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UNOFFICIAL ENGLISH TRANSLATION
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January 21, 2022

Ministère de l'Énergie et des Ressources Naturelles
5700 4e Avenue Ouest
Québec, QC, G1H 6R1
Canada

Re: Consultation sur l'hydrogène vert et les bioénergies

Electrochaea Corporation (Electrochaea) appreciates the opportunity to participate in the Consultation on the first green hydrogen and bioenergy strategy in Québec. Electrochaea supports a diverse and multifaceted approach to meeting Québec's aggressive goals to alleviate climate change, which includes a role for green hydrogen and bioenergy. In these comments, Electrochaea would like to highlight potential contributions from the production of renewable methane using a power-to-gas biomethanation process. These technologies take advantage of biogas production, nearly double the amount of renewable gas produced, lower the carbon intensity of the existing natural gas grid, support the green hydrogen market, and provide a long-term storage mechanism for renewable electricity. To this end, Electrochaea encourages of Quebec a supportive regulatory framework for a diverse range of technologies that can support the use of green hydrogen and bioenergy to participate in Quebec's quest to become carbon-neutral by 2050.

A. BACKGROUND ON ELECTROCHAEA

Electrochaea Corporation is a subsidiary of Electrochaea GmbH that has developed an industrial-scale biomethanation technology for the production of grid-quality renewable methane that can replace any use of fossil natural gas. Biomethanation technology, a power-to-gas process, uses renewable power to produce green hydrogen, which is combined with carbon dioxide to form renewable methane[1]. Biomethanation is accomplished by a biological organism which is a methanogenic archaea. Carbon dioxide used in this process can come from a biological source such as landfill gas or from a purified CO_2 that may be emitted from an industrial process. Electrochaea's operating plants have been injecting renewable methane into commercial gas grids in Switzerland and Denmark., Electrochaea has worked with the National Renewable Energy Laboratory on a research reactor in Golden, Colorado that is now being reployed to a dairy biogas site in Maine.

Electrochaea has been actively exploring potential biomethanation projects to serve the Québec market. Power-to-gas biomethanation technology can play a substantial role in meeting the climate goals of the Province of Québec with support and recognition of the value of the technology, and those like it, from agencies in Québec.

[1] Low-carbon intensity methane may be referred to as renewable natural gas (RNG), biomethane, biogas, or otherwise.

B. SPECIFIC COMMENTS ON THE CONSULTATION STRATEGY

1. Power-to-gas biomethanation can play a significant role in Quebec's green hydrogen and bioenergy strategy

Quebec has recognized that electrification with renewables and increased energy efficiency are not sufficient to meet Quebec's greenhouse gas (GHG) reduction goals, targeted at 37.5% reduction compared to 1990 levels by 2030. Hard-to-electrify and high GHG emitting industries require additional means to participate in the race to prevent climate change, and these means may include a strategy to use green hydrogen and Quebec's bioenergy resources. The production of synthetic renewable methane, a low carbon intensity fuel, can participate in this strategy as the process of biomethanation uses green hydrogen and CO_2 derived from biological resources.

When producing renewable methane using green hydrogen and CO_2 derived from biomass resources, biomethanation has additional advantages, particularly the mitigation of CO_2 release and the nearly doubling of quantity of renewable methane available from anaerobic digesters or landfills. These resources typically contain about 40% CO_2 and 60% methane. With biomethanation, that CO_2 is converted to renewable methane resulting in a nearly doubling of the volume of renewable methane available to be injected into the natural gas grid, enabling the optimal use of Quebec's natural resources.

In 2018, the technical and economic potential of renewable natural gas production from biogas and landfill gas in Québec was estimated at 25.8 million GJ, which corresponds to 12% of the volume of natural gas currently distributed by Energir in Québec[2]. Broad deployment of biomethanation could nearly double available renewable methane from biomass to more than 20% of Quebec's natural gas usage. In addition, biomethanation can be deployed beyond those biomass sources. For example, CO_2 emitted from ethanol, beer, and other fermentation processes can further stimulate the production of renewable methane using green hydrogen. Overall, biomethanation supports the achievement of the goal set by the Government of Quebec, as part of its "Plan pour une économie verte 2030", aiming at a minimum quantity of renewable natural gas to be delivered annually by a natural gas distributor to be 10% by 2030[3].

2. Renewable methane will stimulate near-term hydrogen market growth

As a low-carbon intensity energy source, green hydrogen is an attractive resource for Quebec's decarbonization planning. While recognizing its advantages, it is also important to acknowledge that hydrogen can be challenging to store and transport. It can also embrittle some current infrastructure materials such as pipeline steels, posing challenges for its wide-spread, near-term use without significant investment[4]. Hydrogen is not yet a grid-scale solution to significantly decarbonize the gas grid.

Nevertheless, biomethanation captures important benefits from green hydrogen while delivering renewable methane suited to grid-scale use. Biomethanation utilizes green hydrogen immediately after production, without the need to store hydrogen, while instead storing its energy as renewable methane. Alternatively, storing renewable energy in the form of renewable methane makes it possible to perpetuate existing gas infrastructures and equipment (distribution networks, natural gas boilers, etc.), thus avoiding the implementation of specific hydrogen infrastructures.

