Link to submit a formal comment: Federal Register :: Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election To Treat Clean Hydrogen Production Facilities as Energy Property

To: Treasury Department and Internal Revenue Service

Subject: Comments on the 45V Proposed Rules (REG–117631–23)

Date: February 26, 2024

On behalf of the Aurora Hydrogen, I respectfully submit the attached comments to the Department of the Treasury and the Internal Revenue Service's Request for Comments on the Credit for Production of Clean Hydrogen, Election to Treat Clean Hydrogen Production Facilities as Energy Property (REG–117631–23). I appreciate the opportunity to comment and would welcome the opportunity to participate in any stakeholder engagement on the Inflation Reduction Act section 45V rulemaking.

Below are our suggestions regarding the proposed regulations:

- Include valorization of solid carbon / providing an emissions displacement credit for carbon coproduct.

Methane-splitting technologies produce both hydrogen and solid carbon. The solid carbon is a commercial product. The proposed regulations do not clearly address how this carbon will be treated as valorized, which is important for purposes of allocating the GHG emissions. The 45VH2-GREET model guidance document and the model itself indicate that only steam, oxygen, and nitrogen may be valorized. We urge the Treasury Department to include the concept and definition of valorization in the final regulations, and to permit solid carbon to be treated as valorized when the carbon is sold or used to produce an end product that will be sold.

- Add new pathways for methane pyrolysis/methane splitting technologies: The 45VH2-GREET model does not yet have pathways for a key emerging category of hydrogen production technologies that split methane into clean hydrogen and solid carbon including electric, non-electric and thermal technologies. We request that new pathways be added by Argonne National Laboratory as soon as possible, with industry input and collaboration.

- Include different emission factors for upstream natural gas/methane feedstocks: The proposed regulations state that the upstream loss rates of natural gas feedstocks are background data in the 45VH2-GREET model. This rate may not reflect the actual emissions of different sources of natural gas, especially those that have lower methane leakage. We suggest that the Treasury Department allow the use of different emission factors for upstream natural gas, especially if verifiable data is available about the local carbon intensity such as certificates or verified LCA data from companies providing the methane. We encourage the Treasury to explore cross leveraging the U.S. Environmental Protection Act's (EPA's) GHGRP Subpart W and Subpart C to address upstream methane emissions and upstream carbon dioxide emissions from the natural gas value chain respectively. Similar reporting and verification structures can be developed for RNG and biomass feedstocks. Thus, upstream methane loss rates should be foreground

data. This would encourage the use of cleaner natural gas sources and reward the efforts of reducing methane emissions.

- Addition of and flexible access to methane fuel pathways including RSG, RNG, biogas & biomethane: The 45VH2-GREET model limits methane feedstocks to natural gas and one source of renewable natural gas (RNG), i.e., landfill gas. We request the Treasury Department to include all sources of RNG production in the 45VH2-GREET model and to further provide clarification on the terms RNG, responsibly sourced natural gas, biogas, biomethane and fugitive sources of methane. In addition, we request flexible access to low-GHG methane sources in an effort to both reduce costs and carbon intensity of clean hydrogen.

- Optionality between PER or 45VH2-GREET: The proposed regulations state that the emissions rate for hydrogen production must be determined using the 45VH2-GREET model. Where a hydrogen production pathway is not included in the 45VH2-GREET model, the hydrogen producer would have to obtain a Provisional Emissions Rate (PER). We believe that there should be optionality between using the PER or the GREET model. This would provide more flexibility and certainty for hydrogen producers.

- Transparency and participation in the 45VH2-GREET model: The proposed regulations state that the 45VH2-GREET model will be updated annually by Argonne National Laboratory, and that the Treasury Department will publish the updated model and guidance document on its website. We appreciate the efforts to keep the model up to date and relevant, but we are concerned about the potential impacts of these updates on the eligibility and amount of tax credits for hydrogen producers. We request that the Treasury Department provide more transparency and participation in the process of updating the 45VH2-GREET model, such as disclosing the formulas and assumptions used in the model, soliciting feedback and input from the industry and stakeholders, and giving advance notice of the changes and their implications.

In addition, we at Aurora Hydrogen support the written comments made by the Open Hydrogen Initiative relative to topics I, II, III and IV below. We thank the Treasury Department and the IRS for their consideration of our comments. We look forward to working with you to ensure the successful implementation of the 45V program and the advancement of the low-carbon hydrogen industry.

