OPEN **HYDROGEN** INITIATIVE

SUBMITTED ELECTRONICALLY

Internal Revenue Service
CC:PA:LPD:PR (REG–117631–23)
Room 5203
P.O. Box 7604, Ben Franklin Station
Washington, DC 20044

February 26, 2024

Re: REG–117631–23 | Credit for Production of Clean Hydrogen, Election to Treat Clean Hydrogen Production Facilities as Energy Property

On behalf of the Open Hydrogen Initiative. ("OHI"), I respectfully submit the attached comments to the Department of the Treasury ("Treasury Department") and the Internal Revenue Service's ("IRS") Request for Comments on the Credit for Production of Clean Hydrogen, Election to Treat Clean Hydrogen Production Facilities as Energy Property (REG–117631–23).

We appreciate the opportunity to comment and would welcome the opportunity to participate in any stakeholder engagement on the Inflation Reduction Act section 45V rulemaking.

Thank you for your time and your consideration.

Sincerely,

Zane McDonald

Zane McDonald

Executive Director, Open Hydrogen Initiative

GTI Energy and S&P Global Commodity Insights, with technical support from the DOE's National Energy Technology Laboratory (NETL), launched the Open Hydrogen Initiative in 2022. OHI is an international coalition of over 40 participating organizations from industry, government, academia, coalition groups, and environmental NGOs with the mission of creating a harmonized methodology to vet the carbon intensity of hydrogen production at the facility level. Specifically, the OHI methodology will establish a globally accepted tool and corresponding set of protocols, giving market participants a consistent and credible framework for determining the carbon intensity of a given kilogram of hydrogen produced at a given facility.

In a bid for transparency and credibility, all the deliverables and research from OHI will be made open source and publicly available for integration and implementation across markets, corporate intelligence efforts, and policymaking. To this end, we stands ready to support Treasury and the Department of Energy in 45V implementation. Our work can serve as complementing source material for any future development of the Greenhouse Gases, Regulated Emissions, and Energy Use in Technologies (GREET) model established by DOE's Argonne National Laboratory. The OHI team would welcome deeper collaboration with Argonne National Lab, the DOE, and Treasury on this topic.

NETL's role in the Open Hydrogen Initiative project does not represent or endorse the actions of the United States Government nor any agency thereof, expressed or implied, and does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions expressed by NETL and/or OHI do not necessarily state or reflect those of the United States Government or any agency thereof.

I. Encourage Greater Customization & Flexibility in the Upstream

OHI requests that the Treasury Department releases final guidance that expands users' ability to customize their upstream supply-chain parameters. Specifically, users should have the ability to input bespoke upstream data that is reflective of their own supply-chains. The ability for qualified taxpayers to reflect the real-world characteristics of their hydrogen production pathway in the calculation of life cycle carbon intensity is crucial for both accuracy in emissions accounting and achieving intended 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 US, can have significant impacts on the carbon intensity of the hydrogen being produced[1].

