Clean Hydrogen Future Coalition

February 26, 2024

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Submitted via the Federal eRulemaking Portal at: www.regulations.gov

Re: Comments of the Clean Hydrogen Future Coalition (CHFC or the "Coalition") on the Notice of Proposed Rulemaking for the Section 45V Credit for the Production of Clean Hydrogen ("Proposal") (REG-117631-23)

Dear Assistant Secretary Batchelder and Deputy Commissioner O'Donnell:

The Clean Hydrogen Future Coalition was founded to bring together a diverse group of stakeholders to promote clean hydrogen as a critical pathway to achieve global decarbonization objectives. Reflective of the clean hydrogen supply chain, the CHFC represents a diverse group of energy companies, labor unions, utilities, NGOs, equipment suppliers, and project developers who are committed to the advancement of a net-zero CO_2 economy that is supported by infrastructure across the supply chain to fully scale clean hydrogen production and use.

CHFC members coalesce around the foundational principle that clean hydrogen is vital to transitioning several sectors of our economy to a low-carbon future and must be produced through a range of methods, whether produced from renewable and nuclear electricity, biomass, or fossil fuels combined with carbon capture, use and storage (CCUS). We support policy designs that stimulate the production and use of low-cost, clean hydrogen with a fully transparent lifecycle GHG accounting system applied consistently across the value chain. With the enactment of the Section 45V clean hydrogen production tax credit (PTC), production of clean hydrogen should grow over time. Additional incentives and supporting policies to expand the infrastructure to transport and distribute clean hydrogen, or to incentivize the use of clean hydrogen in various end use applications, will also be needed for clean hydrogen to play the role it must play in decarbonizing the economy for which it has a unique role.

The Clean Hydrogen Future Coalition developed its comments through the lens of the coalition's policy principles:

Federal policy must incentivize the creation of a clean hydrogen market. Clean hydrogen is a nascent industry and government support will be critical to create a clean hydrogen market. Federal policy should be designed to create a clean hydrogen market that can be sustainable and economic over the long-term. Policy should also recognize that all methods of clean hydrogen production will be necessary to cost-effectively create and scale an industry to enable clean hydrogen as a decarbonization solution.

Federal policies should incentivize the full value chain for clean hydrogen. Policies are necessary to scale the full value chain of hydrogen infrastructure so it can be used to decarbonize end use markets.

Federal policy must provide certainty for financial investment. Federal incentives should be designed to help first movers overcome investment risk, which is the most uncertain phase on the deployment curve for new energy technologies. Targeted incentives that provide certainty for financial investment in clean hydrogen infrastructure will reduce financial risk attract private sector investment and ensure that taxpayer dollars are used to achieve the results intended.

Incentives should be based on carbon dioxide intensity of the hydrogen being produced, distributed and utilized. Federal policy should promote a level playing field for all forms and uses of clean hydrogen, and a CO_2 intensity-based approach that includes a full lifecycle analysis of greenhouse gas emissions will ensure this outcome. Such an approach will also result in competitive and standardized pricing signals that will be needed for clean hydrogen to be appropriately valued in markets.

Policies should reflect the contributions of skilled labor and the use of existing infrastructure necessary to underwrite the clean energy transition. Any federal policy should recognize the value that skilled labor will bring to each sector of the clean hydrogen value chain and the contribution that the skills and proficiency of existing jobs will bring to a clean energy economy. Policies must also identify the important role that our infrastructure and existing assets can play in the deployment of clean hydrogen.

CHFC's detailed comments are centered on the below critical recommendations that must be addressed in final Treasury guidance and are presented in no order of priority:

(1) A taxpayer may use the most recent 45VH2 GREET model available at the time the taxpayer's project begins construction and use that model for the full ten-year tax credit claiming period. The taxpayer has the option to elect to use the most recent 45VH2-GREET model available during the ten-year tax credit claiming period.
(2) A taxpayer may use annual time-matching if the taxpayer's project commences construction before January 1, 2030 for the life of the tax credit claiming period.

