



February 26, 2024

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Office of Chief Counsel (Passthroughs and Special Industries)  
CC:PA:LPD:PR (REG-117631-23)  
Room 5203  
Internal Revenue Service  
P.O. Box 7604  
Ben Franklin Station  
Washington, DC 20044

Re: Twelve Benefit Corporation Comments on the Notice of Proposed Rulemaking on the Section 45V Credit for Production of Clean Hydrogen

Dear Sir/Madam:

Twelve Benefit Corporation (Twelve) appreciates the opportunity to comment on the Internal Revenue Service's (IRS) December 26, 2023, proposed rule on the clean hydrogen production credit set forth in section 45V of the Internal Revenue Code,<sup>1</sup> which became part of the Code via section 13204 of Public Law 117-169, otherwise known as the Inflation Reduction Act of 2022 (IRA).<sup>2</sup>

As detailed below, our comments address the following main points:

- We largely support the definitions in proposed § 1.45V-1;
- Additional indicators of a hydrogen production facility's project readiness should be identified in the regulatory language for the Department of Energy's (DOE) emissions value request process;
- The proposed incrementality requirement for Energy Attribute Certificates (EACs) is unduly restrictive;
- With respect to temporal matching, the IRS should extend the proposed transition rule to allow annual matching until January 1, 2033, with grandfathering;
- The section 45V credit amount should be calculated on a kilogram-by-kilogram basis;
- With regard to deliverability, the IRS should respect current and future balancing authorities without exception and should establish a grandfathering rule;

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<sup>1</sup> Available at <https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf>.

<sup>2</sup> We previously commented on the section 45V tax credit in response to IRS Notice 2022-58. Our earlier comments are posted at [https://downloads.regulations.gov/IRS-2022-0029-0034/attachment\\_1.pdf](https://downloads.regulations.gov/IRS-2022-0029-0034/attachment_1.pdf).

- The IRS should ensure the regional definitions in the 45VH2-GREET Model mirror the proposed definition in section 1.45V-4(d)(2)(vi); and
- For renewable natural gas (RNG), avoided methane emissions should be considered and book-and-claim accounting should be allowed;

In addition, please note that we endorse the comments submitted by the Fuel Cell & Hydrogen Energy Association.

Before setting out our detailed comments in Part II below, we first provide background information on Twelve and our groundbreaking carbon transformation™ technology, as well as a brief overview of power-to-liquid (PtL) transportation fuels, sometimes referred to as electrofuels or e-fuels.

## I. Background

### A. *Twelve and Carbon Transformation*

Founded in 2015 and based in northern California, Twelve currently employs a staff of almost three hundred chemists, engineers, techno-economic experts, product developers, and other specialists, with the vast majority of our personnel working in one of our locations in the San Francisco Bay area. We are on a mission to eliminate global carbon dioxide (CO<sub>2</sub>) emissions and build a fossil-free future.

Our proprietary carbon transformation technology takes captured CO<sub>2</sub> and, using only water and renewable electricity, transforms it into synthesis gas (syngas), a combination of carbon monoxide and hydrogen. Once formed, the syngas is routed through an integrated Fischer-Tropsch reactor and then upgraded, ultimately resulting in our E-Jet® fuel – PtL sustainable aviation fuel (SAF) that meets the specifications in Annex A1 of ASTM International's D7566 Standard (*Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons*) – as well as our E-Naphtha™. We expect our E-Jet, which has been tested and validated under a grant from the U.S. Air Force,<sup>3</sup> to reduce lifecycle greenhouse gas (GHG) emissions by up to 90% in comparison to conventional, petroleum-based jet fuel.<sup>4</sup>

Last summer, we began constructing our first E-Jet plant in Moses Lake, Washington.<sup>5</sup> We selected Moses Lake in part because of the availability and abundance of low-carbon electricity in the state of Washington, including existing (especially hydropower) and new renewable

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<sup>3</sup> See <https://www.af.mil/News/Article-Display/Article/2819999/the-air-force-partners-with-twelve-proves-its-possible-to-make-jet-fuel-out-of/>.

<sup>4</sup> For more on Twelve and carbon transformation, our revolutionary electrochemical technology, please visit our website at [twelve.co](https://twelve.co).