[2] https://www.energir.com/~/media/Files/Corporatif/Publications/181120_Potentiel%20GNR_Rapport%20synth%C3%A8se_ANG.pdf?la=en
[3] https://www.quebec.ca/gouv/politiques-orientations/plan-economie-ve
[4] https://www.energypolicy.columbia.edu/sites/default/files/file-uploads/Green%20hydrogen%20report,%20designed,%2009.07.21.pdf

3. A carbon-neutral gas grid, containing renewable natural gas, is the largest and lowest cost energy storage mechanism.

As intermittent renewable energy sources are increased, the temporal imbalance between production and consumption increases the demand for energy storage. Quebec's expected energy needs by 2029 of at least 1400 megawatts and 1.5 terawatt hours anticipate a significant portion from wind power[5]. Investments in energy storage (such as conventional batteries) are already being considered in Quebec[6]. Electrochaea strongly believes that synthetic RNG should also be supported as a means of large-scale renewable energy storage.

As described earlier, biomethanation utilizes green hydrogen to store renewable energy in the C-H bonds in the renewable methane molecule. This renewable methane is a drop-in substitute for natural gas utilizing the largest, already-available, energy storage infrastructure, the gas grid. Unlike a conventional battery, energy stored on the gas grid is not subject to loss-of-charge, nor loss of capacity, over time. The gas grid can also seasonally store the energy by time-shifting the availability of renewable energy, which may be especially needed during cold winter months.

4. Concrete measures to promote the industrial deployment of diverse technologies will accelerate the energy transition

Biomethanation, like other new energy technologies, will achieve full-scale commercialization only in the years ahead. Such new tools will be required to achieve the substantial decarbonization goals, where existing technologies may be necessary, though insufficient.

Given the urgency to reduce GHG emissions, investment in technologies that have reached and are reaching commercial readiness but have low adoption rates should be expanded. Investment mechanisms should include such technologies to accelerate their availability and leverage their readiness for widespread commercialization. A full portfolio of tools is needed to achieve Quebec's, and the world's, climate goals. Limiting support to already proven technologies limits innovation, potentially removing a necessary solution from application. As investment is provided in a new solution, cost-effectiveness will be improved as further buildout is implemented. Project investment in support of decarbonization will also require competitive offtake pricing of sufficient duration and competitiveness. Markets across North America with comparable decarbonization goals and challenges are competing for such investment and Quebec should recognize this dynamic as part of its policy development.

Among other means of support, the government can also provide additional support mechanisms for green hydrogen from electrolysis and use of biomass in the form of tax credits or exemptions. For example, US tax credit for hydrogen production is being considered in the US. The "Build Back Better" bill would support clean hydrogen through tax credits of up to $3 per kilogram for 10 years on hydrogen production, or a tax credit of up to 30% of the cost of the electrolyzer and other equipment[7]. In addition, there is a tax exemption for electricity used solely for electrolysis in Germany and Norway. In 2021, the German government announced that the state electricity surcharge would be limited to 15% or eliminated altogether for green hydrogen producers[8]. In addition, as part of their hydrogen strategy released in 2020, the Norwegian government also announced an exemption from the national consumption tax on electricity for electrolytic hydrogen production[9]. Economic incentives could also exist in the form of a value associated with energy storage in RNG, which can facilitate balancing and reliability of the electricity grid. Mobilizing funding to support investments in RNG production through biomethanation is another possibility.

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[5] https://www.quebec.ca/nouvelles/actualites/details/nouveaux-approvisionnements-denergie-renouvelable-le-ministre-julien-place-la-filiere-eolienne-au-coeur-de-la-transition-energetique-33403
[6] https://www.evloenergy.com/en/about/#main-content
[7] https://amendments-rules.house.gov/amendments/YARMUT_024_xml211104220514322.pdf
[8] https://www.bmwi.de/Redaktion/DE/FAQ/EEG-2021-FAQ/faq-beihilferechtlichen-genehmigung-eu-kommission.html
[9] https://www.regjeringen.no/contentassets/8ffd54808d7e42e8bce81340b13b6b7d/hydrogenstrategien-engelsk.pdf

Electrochaea appreciates the opportunity to submit these comments to the Government of Quebec and is interested in working with “Ministère des Ressources Naturelles” in developing a regulatory landscape that can accelerate the transition to clean, green energy. We strongly believe that a synergistic approach, supporting multiple technologies and strategies to reduce and ultimately eliminate the use of fossil fuels, will be the preferred way forward. Electrochaea encourages the Québec government to guide the province forward in an inclusive manner that supports the development of clean energy resources, including the decarbonization of the gas grid. It is important that the Government provides a regulatory landscape supportive of innovative commercial technologies that will deliver on the ability to meet Quebec’s GHG reduction goals.

In the hope that these few comments will prove useful, please accept the assurance of my best regards.

Sincerely,

Mich Hein
CEO
Electrochaea Corp.
Sacramento, CA, USA