(3) A taxpayer meets the clean electricity incrementality[1] requirements if the source of clean electricity used to power the hydrogen facility is operational (commercial operations date or "COD") within five years from the first taxable year the taxpayer claims the tax credit.
(4) The 45VH2-GREET model must be updated in the final rule to allow foreground inputs to account for the use of differentiated natural gas supplies.[2]
(5) Special rules for early projects: projects that are placed in-service by January 1, 2030 will have no incrementality requirements, six regions for deliverability, and annual time-matching of energy attribute certificates (EACs) for the ten-year credit claiming period.
(6) Any project, even if its feedstock and product technology is currently represented in 45VH2-GREET, can apply for a provisional emission rate (PER).
(7) Standard book-and-claim accounting principles must be used for renewable natural gas (RNG) and differentiated natural gas.
(8) Allow for a 10% curtailment of electricity from existing clean resources safe harbor to allow the curtailed electricity to meet the incrementality requirements.
(9) Create a process with DOE for taxpayers to provide information to establish that electricity from a minimal-emitting generator can be delivered to a hydrogen production facility in a different region. The facility can then use the emission rate associated with the EACs from that generator.

Below are the Clean Hydrogen Future Coalition's detailed comments in response to REG-117631-23.

1. Proposed Rule Will Not Achieve the Administration's Clean Hydrogen Objectives

Treasury's proposed guidance will not achieve the Administration's goals to enable clean hydrogen to be a climate mitigation tool for sectors of our economy that have no alternative option to reduce their GHG emissions. Treasury's proposal would require clean hydrogen producers to adhere to overly restrictive rules on time matching, incrementality, and regionality for the purchase of EACs to be eligible for the tax credit. As discussed in more detail in the comments that follow, these requirements will deter investment by driving up the costs of producing clean hydrogen – even with the use of the tax credit – causing clean hydrogen to remain uncompetitive with existing higher emitting fuels and feedstocks it must replace. The lack of investment will deter equally necessary supply chain investments in the equipment and infrastructure needed to reduce the costs of clean hydrogen production: electrolyzers, methane reforming and carbon capture and storage infrastructure. Without the opportunity to drive down costs through deployment, clean hydrogen will not become a meaningful part of the climate

[1] Incrementality refers to the Treasury requirement that a source of electricity for producing hydrogen represents an incremental source of electricity, such as electricity from an electricity generating facility that has a recent commercial operations date. The term incrementality is used in Treasury guidance in the same way the term "additionality" is often used that requires new sources of clean power generation to the power system to match demand increases from hydrogen production.
[2] The term differentiated gas used in these comments refers to natural gas that has been produced and distributed in a manner that minimizes the methane emissions from those sources of natural gas, which can include gas that has been independently verified by a third party to measure the CO_2 intensity of the product.

solution, putting our net-zero by 2050 goal in jeopardy. The guidance undermines the creation of a robust domestic clean hydrogen industry along with the Administration's promise of creating more good jobs from the clean energy transition.

A. Clean Hydrogen in the Administration's Greenhouse Gas Emission Reductions Objectives.

The Administration set a goal for clean hydrogen to deliver 50 percent of economy-wide greenhouse gas (GHG) emissions reductions from 2005 levels by 2030.[3] The U.S. National Clean Hydrogen Strategy and Roadmap (U.S. Strategy) indicates this will require 10 million metric tons (MMT) of annual clean hydrogen production and use at $1/kg by 2030. In comparison, the U.S. currently produces roughly 10 MMT of hydrogen annually, almost all from natural gas without CO_2 capture, and produces very small amounts of qualified clean hydrogen.

1) Gigawatt-scale deployment of electrolyzers and development of domestic supply chains needed between 2026-29.[4]

If produced only with electrolyzers, about 550,000 GWh of electricity powering 63 GW of electrolyzers will be needed to produce 10 MMT of clean hydrogen annually by 2030.[5] As of June 2023, a DOE report indicates there is current installed capacity of 0.067 GW of electrolyzers in the US, with 3.6 GW of capacity in planning or under construction.[6] Climbing from the currently planned 3.6 GW of electrolyzer capacity to the 63 GW of capacity – within the next 5 to 6 years – is no small feat. The ability to scale infrastructure of this magnitude in such a short period of time is unprecedented. By way of example, when the renewable electricity PTC was enacted in 1992, there was roughly 1.5 GW of installed wind capacity in the U.S.[7] It took ***twenty years*** (2012) to reach over 60 GW of installed wind capacity.[8] Under Treasury's Proposal, hydrogen industry growth will be dependent not only on the time needed to realize electrolyzer capacity installations, but also the time needed for the installation of new, zero emitting resources. According to DOE, if water electrolysis is the dominant production method, up to 200 GW of new clean energy sources would be needed by 2030 to support clean hydrogen production.[9] Today, we have only a negligible amount of qualified clean hydrogen produced with electrolyzers powered by minimal-emitting electricity and natural gas with CO_2 capture and storage (CCS), demonstrating that the scale up, whether from electrolyzers or hydrogen produced using CCS, will require a sustained and substantial financial investment as well as streamlined infrastructure buildout, to achieve those production volumes.