<sup>5</sup> The Moses Lake AirPlant™ will have a water electrolyzer operating alongside our CO<sub>2</sub> electrolyzer, but in the future, we may produce the clean hydrogen that is needed for the syngas via an alternative hydrogen production pathway (e.g., one of the non-water electrolysis pathways included in the 45VH2-GREET Model), or we may opt to obtain the clean hydrogen from a supplier.

energy sources. Over the next few years, we intend to develop commercial-scale fuel production plants in various locations around the country, and to supply our E-Jet and E-Naphtha to the global airline and chemical industries and other customers.

### *B. PtL Fuels in General*

While technological approaches to the production of PtL fuels can vary, the common thread among all such fuels is the utilization of the same feedstocks: CO<sub>2</sub> that is either captured from an industrial source (e.g., an ethanol facility) or obtained from direct air capture; and a renewable source of electricity (e.g., solar, wind, hydropower) that is used to create clean hydrogen through the electrolysis of water (or perhaps through some other hydrogen production pathway). The national blueprint for transportation decarbonization, a multi-agency effort released by the federal government early last year, points out that PtL fuels represent “a viable pathway” to sustainable, low-carbon transportation fuels.<sup>6</sup> According to DOE, one of the federal agencies involved in that effort, PtL fuels “have dramatically smaller land, water, and [GHG] footprints compared to fossil fuels.”<sup>7</sup> Specifically in the context of the hard-to-abate aviation sector,<sup>8</sup> PtL SAF poses fewer land-related issues than most biomass-based SAF, is also advantageous from a water demand standpoint, and has been cited as “the only SAF technology that has the potential for unbounded production,”<sup>9</sup> an apt description given the ever-increasing amount of CO<sub>2</sub> in the Earth’s atmosphere. For its part, Airbus, the commercial aircraft manufacturer, has referred to PtL SAF as an “exciting option” for fueling airplanes, one that “will be necessary to meet [expected SAF] demand,”<sup>10</sup> while the International Energy Agency recently asserted that e-fuels “made from biogenic or air-captured CO<sub>2</sub> can potentially provide

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<sup>6</sup> *The U.S. National Blueprint for Transportation Decarbonization: A Joint Strategy to Transform Transportation*, at 55 (Jan. 2023), available at <https://www.energy.gov/sites/default/files/2023-01/the-us-national-blueprint-for-transportation-decarbonization.pdf>.

<sup>7</sup> DOE Bioenergy Technologies Office, “CO<sub>2</sub> Reduction and Upgrading for e-Fuels Consortium,” available at <https://www.energy.gov/eere/bioenergy/co2-reduction-and-upgrading-e-fuels-consortium>.

<sup>8</sup> As the Federal Aviation Administration (FAA) puts it, “decarbonization of the aviation sector is extremely challenging,” and SAF is “critical to the long-term decarbonization of aviation.” See FAA, *United States 2021 Aviation Climate Action Plan*, at 3, 21 (Nov. 2021), available at [https://www.faa.gov/sites/faa.gov/files/2021-11/Aviation\\_Climate\\_Action\\_Plan.pdf](https://www.faa.gov/sites/faa.gov/files/2021-11/Aviation_Climate_Action_Plan.pdf).

<sup>9</sup> Rhodium Group, “Sustainable Aviation Fuels: The Key to Decarbonizing Aviation” (Dec. 7, 2022), available at <https://rhg.com/research/sustainable-aviation-fuels/>; see also World Economic Forum, *Clean Skies for Tomorrow: Delivering on the Global Power-to-Liquid Ambition*, at 10 (May 2022) (referring to PtL SAF’s “high GHG reduction potential” compared to other types of SAF and indicating that the feedstocks “are theoretically unlimited”), available at [https://www3.weforum.org/docs/WEF\\_Clean\\_Skies\\_for\\_Tomorrow\\_Power\\_to\\_Liquid\\_Deep\\_Dive\\_2022.pdf](https://www3.weforum.org/docs/WEF_Clean_Skies_for_Tomorrow_Power_to_Liquid_Deep_Dive_2022.pdf).