Sincerely,

Andrew Gillis

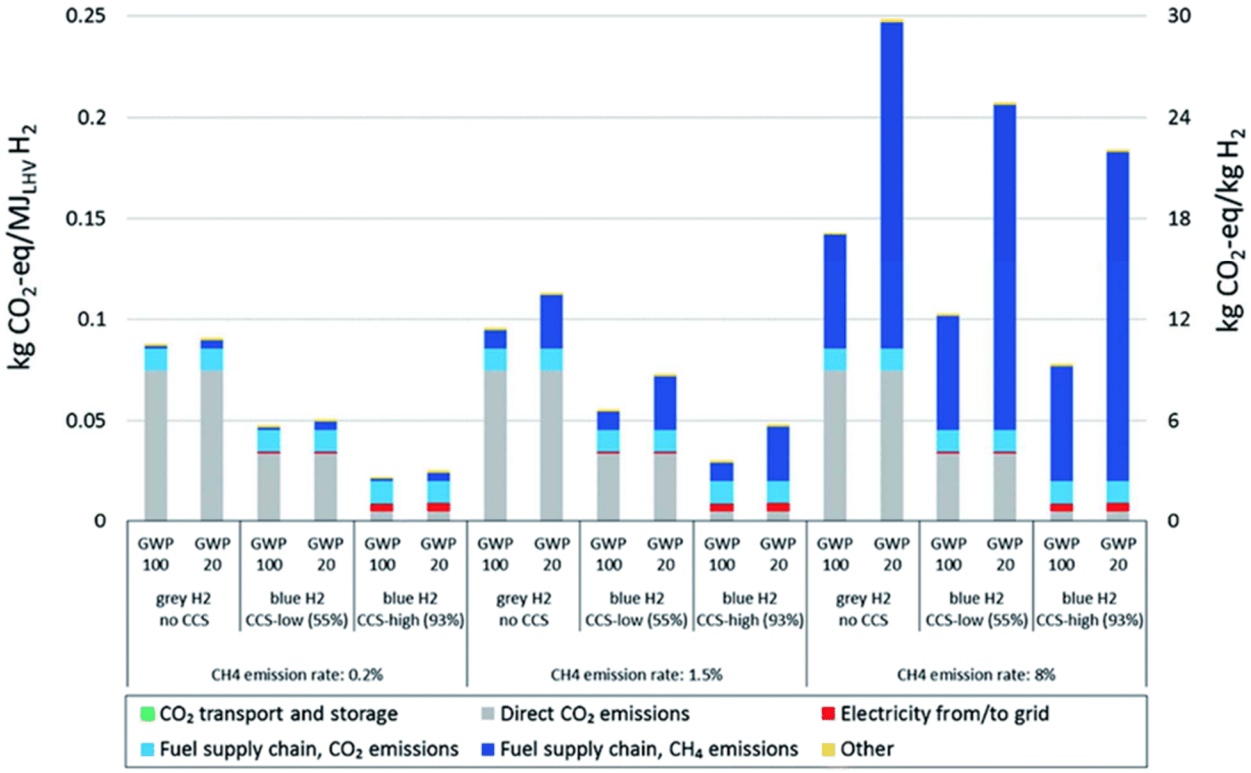
CEO, Aurora Hydrogen

I. <u>Encourage Greater Customization & Flexibility, Particularly in the Upstream</u>

OHI requests that Treasury release final guidance that expands users' ability to customize their upstream supply chain parameters. Specifically, we request that users have the ability to input bespoke upstream data that is reflective of their own supply chains. The ability for qualified taxpayers to represent the actual characteristics of their hydrogen production pathway in the calculation of life cycle carbon intensity is crucial for both accuracy in emissions accounting and achieving decarbonization goals.

For example, Figure 1 clearly bears out that subtle changes in upstream fugitive methane emission rates, well within the variability observed in gas wells across the U.S., can have significant impacts on the carbon intensity of the hydrogen being produced[1].

Figure 1. Global warming potential of natural gas-based hydrogen production under varying methane emissions assumptions.[1]



Restricting customization of supply chain parameters creates an economic disincentive for hydrogen producers to invest in supply-chain-specific decarbonization strategies. The 45VH2_GREET model can be refined to offer users a higher degree of customization in making supply-chain-specific claims. This enhancement would not only contribute to the accuracy of emissions calculations but also foster a more comprehensive approach to incentivizing investments in supply chain decarbonization efforts.

Incorporating these factors is essential to ensuring a fair and accurate representation of emissions profiles. Specifically, we request that Treasury explore greater flexibility in customization around:

- balancing authority-level grid emissions;
- upstream fugitive methane emissions;
- upstream CO_2 emissions;
- transport distance between energy supplier and facility – inclusive of biomass, natural gas, RNG, and other energy molecules; and
- ability for high temperature electrolysis to vary the source of both thermal and electrical energy feedstocks.