DOE's Commercial Liftoff report also indicates that low-cost clean hydrogen via electrolysis will depend on the availability of low-cost clean electricity (<$20/MWh) that will

[3] U.S. National Clean Hydrogen Strategy and Roadmap, June 2023.
[4] U.S. Department of Energy, "Pathways to Commercial Liftoff: Clean Hydrogen", March 2023
[5] Engineering calculations assuming electrolyzer efficiency of 55 kWh/kg H_2.
[6] DOE Hydrogen Program Record, Record: 23003, "Electrolyzer Installations in the United States", Originator: Vanessa Arjona, Approved by Sunita Satyapal (DOE), June 2, 2023.
[7] U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, "20% Wind Energy by 2030: Increasing Wind Energy's Contribution to U.S. Electricity Supply", July 2008, p. 5.
[8] U.S. DOE, Office of Energy Efficiency & Renewable Energy, "Land-Based Wind Market Report: 2023 Edition (energy.gov), p. 4.
[9] U.S. Department of Energy, "Pathways to Commercial Liftoff: Clean Hydrogen", March 2023, p. 1.

need to scale in parallel with market demand for clean hydrogen – and that, even with cost declines in clean hydrogen (DOE even states that this excludes the "PTC"), costs can only be reduced to $1.50–2/kg by 2035, and acknowledges these costs are higher than DOE's Hydrogen Shot target costs of $1/kg by 2031 which is deemed a stretch goal.[10] Requiring hourly time-matching or new sources of electricity to support clean hydrogen production will significantly drive up costs for clean electricity into ranges that will not deliver those cost targets and deter investment in clean hydrogen production projects. This will prevent the industry from meeting the Administration's stated cost and volume goals by 2030.

DOE has identified the availability of clean electricity as playing a critical role in the pace of growth of the clean hydrogen industry, and if electrolysis projects fail to scale during the IRA credit period, ***electrolysis may not achieve the necessary learning curves to remain competitive***.[11] However, Treasury's proposed hourly time-matching and incrementality requirements do not take into account the reality of the timelines required for new clean electricity resources to be developed and become operational, which is a minimum of five years. The most recent Lawrence Berkley National Laboratory (LBL) study assessing the state of the interconnection process indicates that the median duration from an interconnection request to commercial operations date for clean electricity sources continues to rise, reaching approximately five years for projects completed in 2022.[12] This does not include additional time needed for developing a project prior to applying for an interconnection agreement. LBL's analysis also indicates that the interconnection study duration has increased, exceeding three years in many regions, and projects larger than 20 MW have even longer development timelines.[13] Assuming an interconnection request date of February 2024, this means a clean electricity project would not become operational until February 2029, at the earliest, suggesting a fairly narrow window for new projects to start construction before the 45V credit expires in 2032. These timelines are not consistent with DOE's stated need of 200 MW of clean electricity resources being available by 2030 to produce 10 MMT of clean hydrogen annually.

Put simply, Treasury's Proposal does not take into consideration the long timelines for clean electricity resources to become operational in order to deliver sufficient, low-cost hourly or additional resources for clean hydrogen production. Given DOE acknowledges that ***the pace of clean electricity deployment will be a key driver of hydrogen production technology mix***,[14] and that the Administration has a goal of achieving 10 MMT of low cost clean hydrogen annually by 2030, the Proposal should be modified by extending the hourly matching transition date to 2030 and providing a minimum five-year incrementality requirement to enable the clean hydrogen industry to scale through the use of the 45V tax credit. This would incentivize early movers, attract investment, and enable the pace of scaling needed to achieve those targets.

[10] U.S. Department of Energy, "Pathways to Commercial Liftoff: Clean Hydrogen", March 2023, p. 2.
[11] Ibid., p. 3.
[12] U.S. Department of Energy, Lawrence Livermore Laboratory, "Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection | Electricity Markets and Policy Group (lbl.gov)", April 2023.
[13] Ibid.
[14] U.S. Department of Energy, "Pathways to Commercial Liftoff: Clean Hydrogen", March 2023.

2) DOE's stated industrial scaling requirements for clean hydrogen to achieve Administration's GHG reduction targets will not be met.