<sup>10</sup> Airbus, “Power-to-Liquids, explained” (July 15, 2021), available at <https://www.airbus.com/en/newsroom/news/2021-07-power-to-liquids-explained>; “Sustainable aviation fuels: A new generation of reduced emissions fuels,” available at <https://www.airbus.com/en/sustainability/respecting-the-planet/decarbonisation/sustainable-aviation-fuels>.

full emissions reduction, making them the primary production pathway that is consistent with achieving [the global aviation sector’s goal of] net zero emissions by mid-century.”<sup>11</sup>

In short, clean hydrogen is a critical input for Twelve’s electrochemical technology and for the PtL fuels industry more generally.<sup>12</sup> The section 45V credit established by the IRA therefore will play an integral role in the development and growth of the nascent PtL industry, an industry that certainly is needed if we are to reach our national (and global) goal of net-zero GHG emissions by no later than 2050.<sup>13</sup>

## II. Twelve’s Comments on the IRS Proposal

With the above background in mind, our detailed comments on the IRS’ proposed rule follow.

### A. *We Largely Support the Definitions in Proposed § 1.45V-1*

Twelve expresses its support for virtually all of the definitions included in proposed section 1.45V-1. We are particularly supportive of the IRS defining “qualified clean hydrogen” in accordance with the statutory (i.e., section 45V(c)(2)) definition to mean any “hydrogen that is produced through a process that results in a lifecycle GHG emissions rate of not greater than 4 kilograms of CO<sub>2</sub>e per kilogram of hydrogen.”<sup>14</sup>

We are also supportive of “for sale or use” being defined to mean “for the primary purpose of making such hydrogen ready and available for sale or use.”<sup>15</sup> With respect to the sale or use attestation that must be included in the requisite verification report under proposed section 1.45V-5, we observe and appreciate that the IRS makes clear in both the preamble and the regulatory language that “[a] verifiable use can be made by the taxpayer,”<sup>16</sup> who is defined in proposed section 1.45V-1(b)(2) as the owner of the qualified clean hydrogen production facility and, hence, the qualified clean hydrogen producer. Similarly, we recognize that a verification

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<sup>11</sup> International Energy Agency, *The Role of E-Fuels in Decarbonising Transport*, at 10, 24 (Jan. 2024), available at <https://iea.blob.core.windows.net/assets/a24ed363-523f-421b-b34f-0df6a58b2e12/TheRoleofE-fuelsinDecarbonisingTransport.pdf>. The International Civil Aviation Organization (ICAO) established net-zero carbon emissions by 2050 as the long-term global aspirational goal for international aviation in October 2022. See ICAO Assembly Resolution A41-21, ¶ 7, available at [https://www.icao.int/environmental-protection/Documents/Assembly/Resolution\\_A41-21\\_Climate\\_change.pdf](https://www.icao.int/environmental-protection/Documents/Assembly/Resolution_A41-21_Climate_change.pdf).

<sup>12</sup> See DOE, “Clean Fuels & Products Shot™: Alternative Sources for Carbon-based Products,” available at <https://www.energy.gov/eere/clean-fuels-products-shottm-alternative-sources-carbon-based-products>.

<sup>13</sup> White House Executive Office of the President, *The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050* (Nov. 2021), available at <https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf>; United Nations, “Climate Action,” available at <https://www.un.org/en/climatechange/net-zero-coalition>.

<sup>14</sup> Proposed § 1.45V-1(a)(9)(i).

<sup>15</sup> Proposed § 1.45V-1(a)(9)(ii).

<sup>16</sup> 88 FR at 89234 (preamble); proposed § 1.45V-5(d)(2).

report is needed “[f]or each qualified clean hydrogen production facility for which a taxpayer claims a section 45V credit.”<sup>17</sup>

The IRS explains that “lifecycle GHG emissions include emissions only through the point of production (well-to-gate),” as determined under the 45VH2-GREET Model, and that the term “well-to-gate emissions” encompasses “emissions associated with feedstock growth, gathering, extraction, processing, and delivery to a hydrogen production facility,” as well as any “emissions associated with the hydrogen production process, inclusive of the electricity used . . . and any capture and sequestration of [CO<sub>2</sub>] generated by the hydrogen production facility.”<sup>18</sup> Nowhere in the proposed rule, though, does the IRS discuss the possibility of carbon capture and sequestration (CCS) where the carbon generated by the hydrogen production facility is captured and sequestered for purposes of enhanced oil recovery (CCS with EOR). Twelve maintains that a distinction needs to be drawn between CCS on the one hand and CCS with EOR on the other. We respectfully request that the IRS broaden the meaning of “well-to-gate emissions” in the final rule solely in the case of CCS with EOR.<sup>19</sup> In parallel, DOE should extend the well-to-gate system boundary in the 45VH2-GREET model for CCS with EOR so that the GHG emissions associated with the transport, refining, and end-product use of the recovered oil are also factored into the lifecycle GHG emissions analysis for the hydrogen produced at the hydrogen production facility.

