February 26, 2024

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

RE: Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property.

Submitted via Federal eRulemaking portal: www.federalregister.org

REsurety appreciates the opportunity to comment on the notice of proposed rulemaking (Proposed Rule), *Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property*, issued by IRS and Treasury (collectively, Treasury) on December 26, 2023.

Summary:

REsurety applauds and supports Congress' intention to create a vibrant green hydrogen industry in the United States, which is a critical step towards decarbonizing otherwise hard-to-decarbonize sectors of our economy. For Congress' goals to be realized, however, the implementation of the green hydrogen tax credit must be defined in such a way as to both i) encourage significant investment in the nascent green hydrogen industry, and ii) ensure that green hydrogen projects result in demonstrably low lifecycle GHG emissions.

In REsurety's opinion, the Proposed Rule correctly embraces the concept of Incrementality but errs in its sole reliance on the concepts of Deliverability and Time Matching for compliance. While Deliverability and Time Matching can, in certain circumstances, provide an important and useful method to ensure low lifecycle GHG emissions, in many other circumstances these two requirements will result in i) blocking low lifecycle GHG emissions

projects from being built, and ii) encouraging high lifecycle GHG emissions to be pursued.[1,2] As such, REsurety would reiterate the guidance that we and others previously proposed which is to allow for marginal carbon accounting (Carbon Matching), paired with Incrementality, to be allowed as an alternative compliance mechanism for the hydrogen tax credit.

Specific Points:

The realities of transmission congestion will limit the scalability of the green hydrogen industry and undermine the efficacy of Deliverability and Time Matching.

It has widely been acknowledged that the existence of material transmission congestion between the location of clean energy generation and the location of electrolyzer consumption of energy undermines the benefits of Time Matching.[3] The Proposed Rule attempts to address this limitation through the Deliverability requirement, which makes the assumption that transmission congestion is a material issue between grid regions (inter-regional transmission) but an immaterial issue within grid regions (intra-regional transmission). Unfortunately, as Time Matching advocates have long acknowledged, and as is demonstrable in publicly available data, actual transmission congestion rarely follows this simplified definition of Deliverability.[4,5] The resulting problem is twofold.

First, the current implementation of Deliverability will prevent the pairing of incremental generation with an electrolzyer across two different regions where sufficient transmission

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[1] A. Olson et al. Analysis of Hourly and Annual GHG Emissions. April 2023. https://www.ethree.com/e3-and-acore-publish-new-report-comparing-hourly-and-annual-ghg-emissions-accounting-and-associated-costs-for-clean-hydrogen/. See, specifically, "Optimal Match Scenario".

[2] REsurety, Emissions Implications for Clean Hydrogen Accounting Methods, July 2023. https://resurety.com/emissions-implications-for-clean-hydrogen-accounting-methods-white-paper-and-spreadsheet/. See, specifically, the pairing of a Houston-area Electrolyzer with transmission-constrained west Texas solar generation.

[3] W. Ricks, et al. Minimizing emissions from grid-based hydrogen production in the United States. January 2023. https://iopscience.iop.org/article/10.1088/1748-9326/acacb5. See specifically: "*clean resources subject to transmission constraints that prevent delivery of the procured energy cannot be relied on to eliminate emissions from hydrogen production.*"

[4] LBNL, Empirical Estimates of Transmission Value using Locational Marginal Prices, August 2022. https://emp.lbl.gov/publications/empirical-estimates-transmission. See slide 20, where it illustrates that that 2 of the top 5 and 10 of the top 30 congested transmission links (by value) are intra-regional.

[5] W. Ricks, et al. Minimizing emissions from grid-based hydrogen production in the United States. January 2023. https://iopscience.iop.org/article/10.1088/1748-9326/acacb5. See specifically: "*unlike the model system studied in this work, the real grid is not divided neatly in to well-connected zones with perfect internal deliverability, and transmission bottlenecks of varying severity exist at all spatial scales.*"

capacity already exists to enable deliverability of the power, which will result in blocking low lifecycle GHG projects from being built. This will not only reduce the scale of the green hydrogen industry overall, but it will also limit the ability to develop a robust clean hydrogen industry in regions where green hydrogen and clean energy generation facilities cannot be cost-effectively co-located.

Second, the current implementation of Deliverability will support the paring of incremental generation with an electrolyzer within a single grid region, but between which actual transmission congestion prevents true deliverability, which will result in high lifecycle GHG emissions despite the effort and cost of implementing Time Matching. This risk has been under-stated and under-valued to date. By way of specific illustration, in 2022 MISO stated that rea-time congestion costs within the MISO region reached a record $3.6 billion, nearly half of which was related specifically to wind power and resulted in average wind curtailments of 726 MW per hour during the year as a result of intra-regional transmission congestion.[6] Relatedly, using publicly available Locational Marginal Price and wind and solar generation data for 2022 REsurety determined that *the majority* of energy generated by wind and solar projects in ERCOT were generated during times when each clean energy project was experiencing material transmission congestion between its interconnection location and the Houston area, where electrolyzer development is expected.[7]

Carbon Matching, as an alternative compliance method, can achieve the same or greater confidence in low lifecycle GHG emissions without the physical and economic scalability limitations of Deliverability and Time Matching requirements.

