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Douglas W. O'Donnell
Deputy Commissioner for Services and Enforcement
CC:PA:LPD:PR (REG-117631-23)
Room 5203
Internal Revenue Service
P.O. Box 7604
Ben Franklin Station
Washington, DC 20044

Re: Proposed Rule: Section 45V Credit for Production of Clean Hydrogen

Dear Mr. O'Donnell:

Electrochaea Corporation appreciates the opportunity to provide comments in response to the proposed rule entitled "Section 45V Credit for Production of Clean Hydrogen" published at Fed. Reg. Vol. 88, No. 246 (Proposed Rule). Electrochaea is a provider of a power-to-gas methanation solution for the industrial-scale production of renewable synthetic methane. Through the production of a low carbon intensity (CI) natural gas substitute, synthetic methane, the power-to-gas methanation process has the potential to decarbonize the gas grid, support the growing renewable hydrogen economy, and provide long-duration renewable hydrogen storage.

Electrochaea's comments address (1) the importance of a transition to incrementality to lower risks in the development of hydrogen projects, (2) the recognition and treatment of would-be curtailed power as incremental, (3) a delay in the hourly matching requirement, and (4) certain e-fuel plants should qualify for both 45V and 45Q credits.

Description of Electrochaea's power-to-methane solution

Power-to-gas is a technology in which electrical energy is stored in a gas. When power-to-gas is combined with methanation, synthetic methane is produced, which is a renewable and clean drop-in replacement for fossil natural gas. Power-to-gas methanation (power-to-methane) technologies use hydrogen and CO_2 as feedstocks in a two-step process (Figure 1) to produce renewable methane. Electrochaea's power-to-methane process uses a biological catalyst, a

methanogenic archaeon, to combine CO_2 and hydrogen into synthetic methane. In the first step, renewable electricity, such as from solar or wind, is used to produce hydrogen by electrolysis. In the second step, hydrogen and carbon dioxide are delivered to the reactor. The archaea within the reactor take up the hydrogen and carbon dioxide and synthesize methane. After leaving the reactor, the low CI synthetic methane is prepared for gas grid injection or use.

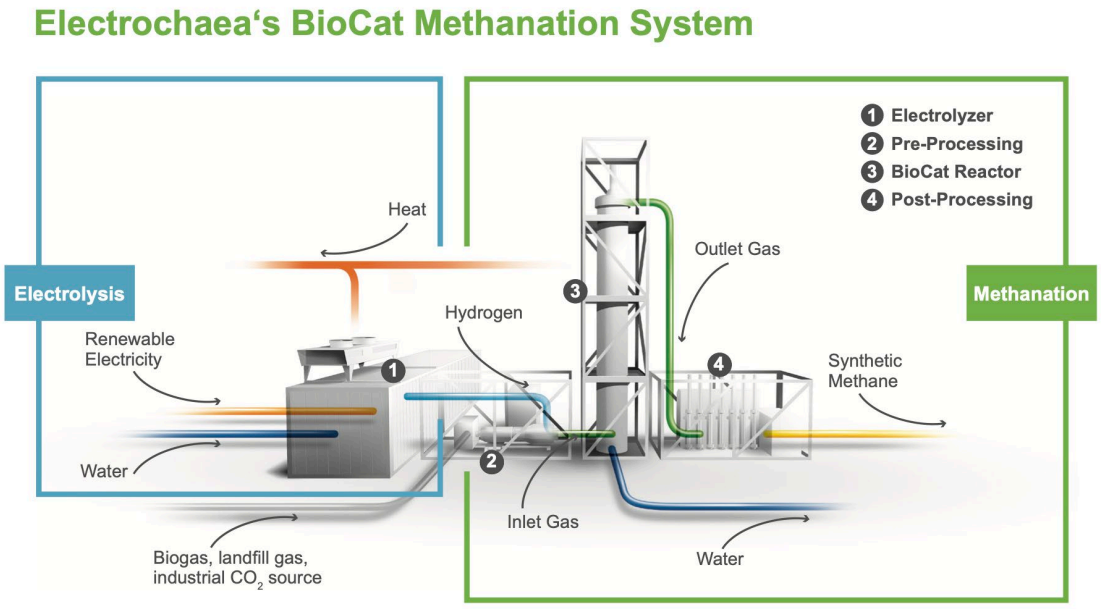


Figure 1. (1) Renewable energy is used to produce hydrogen by electrolysis, (2) hydrogen and carbon dioxide are delivered to the reactor (3) in which clean, synthetic methane is synthesized by the archaea. (4) Clean, synthetic methane (RNG or biomethane) is prepared for grid injection or use.

The power-to-methane process produces clean, synthetic methane with a CI that is significantly lower than fossil natural gas. Since synthetic methane can replace any use of natural gas, including electricity production, the use of synthetic methane avoids the extraction and combustion of fossil natural gas. Analogous to the greening of the electrical grid by solar and wind, energy delivered in the gas grid is becoming decarbonized as the percentage of renewable natural gas (RNG) and renewable synthetic methane delivered from the gas grid is increased.