*B. Additional Indicators of a Hydrogen Production Facility’s Project Readiness Should Be Identified in the Regulatory Language for the DOE Emissions Value Request Process*

Proposed section 1.45V-4(c)(5) stipulates that a hydrogen producer may not seek an emissions value from DOE unless a front-end engineering and design (FEED) study “or similar indication of project maturity, as determined by the DOE, such as project specification and cost estimation sufficient to inform a final investment decision [FID] has been completed for the hydrogen production facility.” In the corresponding preamble discussion, the IRS indicates that impending DOE guidance “will specify criteria the DOE intends to consider in evaluating whether a FEED study has been completed or that a similar indicator of project readiness has been achieved,”

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<sup>17</sup> 88 FR at 89233 (preamble); proposed § 1.45V-5(a). With respect to the lifecycle GHG emissions rate determination procedures in proposed section 1.45V-4, we note that subsection (b) provides in pertinent part that the emissions rate determination is made “separately for each hydrogen production facility the taxpayer owns.” We assume it does not matter if the determination for one facility is made under the latest version of 45VH2-GREET (i.e., proposed section 1.45V-4(b)), and for another facility for which the hydrogen production technology is not included in the latest version of 45VH2-GREET, under the provisional emissions rate process in proposed section 1.45V-4(c).

<sup>18</sup> Proposed § 1.45V-1(a)(8)(i), (iii); see also DOE, *Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2-GREET 2023*, at 6 (Dec. 2023).

<sup>19</sup> This can be done in section 1.45V-1(a)(8)(iii) by adding the following (or similar) language at the very end of the subsection: “In the case of any capture and sequestration where the captured carbon dioxide is sequestered as part of enhanced oil recovery, the term also includes the emissions associated with the transport and refining of the recovered oil as well as emissions associated with the use or combustion of any resulting end products.”

and the IRS solicits comments on “appropriate indicators of project readiness that should be in place” in advance of an applicant requesting an emissions value from DOE.<sup>20</sup>

Twelve firmly believes that a completed FEED study and documentation sufficient to inform FID should not be the only means by which an applicant may demonstrate a hydrogen production facility’s project maturity; additional indicators should be specified in the final regulations. Such additional indicators should include, at a minimum, completion of a feasibility study, completion of some other pre-FEED/pre-FEL-3 study, and an executed offtake agreement (e.g., a SAF offtake agreement between Twelve and an air carrier). All of these documents, on their own, should be deemed sufficient indicia of a hydrogen production facility’s project maturity for purposes of requesting an emissions value from DOE. As far as “standards against which these indicators could be measured,” much like a FEED study, the proffering by an applicant of a completed or executed document would provide a clear and straightforward measuring stick that can be easily administered by DOE.

### *C. The Proposed Incrementality Requirement for EACs Is Unduly Restrictive*

Twelve does not support the incrementality requirement as the IRS has proposed it. More specifically, we disagree with proposed section 1.45V-4(d)(3)(i)(A) and its stipulation – with no exceptions, exemptions, or special circumstances – that the electricity generation facility must have commenced commercial operations no earlier than 36 months before the hydrogen production facility was placed in service in order for an EAC to be a “qualifying EAC.” As the IRS clearly recognizes, this restriction would preclude a great many “existing minimal (that is, zero or near-zero) emissions power generation” sources,<sup>21</sup> including solar, wind, hydropower, and nuclear facilities that are already in operation across the country, from being able to contribute to section 45V-creditable qualified clean hydrogen production. The planned hydropower supply for Twelve’s Moses Lake, WA facility is just one such example.

With respect to the avoided retirements and demonstrated or modeled minimal-emission approaches discussed in the preamble, Twelve believes for the most part that the IRS correctly “recognize[s] the difficulty in reliably identifying the specific electricity generators and specific times and places in which the circumstances described in [those approaches] might occur.”<sup>22</sup> That said, it cannot be denied that the Pacific Northwest possesses “abundant renewable resources” such that a strong argument can be made for application of the demonstrated minimal-emission approach in that region,<sup>23</sup> and perhaps in certain other states (e.g., states with clean power mandates, renewable portfolio standards, or similar policies). Ultimately, we recommend that the IRS at least incorporate in the final rule a “formulaic approach” to existing renewable/clean energy generators, one “that would serve as proxy for all the pathways

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<sup>20</sup> 88 FR at 89226.