Treasury should explore cross leveraging the U.S. Environmental Protection Act's (EPA's) GHGRP Subpart W and Subpart C to address upstream methane emissions and upstream carbon dioxide emissions from the natural gas value chain respectively. Similar reporting and verification structures can be developed for RNG and biomass feedstocks.

II. Expanded Technology Coverage for Both Hydrogen Production and Energy Feedstocks

OHI requests that Treasury work alongside DOE to release final guidance that expands upon the hydrogen production technologies covered by 45VH2_GREET. This expansion can encompass all current commercially viable hydrogen production technologies. Through surveys of the literature and industry, OHI has found that there is ample publicly accessible and verifiable data to accurately characterize several hydrogen production technologies that were omitted from 45VH2_GREET[2]. Omission of these technologies reduces harmonization of lifecycle analysis (LCA) methodology across the industry and puts an undue burden on developers of those technologies. The inclusion of additional commercially viable hydrogen production technologies will reduce uncertainty, facilitate smoother capital acquisition, and simplify the making of investment decisions for developers. Suggested technological expansions include:

- methane pyrolysis;
- partial oxidation;
- solid oxide electrolysis;
- anion exchange membrane (AEM) electrolysis;
- proton exchange membrane (PEM) electrolysis;
- solid oxide electrolyzer cells (SOEC); and
- alkaline electrolysis.

Furthermore, we request that Treasury's final guidance accurately represents the complexities of hydrogen production technologies. The current 45VH2_GREET categorizes electrolysis into two technologies, low temperature (T) and high temperature (T). This overlooks the diversity of electrolytic chemistries available today. Preliminary research by OHI indicates that the four predominately utilized electrolytic chemistries (SOEC, PEM, Alkaline, and AEM) can produce hydrogen varying in carbon intensity by over 30% under identical assumptions. Leveraging broad categories in lieu of specific technologies erodes the accuracy of the LCA. Final guidance and the LCA toolkit used to support that guidance should explicitly include all commercially viable hydrogen production technologies.

We request that Treasury work alongside DOE to expand coverage of feedstock energy sources in 45VH2_GREET. OHI has compiled the necessary data and literature to justify expanding coverage to include more diversity in feedstock pathways, including but not limited to:

- municipal solid waste;
- wastewater;
- renewable natural gas;
- liquified natural gas; and
- a wider selection of woody biomass and energy crop feedstocks.

OHI is a willing collaborator with Treasury and DOE in providing high quality and publicly available data and resources to assist in characterizing these feedstocks and technologies.

III. Improved Collaboration and Industry Engagement in Future 45VH2_GREET Versions

OHI requests that Treasury work alongside DOE to meaningfully engage stakeholders across the entire hydrogen and broader energy community in review and comment periods for future developments of the 45VH2_GREET toolkit.

The proposed guidance indicates an annual review and update process for the 45VH2_GREET tool. This review process exposes hydrogen producers, including those currently relying on the 45VH2_GREET tool and those relying on a provisional emissions rate (PER)-derived carbon intensities, to significant uncertainty. This uncertainty will complicate both securing financing and making final investment decisions. Treasury can work alongside the industry and industry-led coalitions in the review and development process of new iterations of the 45VH2_GREET toolkit. Treasury would benefit from providing review and comment periods for every new version of the 45VH2_GREET toolkit. Comprehensive stakeholder engagement will reduce uncertainty, increase support, and help to ensure the highest caliber data and model assumptions.

IV. Enhanced Transparency in Background Data Source and Methodology

Carbon Accounting and LCA are highly intricate processes, underpinned by a multitude of assumptions and methodological decisions. We request that Treasury adopts a more transparent, trackable, and traceable approach to calculating carbon intensity. Best practices in a trackable, traceable, and transparent modeling process include:

· Making formulas more accessible to users, allowing them to trace calculations without undue burden.

· Explicitly listing assumptions along with a clear description of the value, the units, and the source of the assumption.

· Explicitly listing all methodological decisions that impact the LCA results along with a decision rationale.

· Providing a comprehensive sensitivity analysis of all dependent variables.

· A quantitative ranking of data versus an industry-agreed upon pedigree for representativeness and reliability[3].

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[1] On the Climate Impacts of Blue Hydrogen Production; Bauer C. et. al.; Royal Society of Chemistry; 2022

[2] Open Hydrogen Initiative; Unit Process Library. *Available upon request*

[3] Such data quality pedigrees include The Right Measure by S&P Global & NETL (2020) and the U.S. EPA Guidance on Data Quality Assessments for Life Cycle Inventory Data (2016)