Electrochaea's comments

Electrochaea acknowledges the potential problems of induced emissions if the three pillars of Energy Attributes Certificates (EACs) are not followed. However, overly prescriptive rules and regulations instead threaten the developing clean hydrogen economy. The proposed regulations for hydrogen production impose restrictions on the hydrogen economy that are not imposed on other clean energy technologies. In addition, many states have or are developing

their own Renewable Portfolio Standards (RPS) which also serve to limit induced emissions and eliminate the need for additional regulations that will increase the cost of hydrogen production. We urge Treasury to incorporate a more gradual ramp-up of the three pillars to support the build-up of a large US manufacturing and project base for hydrogen production while avoiding induced emissions as much as possible. This approach will ensure that there are widespread learnings across the industry to reduce costs and sustainably advance clean hydrogen technology. As described below, this ramp-up will more closely match similar rules that the EU has implemented and will help prevent US projects from moving overseas.

1. **Incrementality is an effective and important means to ensure new renewable electricity matches new hydrogen production to avoid induced emissions, though a transition period is needed.**

Incrementality, or additionality, is designed to prevent renewable electricity from being taken from its original use and replaced with a higher-emitting source of electricity. PPAs and REC purchases should be designed with that in mind. However, because of the time constraints in the construction of hydrogen-specific renewable electricity, a transition period is needed to realize the first electrolytic hydrogen projects. Namely, for projects that begin construction before 2028, we recommend an exemption to the incrementality rules for the lifetime of the tax credit. In Europe, under the EU Renewable Fuels of Non-Biological Origin (RFNBO) rules[1] covering green hydrogen production, projects that begin producing hydrogen before 2028 do not have to follow incrementality rules for the first 10 years. Aligning the US approach with the EU's can help protect planned hydrogen projects in the US from being moved overseas because of more lenient regulations.

2. **To stimulate the maximum amount of clean hydrogen production without induced emissions, the regulations should include mechanisms to avoid curtailment and retirements of renewable electricity.**

<u>Avoided Curtailment</u>

The curtailment of production and forced retirement of generation assets are detrimental to the renewable electricity industry. The power-to-methane process is a particularly effective means to store unused electricity, first in hydrogen and ultimately in methane. The significance of this is that renewable methane, the major component of natural gas, can be stored in the existing and functional infrastructure and used later when needed in a variety of industries. Because curtailed renewable electricity does not create induced emissions, we urge Treasury to include methods to minimize curtailment to produce clean hydrogen production while potentially giving renewable electricity assets that are not incremental another source of revenue. The evaluation of simple metrics such as pricing below a certain threshold, including negative pricing, is one of the means to determine that power purchased under these circumstances is not inducing GHG emissions.

[1] See: Commission Delegated Regulation (EU) 2023/1184

The proposed rule states: *"The Treasury Department and the IRS seek comments on this five percent allowance approach, including the merits of this approach compared to the targeted pathways described, particularly with respect to balancing administrative feasibility and burden with accuracy of identifying circumstances with a low risk of induced grid emissions. The Treasury Department and the IRS also seek comments on whether 5 percent is the appropriate magnitude for an allowance"*

Using a 5% allowance approach, as discussed in the proposed rule, does not take into account the situation in the different ISOs throughout the country. Highly renewable regions already have greater than 5% curtailment. Simply averaging the curtailment rate over the entire country decreases the incentives intended by Congress and will slow the development of the hydrogen economy. Allowing projects to use a recent value for curtailment in the local transmission zone will support investment in the hydrogen economy and will also better reflect real-world conditions at the clean hydrogen facility, helping reduce induced emissions and promoting the use of renewable electricity where it is already abundant and underutilized.

<u>Avoided Retirement and the Treatment of Repowering of Electricity</u>

Power-to-methane can also impact renewable assets that otherwise would have been prematurely retired. Like would-be curtailment, simple means, such as new power purchase agreements for electrolytic hydrogen production, are sufficient to meet the incrementality pillar.

We request clarity on the incrementality eligibility when the 80/20 rule is applied to inactive renewable electricity generation assets (a.k.a., repowering). Repowering renewable generation assets for hydrogen production has little to no risk of induced emissions. We recommend that the regulations indicate that in these repowering cases, the new electricity is incremental from the date of operation after refurbishment.

3. **Hourly matching beginning as soon as 2028 will decrease the GHG reductions that can be achieved when using hydrogen to produce a low CI fuel.**

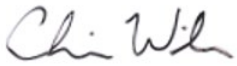
We acknowledge the need for hourly matching of EACs to prevent induced electricity during the times of the day and seasons when renewable electricity is not being produced. However, we are requesting a delay in hourly matching until 2030 to align with European RFNBO rules. For the same reasons as stated above when referencing incrementality, aligning the programs will enable early projects to move forward with more certainty. More first-movers will enable better industry learning on how to reduce costs for these projects, both for electrolyzer technology and for the balance of plants.

4. **The regulations should confirm that certain e-fuel processes can claim 45V and 45Q because the production of the e-fuel from hydrogen does not alter the CI of the hydrogen.**

At an e-fuel plant, such as a power-to-methane plant, a two-step process is utilized to produce methane. In the first step, hydrogen is produced by electrolysis, using renewable electricity. This hydrogen does not require carbon capture processes to either lower the CI or produce or condition the hydrogen in any way. In a sequential step, the hydrogen is combined with CO_2 captured from a distinct process, such as biogas conditioning, in a methane synthesis process. This process is a carbon utilization process and will qualify for 45Q credits per that tax section. Importantly, this second step in the power-to-methane does not impact the CI of the hydrogen produced in the first step. Thus, 45V and 45Q credits can both be claimed for the power-to-methane process. This should also be true for other e-fuel production processes. The final regulations should confirm that taxpayers with separate processes may be eligible for both 45V and 45Q credits on a separate process basis.

Thank you in advance for your consideration.

Sincerely,



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