<sup>21</sup> 88 FR at 89230.

<sup>22</sup> 88 FR at 89231.

<sup>23</sup> White House, “Biden Administration Announces Regional Clean Hydrogen Hubs to Drive Clean Manufacturing and Jobs” (Oct. 13, 2023), available at <https://www.whitehouse.gov/briefing-room/statements-releases/2023/10/13/biden-harris-administration-announces-regional-clean-hydrogen-hubs-to-drive-clean-manufacturing-and-jobs/>.

described in the [avoided retirements and demonstrated or modeled minimal-emission discussions].”<sup>24</sup>

We support the percentage allowance approach in which a fixed percentage of the generation from minimal-emitting electricity generators placed in service before January 1, 2023, would be deemed as automatically meeting the incrementality requirement. Rather than five percent, though, we recommend that the IRS finalize the allowance level at 10 percent for the reasons the IRS itself points out, i.e., “data show that curtailment rates have increased in recent years and NREL’s Cambium model predicts additional increases going forward.”<sup>25</sup> The 10 percent allowance based on expected curtailments, moreover, should apply to existing minimal-emitting electricity generators throughout the country on a corporate fleet-wide level rather than on a facility-specific level.

In addition to incorporating in the final rule the 10 percent allowance approach, Twelve urges the IRS to establish a grandfathering rule for hydrogen production facilities that commence construction before January 1, 2027, with the rule exempting such early-mover facilities from the incrementality requirement altogether. It would be grossly unfair for these facilities, the development and even construction of which began after the IRA was signed into law but before the IRS issued its section 45V proposed rule, to be subject to requirements that did not exist when the facilities were being planned and constructed.

If the IRS is disinclined to do this, it should at the very least include a transitional period during which the EAC incrementality requirement would not apply until January 1, 2033. Such a phase-in would align section 45V credit’s incrementality requirement more closely with the European Union’s (EU) additionality condition under its detailed rules for assessing electricity used for the production of renewable liquid and gaseous transport fuels of non-biological origin (RFNBOs). Under the EU rules, RFNBO production facilities (including but not limited to renewable hydrogen plants) that begin operations before January 1, 2028, need not demonstrate the additionality of a renewable energy source (i.e., that that source came into operation no more than 36 months before the RFNBO production facility) until January 1, 2038.<sup>26</sup> Establishing closer alignment vis-à-vis incrementality with the EU’s RFNBO Delegated Act would constitute sound policy in that it would help to ensure that hydrogen producers in the U.S. – for example, the myriad producer/project participants in the seven regional clean hydrogen hubs announced by the White House and DOE last October<sup>27</sup> – move forward and build their planned production facilities domestically and do not alter their plans due to a more restrictive approach on

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<sup>24</sup> 88 FR at 89231.

<sup>25</sup> 88 FR at 89232.

<sup>26</sup> See Articles 5 and 11 of Commission Delegated Regulation (EU) 2023/1184 of 10 February 2023 (hereinafter, RFNBO Delegated Act), available at <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1184>.

<sup>27</sup> See White House, “Biden-Harris Administration Announces Regional Clean Hydrogen Hubs to Drive Clean Manufacturing and Jobs” (Oct. 13, 2023), available at <https://www.whitehouse.gov/briefing-room/statements-releases/2023/10/13/biden-harris-administration-announces-regional-clean-hydrogen-hubs-to-drive-clean-manufacturing-and-jobs/>; DOE, “Regional Clean Hydrogen Hubs Selections for Award Negotiations,” available at <https://www.energy.gov/oced/regional-clean-hydrogen-hubs-selections-award-negotiations>.

incrementality under section 45V than exists in Europe.