As previously discussed and proposed by groups including RMI, REsurety and NYU School of Law Institute for Policy Integrity & WattTime, among others, Carbon Matching (also sometimes referred to as "Marginal Emissions Accounting" or "Emissions Matching") should be

[6] Potomac Economics, MISO 2022 State of the Market Report. https://www.potomaceconomics.com/wp-content/uploads/2023/06/2022-MISO-SOM_Report_Body-Final.pdf

[7] REsurety utilized hourly real-time Locational Marginal Price (LMPs) data for each of 229 individual wind and solar projects in ERCOT and defined "material congestion" as any hour when LMPs at each project's interconnection point differed from concurrent LMPs at the Houston Hub by more than 10%.

included as an alternative compliance method to Deliverability and Time Matching.[8,9,10] Carbon Matching refers to the a method of directly calculating the induced emissions by grid energy consumption and clean energy generation. As such, Carbon Matching ensures that measured lifecycle GHG emissions fall demonstrably below the levels required for hydrogen tax credit compliance, without having to rely upon matching in time and location as a "proxy" for matching in induced emissions. In addition to enabling increased confidence in the actual induced emissions caused by electrolyzer consumption and clean energy generation, Carbon Matching allows for greater flexibility in the time and location of such energy consumption and clean energy generation, which increases the number of projects that are physically and economically viable, resulting in accelerated growth of the U.S. green hydrogen industry.

It is worth noting here that some institutions have published the finding that true additionality only occurs when Hourly Matching and Deliverability are required in conjunction with Incrementality, and that such true additionality does not occur when Carbon Matching is utilized.[11] However, we encourage Treasury to recognize that this conclusion results only from a specific implementation of a capacity expansion model for which there is a lack of academic consensus, and the input and assumptions for which have been contradicted as being unrealistic, and non-reflective of actual market conditions.[12,13]

The data required for Carbon Matching exists today and is actively being utilized across the investment, procurement and operational commercial applications in the energy industry today.

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[8] Comments from RMI re: Notice 2022-58, submitted December 2, 2022. https://www.regulations.gov/comment/IRS-2022-0029-0111. See specifically the conclusion that Marginal Emissions Accounting would result in an outcome where *"Carbon emissions are fully offset. Hydrogen projects are encouraged to be built in areas with robust clean energy and curtailed renewables. New clean energy is built in dirtiest grids to offset marginal emissions most efficiently."*

[9] Comments from REsurety re: Notice 2022-58, submitted December 9, 2022. https://www.regulations.gov/comment/IRS-2022-0029-0187

[10] Comments from NYU School of Law Institute for Policy Integrity & WattTime re: Notice 2022-58, submitted December 2, 2022. https://www.regulations.gov/comment/IRS-2022-0029-0026

[11] Q. Xu, et al. System-level impacts of voluntary carbon-free electricity procurement strategies, Joule, February 2024. https://www.sciencedirect.com/science/article/pii/S2542435123004993

[12] O. Ruhnau et al. Flexible green hydrogen: The effect of relaxing simultaneity on project design, economics and power sector emissions, November 2023. https://www.sciencedirect.com/science/article/pii/S0301421523003488

[13] UtilityDive Opinion: Princeton's Zero Lab has it wrong on corporate renewable energy procurement and emissions. October 25, 2023. https://www.utilitydive.com/news/princetons-zero-lab-has-it-wrong-on-corporate-renewable-energy-procurement/696956/

While high quality marginal emissions data availability may have been a challenge in the past, it is no longer a challenge to implementing Carbon Matching. Today, high quality marginal emissions data with regional and sub-regional granularity is available for the entire United States by non-profit entities such as WattTime, and high-quality marginal emissions data at nodal granularity is available for the majority of the U.S., including all electrical nodes within ERCOT, PJM, MISO, SPP, NYISO, CAISO and ISONE.[14] This data is already available to end users free of charge for emissions impact accounting as well as to policy and academic institutions.[15] Beyond data availability, high quality marginal emissions data are already being commercially utilized for Carbon Matching and related carbon impact analysis in a wide range of commercial applications including investment impact analysis, corporate carbon accounting, REC pricing and energy storage emissions impact analysis.[16,17,18,19]

We appreciate the opportunity to respond to this request for comments on Section 45V credits and look forward to continuing engagement with Treasury on this issue.

Sincerely,

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[14] See https://watttime.org/data-science/data-signals/marginal-co2/ and https://watttime.org/docs-dev/coverage-map/

[15] See https://resurety.com/resurety-and-watttime-to-make-marginal-emissions-data-widely-available-to-support-more-impactful-climate-action/

[16] See https://press.spglobal.com/2023-09-18-S-P-Global-Commodity-Insights-to-Launch-First-of-Kind-Emissions-Adjusted-Price-Assessments-for-Renewable-Energy-Certificates-RECs

[17] See https://www.hasi.com/wp-content/uploads/2023/04/HASI-CarbonCount-2.0-White-Paper-April-2023.pdf

[18] See https://resurety.com/white-paper-charging-towards-zero/

[19] See https://resurety.com/wp-content/uploads/2022/04/REsurety_Akamai_Case_Study.pdf