The U.S. Strategy indicates that clean hydrogen **must** be available at the $1/kg price and 10 MMT volume in order for it to contribute to the necessary GHG reductions in hard to abate sectors where only hydrogen can be used: industrial, heavy duty, aviation and marine transport, and long-term back up for the power sector.[15] DOE's Commercial Liftoff report identifies the availability of clean electricity and electrolyzer components as critical to support the pace of growth for electrolytic hydrogen, and failure to scale and achieve cost reductions during the IRA credit period will result in electrolysis not achieving the necessary learning curves to remain competitive in the absence of tax credits. Even with the 45V tax credit and other IRA tax credits for clean electricity deployment, DOE acknowledges that electrolyzer supply chains, CO_2 distribution and storage infrastructure, and a skilled hydrogen workforce will all face pressure to scale, and ***if not resolved earlier*** than DOE's projected "Expansion Phase" (~2023–2026), those growth challenges will be exacerbated.[16] To avoid these challenges and enable the growth of a clean hydrogen industry as contemplated by Congress, Treasury's final guidance should be modified by extending the hourly matching transition date and providing a minimum five-year incrementality requirement to enable the clean hydrogen industry to scale through the use of the 45V tax credit.

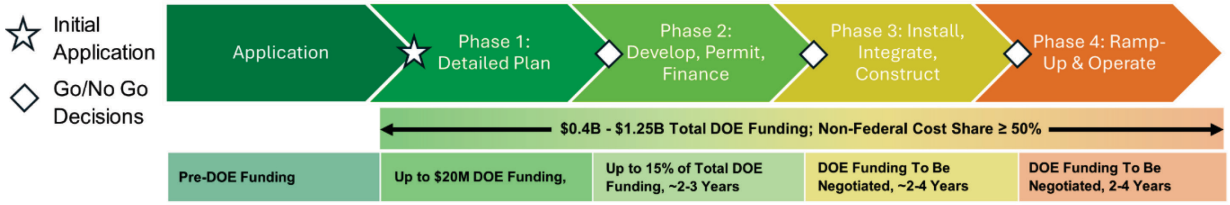
3) The Administration's proposal will have negative impacts on the Regional Clean Hydrogen Hubs.

The $8 billion Department of Energy Clean Hydrogen Hub program is intended to catalyze investment in hubs that demonstrate the production, processing, delivery, storage, and end-use of clean hydrogen.[17] DOE's funding opportunity announcement (FOA) indicates that the hubs selected under the FOA are a key part of the strategy to support the Administration's goal to achieve a carbon-free electric grid by 2035 and a net zero emissions economy by 2050.[18] Treasury's Proposal will not enable this outcome, as discussed in Section 1.A. of these comments, and will have negative impacts across the clean hydrogen supply chain.

DOE indicates that the seven selected hubs are projected to reduce 25 million metric tons of CO_2 emissions from end-uses each year and create tens of thousands of good-paying jobs. However, according to DOE's proposed hub phased timeline for funding and project execution, the absolute earliest date a hub would begin project operations would be 2031 (See Figure below).[19] This date is not in alignment with the January 1, 2028 date upon which Treasury would require hourly matching, rendering several projects within the hubs uneconomic and unable to proceed. In addition, several projects within the hubs would need to build new clean electricity resources to meet Treasury's proposed three-year incrementality requirements, making several

[15] U.S. National Clean Hydrogen Strategy and Roadmap, June 2023
[16] U.S. Department of Energy, "Pathways to Commercial Liftoff: Clean Hydrogen", March 2023
[17] U.S. Department of Energy, Office of Clean Energy Demonstrations, Funding Opportunity Announcement (FOA) Number: DE-FOA-0002779, FOA Type: Mod 000002 (Last Updated: 1/26/2023 04:06 PM ET), Executive Summary, p. 6.
[18] Id, p. 10
[19] Id, p. 19

clean hydrogen production projects that will form the anchor of these hubs at risk of not moving forward due to being uneconomic. In addition, the inability of the 45VH2-GREET model to account for upstream, lower-CI methane emissions puts some hub projects at risk of not being economic. For example, one project in the HyVelocity hub has indicated that it may not move forward due to this lack of foreground data being included in the 45VH2-GREET model.[20] The inability of projects within the hubs to move forward would likewise put achieving the Administration's GHG reduction goals at risk – undermining the ability of the hubs to serve the function to catalyze the clean hydrogen industry as contemplated by Congress.



B. The Administration's Guiding Principles for Enabling Clean Hydrogen to Achieve its GHG Reduction Goals Are Not Being Applied in the 45V Proposal.