*D. With Respect to Temporal Matching, the IRS Should Extend the Proposed Transition Rule to Allow Annual Matching until January 1, 2033, with Grandfathering*

Proposed section 1.45V-4(d)(3)(ii)(B) sets out a transition rule that allows for annual matching of the electricity represented by an EAC and the hydrogen production facility's electricity usage, with the correlation between electricity generation and usage shifting to an hourly basis beginning on January 1, 2028. According to the IRS, "[t]his transition rule is intended to provide time for the EAC market to develop the hourly tracking capability necessary to verify compliance with [the hourly matching] requirement."<sup>28</sup>

While the IRS believes that the proposed duration of the transition rule (i.e., approximately four years) "would allow sufficient time for [EAC tracking] systems to develop hourly tracking mechanisms and for the associated trading markets to develop," it explicitly acknowledges "uncertainty in the timing of implementing an hourly matching requirement."<sup>29</sup> In light of this uncertainty, Twelve suggests that the transition rule be extended at least until January 1, 2033. This duration would be based on the maximum timeline for functionality development offered in the Center for Research Solutions survey cited in the preamble (i.e., five years) with an additional period applied to account for the "additional time for transactional structures and efficient hourly EAC markets to develop."<sup>30</sup>

Finally, similar to the incrementality requirement discussed above, Twelve urges the IRS to establish a grandfathering rule for hydrogen production facilities that commence construction before January 1, 2027. To incentivize the rapid deployment of hydrogen electrolyzers, such early-mover facilities should be allowed to use annual matching for the full 10-year credit period.

*E. The Credit Amount Should Be Calculated on a Kilogram-by-Kilogram Basis*

Proposed section 1.45V-4(a) would specify that the amount of the section 45V credit "is determined . . . according to the lifecycle GHG emissions rate of all hydrogen produced at a hydrogen production facility during the taxable year" (emphasis added). In view of this seemingly all-or-nothing proposition (and the hourly matching requirement in 2028), a hydrogen producer could find its tax credit amount reduced from \$3 per kilogram to \$1 per kilogram for all of the hydrogen produced at a facility during a particular year due, for example, to a slight

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<sup>28</sup> 88 FR at 89233.

<sup>29</sup> 88 FR at 89233. The IRS references DOE's 45V White Paper, which states that "[h]ourly tracking systems for EACs are not yet broadly available across the country and, while they are in effect or under development in some regions, widespread availability and functionality will take time . . . . Once the tracking software infrastructure is in place nationally, it may take additional time for transactional structures and efficient hourly EAC markets to develop." DOE, *Assessing Lifecycle Greenhouse Gas Emissions Associated with Electricity Use for the Section 45V Clean Hydrogen Production Tax Credit*, at 11-12 (2023), available at [https://www.energy.gov/sites/default/files/2023-12/Assessing\\_Lifecycle\\_Greenhouse\\_Gas\\_Emissions\\_Associated\\_with\\_Electricity\\_Use\\_for\\_the\\_Section\\_45V\\_Clean\\_Hydrogen\\_Production\\_Tax\\_Credit.pdf](https://www.energy.gov/sites/default/files/2023-12/Assessing_Lifecycle_Greenhouse_Gas_Emissions_Associated_with_Electricity_Use_for_the_Section_45V_Clean_Hydrogen_Production_Tax_Credit.pdf).

<sup>30</sup> 88 FR at 89233.



forecasting error or an inability to procure qualifying EACs for some period of time, that drops its overall hourly matching percentage from, say 97.1 percent to 97 percent (depending upon the grid mix). Given the novelty and inherent operational challenges associated with the real-time matching of hydrogen production to renewable electricity generation, such step changes in the tax credit present an undue risk to the developing clean hydrogen industry, and may prevent hydrogen producers from being able to attract the necessary capital because lenders are notoriously reluctant to finance so-called “cliff risks.”

Twelve proposes that the section 45V credit instead be determined on a kilogram-by-kilogram basis, using the lifecycle GHG emissions rate of the hydrogen produced at a hydrogen production facility each hour. Under the example above, if the hydrogen producer achieved (beginning in 2028) hourly matching for 97.1 percent of all the hydrogen produced during the taxable year, it would be able to claim the full tax credit of \$3/kilogram (assuming a lifecycle GHG emissions rate of less than 0.45 kilograms of CO<sub>2e</sub> per kilogram of hydrogen) for 97.1 percent of the hours (and potentially no tax credit for the remaining 2.9 percent of the hours). In this scenario, the producer would only be incrementally worse off if its hourly matching percentage drops from 97.1 to 97 percent. Determining the credit in this manner rather than on an annualized average basis would provide an adequate incentive for hydrogen developers to procure qualifying EACs, while simultaneously reducing the risk of suddenly losing a large portion of the section 45V credit.

