extend its scope beyond the transportation sector. California’s LCFS program, which solely addresses the transportation market, is a proven model to support RNG product development. The program has been a great success for the adoption of RNG in the transportation market; in Q4 2020 and Q1 2021, RNG made up ~98% of the natural gas used in the transportation market. However, transportation is not the largest use market for natural gas. With the growing availability of RNG, it is time for similar incentive programs to be adopted with the goal of decreasing the CI of the gas grid, providing RNG to core customers who want to use renewable products in their homes and for industries that must use natural gas to support their business. Core customers use 34% and non-core industrial customers use 37% of the natural gas in California. Incentives promoting use of RNG in these markets would significantly increase the use and production of this important alternative to fossil-based natural gas, resulting in a reduction in GHG emissions.

Regulations and mechanisms should also be developed to facilitate the purchase of RNG by gas utilities, allow RNG producers to sell the RNG and continue to support the development of interconnections to the gas grid by RNG producers. Gas utilities are now taking steps to decrease the carbon intensities of their product, and they should be supported. SoCalGas has pledged to replace 20% of the core natural gas in their grid with RNG by 2030⁴. California, the leader in the fight against climate change, should go beyond providing incentives for reduced emissions in the transportation field, and lead the way to establish a landscape in which SoCalGas and other gas utilities can overachieve their goals to replace natural gas with low CI gas. Long-term contracts (10-20 years) with the utilities for purchase of RNG at an attractive price is an example of how the risk in project development can be decreased providing a mechanism to speed construction of new projects⁵.

IV. CARBON CAPTURE AND UTILIZATION IS AN ADDITIONAL MEANS TO REPLACE FOSSIL-BASED NATURAL GAS

Carbon capture technologies combined with power-to-gas can greatly reduce emissions of CO₂, while increasing availability of renewable methane. Such possibilities are enabled when CI is used as the metric for the reduction in GHG emissions, rather than limiting the source of

⁴ <https://efiling.energy.ca.gov/getdocument.aspx?tn=239522>

⁵ Verdant presentation by Stephan Barsun <https://efiling.energy.ca.gov/getdocument.aspx?tn=239523>

RNG to biogas. When CO₂ is captured from industries with unavoidable CO₂ emissions or other industries with CO₂ emissions, such as ethanol production, the availability of renewable natural gas replacements can be significantly increased. Although California's short-lived climate pollutant reduction strategy (SB 1383) will serve to increase the production of biogas through the diversion of organic food waste to anaerobic digestion, looking forward to the ability to capture and recycle carbon into gaseous fuels will provide an even greater reduction in fossil GHG emissions.

The realization of large-scale carbon capture and utilization projects is dependent upon enabling regulations and incentives. An expanded incentive program, based on the LCFS model, will accelerate the availability of low CI natural gas substitutes that can be used by core customers and industries with unavoidable CO₂ emissions.

V. CONCLUSIONS

Electrochaea has been actively exploring potential projects to serve the California market and believes that our biomethanation technology can play a substantial role in meeting the climate goals of the State of California, with support and recognition of the value of the technology, and those like it, from agencies in California. Electrochaea encourages the State of California to provide goals and policies to green the gas grid, while avoiding prescriptive choices. It is important to support the ability of the private sector to evaluate and commercialize technologies that deliver on the State's climate goals, with a regulatory and policy apparatus that is supportive of required investments. Thank you for consideration of our comments.

Sincerely,

/s/ Mich Hein

Mich Hein, CEO

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