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

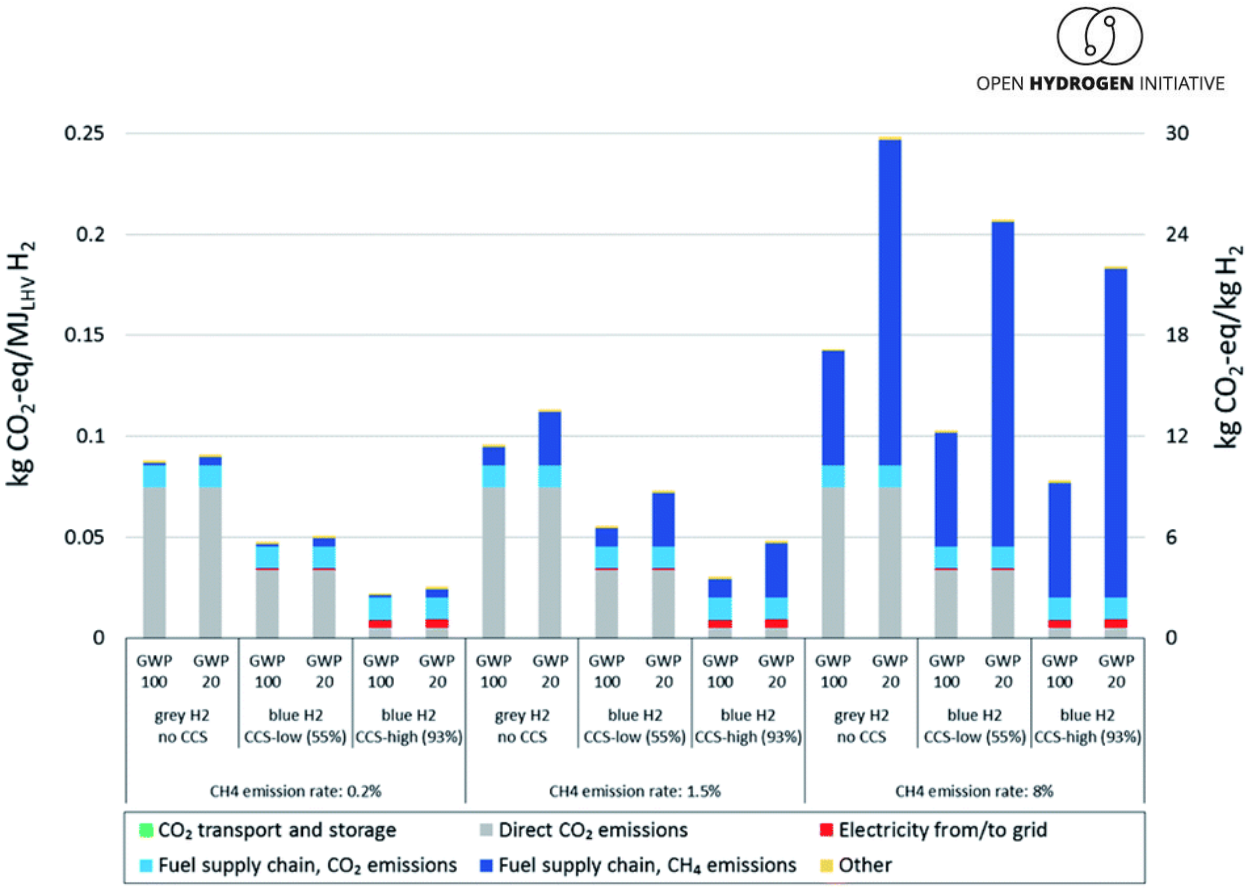

Figure 1. Global warming potential of natural gas-based hydrogen production under varying methane emissions assumptions.[1]

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 should 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 avoiding unintended consequences and ensuring a fair and accurate representation of emissions profiles. Specifically, Treasury should 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.
- ability for high temperature electrolysis to vary the source of both thermal and electrical energy feedstocks.

Treasury should explore cross-leveraging EPA's GHGRP Subpart W and Subpart C to address upstream methane emissions and upstream CO_2 emissions from the natural gas value chain respectively. Similar reporting and verification structures should be developed for RNG and biomass feedstocks.

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

OHI requests that the Treasury Department work alongside the Department of Energy to release final guidance that expands upon the hydrogen production technologies covered by 45VH2_GREET. This expansion should encompass all current commercially viable hydrogen production technologies. Through surveys of the literature and industry, the Open Hydrogen Initiative has found that there is ample publicly accessible and verifiable data to accurately characterize a number of hydrogen production technologies that were omitted from 45VH2_GREET[2]. Omission of these technologies reduces harmonization of LCA methodology across the industry and puts an undue burden on developers specializing in these 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.

We recommend that Treasury similarly expand the palette of potential coproducts included in the 45VH2_GREET model across which emissions are allocated to include coproducts from these technologies, such as pure carbon and carbon black.

Furthermore, we suggest Treasury avoid oversimplifications in the representation of hydrogen production technologies. The current 45VH2_GREET categorizes electrolysis into two technologies, low temperature (T) and high temperature (T). This represents an oversimplification, overlooking the diversity of electrolytic chemistries available today. Preliminary research by the Open Hydrogen Initiative 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 life cycle analysis (LCA). Final guidance and the LCA toolkit used to support that guidance should explicitly include all commercially viable hydrogen production technologies.

Treasury should work alongside the Department of Energy to expand coverage of feedstock energy sources in 45VH2_GREET. The Open Hydrogen Initiative 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,
- waste water,
- renewable natural gas,

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

- liquified natural gas, and
- a wider selection of woody biomass and energy crop feedstocks.

The Open Hydrogen Initiative would be a willing collaborator with Treasury and the DOE in providing best-in-class 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 the Treasury Department work alongside the Department of Energy to meaningfully engage stakeholders across the entire hydrogen and energy community in review and comment periods for every future development 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 PER-derived carbon intensities, to significant uncertainty. This uncertainty will complicate both securing financing and making final investment decisions. Treasury should work alongside the industry and industry-led coalitions in the review and development process of new iterations of the 45VH2_GREET toolkit. Treasury should be obliged to provide 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 Life Cycle Analysis (LCA) are highly intricate processes, underpinned by a multitude of assumptions and methodological decisions. We recommend 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].

This approach would not only enhance industry awareness and confidence but also empower the energy community to actively contribute to the robustness of the assumptions underpinning this tax credit.

[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)

Thank you for your consideration of the above listed recommendations. Developing a resilient and low-carbon hydrogen economy will require substantive collaboration at all levels. The Open Hydrogen Initiative stands ready to assist the US Government in their efforts. We appreciate the dedication of the Treasury and the DOE in fostering policies that promote clean technology and address the challenges facing the hydrogen industry. For further information or questions, please contact Zane McDonald at zmcdonald@gti.energy.

Sincerely,

Zane McDonald