Such a kilogram-by-kilogram approach would be consistent with the proportional approach taken in Europe. Under the EU’s RFNBO rules, fuel production facilities can make both non-renewable and renewable fuels on a percentage basis, depending upon compliance with the additionality, temporal correlation, and geographic correlation conditions.<sup>31</sup> Twelve requests that the IRS apply in the final rule this same concept of proportional award based on renewable electricity matching. Especially given the proposed hourly matching requirement for EACs, producers should be allowed to distinguish their clean hydrogen production between qualified and non-qualified amounts for purposes of the section 45V credit. They should not have to average the two amounts.

*F. With Regard to Deliverability, the IRS Should Respect Current and Future Balancing Authorities Without Exception and Should Establish a Grandfathering Rule*

The IRS’ approach to deliverability, providing that each balancing authority is located entirely within a single region, is a sound one. Since a balancing authority is responsible for ensuring the safe and reliable operation of the power system in a specific geographical area, this is a logical proxy for ensuring deliverability. Furthermore, it provides certainty to hydrogen producers and renewable electricity generators operating within the same Regional Transmission Organizations (RTOs) or Independent System Operators (ISOs) that they are also operating within the same region and, as a result, can take advantage of the existing robust wholesale electricity markets.

However, the IRS has made an unnecessary and unexplained exception for the Midcontinent Independent System Operator (MISO) balancing authority, which is split into two regions, Delta

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<sup>31</sup> See, e.g., Paragraph (5) and Article 8(c) of the RFNBO Delegated Act.

and Midwest.<sup>32</sup> There is no reason for this split, and by making this lone exception, the IRS appears to be imposing its own judgment of "interconnectedness" in place of the judgment of the system operator that manages the MISO balancing authority. This not only creates an artificial rift in a single wholesale market, but it also creates uncertainty for the fate of future balancing authorities that may develop in the West, which may not pass this currently unclear, additional test the IRS is imposing on MISO to determine whether a balancing authority's boundaries will be respected.

Twelve urges the IRS to provide greater predictability by respecting balancing authority boundaries when defining regions for purposes of the section 45V credit. This should apply to MISO in the final regulations, and to address the possible creation of future balancing authorities, the IRS should also clarify in the final rule that regional boundaries will be expanded in the future, as necessary, to ensure that no balancing authority is split across multiple regions.

In addition, similar to incrementality and temporal matching discussed above, Twelve urges the IRS to establish a grandfathering rule for hydrogen production facilities that commence construction before January 1, 2027. Such early-mover facilities should be exempt from the deliverability requirement altogether.

*G. On Emissions Associated with Regional Electricity Grids, the IRS Should Ensure the Regional Definitions in the GREET Model Mirror the Proposed Definition in Section 1.45V-4(d)(2)(vi)*

The IRS should require that the background data used in the 45VH2-GREET Model be amended to match the same level of granularity used for the deliverability requirement for EACs. Logic demands that the regional definitions should be identical. That is, the rationale for ensuring that a new renewable generation project is generating electricity in the same regional grid during the same hour to reduce the lifecycle GHG emissions of a hydrogen production facility implies that the effective emissions of hydrogen production without that renewable project should be measured by that same regional grid during that hour.

Currently, the 45VH2-GREET Model divides the United States, as shown in the map that appears on the H2\_User\_Inputs sheet of the model, into ten regions, which do not correspond to the regions identified in the DOE National Transmission Needs Study. Twelve believes the model's regional definitions should be revised to match the definition of "region" in proposed section 1.45V-4(d)(2)(vi) and thereby align with the DOE study and RTO control areas.

*H. For Renewable Natural Gas, Avoided Methane Emissions Should Be Considered and Book-and-Claim Accounting Should Be Allowed*

Although Twelve is primarily planning to source hydrogen from electrolysis, we are also exploring opportunities to source hydrogen from the reforming of RNG. The IRS should clarify in the final rule the approach to calculating the lifecycle GHG emissions rate of hydrogen produced from RNG and also whether book-and-claim accounting can be used for the RNG. Twelve maintains that since the reforming of methane into hydrogen can avoid methane emissions that

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<sup>32</sup> See DOE, *Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2-GREET 2023*, at 23-24 (Dec. 2023).

otherwise would have been emitted into the atmosphere, these avoided emissions should be factored into the lifecycle GHG emissions rate determination of the associated hydrogen. In addition, Twelve urges the IRS to allow book-and-claim accounting of the methane feedstock without geographic restrictions, albeit with appropriate safeguards to eliminate double counting. Allowing book-and-claim accounting for RNG would enable companies to utilize existing North American natural gas transportation infrastructure.

## *I. Other Comments*

### *1. Using Storage for Hourly Matching*

In the final rule, the IRS should provide guidance on how storage may be used to shift renewably generated power to enable hourly matching. Aligned with its rationale for regionality and hourly matching, the IRS should clarify that electricity storage, when charged in the same hour that a renewable project generates electricity on the same grid, may receive a transfer of the hourly EACs generated by that renewable project, and then may discharge that energy and transfer EACs with a new hourly stamp representing the time of discharge (and discounted by round-trip efficiency) to supply power to a hydrogen production facility. The EACs should be paired to a specific original renewable generator for the purposes of meeting the commercial operations date aspect of proposed section 1.45V-4(d). This clarification would ensure that storage is optimally sited for grid benefits, whether that is at the hydrogen production facility, at the renewable generation facility, or somewhere else entirely.

### *2. Comments on the 45VH2-GREET Model*

The IRS indicates in the proposed rule that the 45VH2-GREET Model will be updated over time, and that clean hydrogen qualification in a particular taxable year will depend upon the then-current version of the model.<sup>33</sup> This, however, will create significant financing challenges for hydrogen producers that need predictability and long-term certainty in quantifying the value of and deriving benefit from the section 45V credit. We therefore urge the IRS to provide hydrogen producers with the option under section 1.45V-4(b), for the full 10-year credit period, to rely upon the version of the model that was current at the time their final investment decision was reached, or to use the latest version of the model if they so prefer. This would enable project developers and their financing partners to move ahead with clean hydrogen production facilities with the knowledge that they are not dependent upon a framework that may be altered to their detriment in the future.

We also request the inclusion of the following electricity technology options in future versions of the 45VH2-GREET Model: (1) RNG; (2) RNG combined with CCS; and (3) biomass combustion combined with CCS.

### *3. Expansion of a Hydrogen Production Facility*

Finally, Twelve requests that the IRS provide clarification in the final rule of how proposed section 1.45V-6(b) would apply to an expansion of a qualified clean hydrogen production facility.

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<sup>33</sup> Proposed §§ 1.45V-1(a)(8)(ii), 1.45V-4(b).

We recognize that this provision states in relevant part that “[t]he 80/20 Rule applies to any existing facility, regardless of whether the facility previously produced qualified clean hydrogen and regardless of when the facility was originally placed in service (before application of this paragraph (b)).” Based on this language, our understanding is that a qualified clean hydrogen production facility that is placed in service on November 1, 2024, and then expanded three years later to produce still more qualified clean hydrogen, would be deemed to be originally placed in service on November 1, 2027 (assuming the requirements of the 80/20 Rule have been met), thereby enabling the section 45V credit to be claimed for the 10-year period running from that later date. We seek confirmation of our understanding, and also of the producer’s ability to continue to rely on EACs from renewable generation sources that began commercial operations within 36 months of the date the pre-expansion hydrogen facility came online (again, November 1, 2024). Neither example 4 nor example 5 in proposed section 1.45V-6(b) appears to address this scenario.

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In conclusion, Twelve appreciates the opportunity to comment, and commends the IRS for its efforts to implement this important incentive for low-carbon hydrogen production, which will do much to advance the nation's energy and environmental goals. We urge the IRS to consider our comments and recommendations, as articulated above. We firmly believe that our suggestions would enhance the clarity, flexibility, and effectiveness of the section 45V credit, and would encourage more investment and innovation in the hydrogen sector in the manner contemplated by Congress. We also wish to stress the importance of a broad and inclusive final rule that recognizes the diversity of hydrogen production pathways and technologies, while not imposing unnecessary or arbitrary restrictions on the eligibility of clean hydrogen projects, and on those industries that rely upon clean hydrogen as a feedstock. By adopting such a final rule, the IRS would accelerate the promise of addressing the threat of climate change by supporting Twelve's CO<sub>2</sub> transformation technology, which transforms waste CO<sub>2</sub> into valuable products such as sustainable aviation fuel and a host of other hydrocarbon-based products and materials (when combined with clean hydrogen). We look forward to working with the IRS and other stakeholders to ensure the successful implementation of the section 45V credit.

Thank you for your consideration of our comments. Please let me know if you have any questions.

Sincerely yours,

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