The U.S. Strategy identified several "guiding principles" that the Administration deemed necessary for clean hydrogen to enable its targeted GHG emissions reductions. The principles are:[21]

a. Enable deep decarbonization through strategic, high-impact uses.
b. Catalyze innovation and investment.
c. Spur domestic manufacturing and robust supply chains.
d. Approach holistically.
e. Enable affordability and versatility.
f. Advance energy and environmental justice.
g. Foster diversity, equity, inclusion, and accessibility.
h. Grow quality jobs.

None of these guiding principles are facilitated by Treasury's Proposal. The requirements proposed in Treasury's guidance, particularly on time-matching and incrementality, will not lead to the level of investment needed for clean hydrogen to be cost-competitive and replace higher emitting incumbent fuels in end-uses. Without clean hydrogen offtake agreements to enable adoption of clean hydrogen in several end-use cases, there will be no signal to invest in domestic manufacturing necessary to enable the growth of robust supply chains. Treasury's guidance will result in clean hydrogen not being affordable due to its lack of versatility and investment certainty. And without a clean hydrogen industry, energy and environmental justice cannot be achieved, nor will quality jobs transition and grow.

[20] Osborne, James, "Exxon warns Baytown, other hydrogen projects unlikely under federal draft rules", Houston Chronicle, February 22, 2024.
[21] U.S. National Clean Hydrogen Strategy and Roadmap, June 2023.

2. Issues Impacting all Pathways for Producing Clean Hydrogen

A. Definition of Most Recent GREET Model.

The definition of "most recent GREET Model" in proposed regulation 1.45V-1(a)(8)(ii) does not provide the certainty that project developers will need to finance early-stage clean hydrogen projects. As these initial projects are being planned, the project developers will need certainty as to the level of CO_2 intensity that will be assigned to their pathway for producing clean hydrogen. That certainty can only be provided by giving the owner of the project an election to utilize either the 45VH2–GREET model in effect when the project begins construction or on the first day of the taxable year in which the clean hydrogen is placed in service. That election should be made on the tax return filed for the taxable year in which the project is placed in service. That CO_2 intensity level should apply to hydrogen produced in the facility during the ten-year credit window. For taxable years beginning after the project is placed in service, the owner of the clean hydrogen facility should have the option to elect to use the 45VH2–GREET in effect on the first day of the taxable year in which the hydrogen is produced or continue using the model originally elected for the first taxable year.

B. 45VH2–GREET is Different from Argonne's Standard H2GREET

The statutory language in Section 45V requires potential credit claimants to measure the lifecycle GHG emissions "well-to-gate" using the GREET model or a "successor" model. On the same day the proposed regulations were issued, DOE released a new 45VH2-GREET model that is referenced in Treasury's proposed regulations. It appears the 45VH2-GREET model makes no computational changes to the existing Hydrogen (H2) GREET pathways model but it overlays a user interface that dictates whether and the extent to which hydrogen producers can input project-specific data to the model. The new user interface limits the 45V model so that it can only test hydrogen using eight pathways (although the proposed regulations state that future versions of the 45VH2-GREET model may include additional hydrogen production pathways). The 45VH2–GREET model defined in the proposed regulations has significant changes as compared to the existing H2 GREET model designed to analyze the carbon intensity of existing hydrogen production. In the normal course of GREET model updates, Argonne provides the opportunity for interested stakeholders to review and provide comment on modifications to its draft models, including the standard H2 GREET model, and this review and comments process should be applied to the 45VH2 GREET model. In addition, the parameters in the 45VH2–Greet model should be consistent with requirements in the proposed regulations.

C. Regions and Associated Data

The Proposal defines region as the regions derived from the National Transmission Needs (Needs) Study that was released by the DOE on October 30, 2023. Alaska, Hawaii, and each U.S. territory will be treated as separate regions. There are thirteen regions identified in the continental U.S. in the Needs Study. The 45VH2-GREET 2023 model currently utilizes the NERC regions (six regions in the continental U.S.) for hydrogen production facilities to use for an associated grid emission rate for the use of grid power and uses the Needs Study regions for deliverability of specific sources of electricity. For the use of both specific sources of electricity and grid power, 45VH2-GREET requires the use of a transmission and distribution loss rate of

4.9%. This loss rate is far too high given the narrow regions (especially for the Needs Study regions) which avoid substantial transmission system losses. According to the Energy Information Administration (EIA), the average losses for the U.S. over the past five years is 5%[22]. EIA has data to more closely estimate the losses on a regional basis. Treasury should require the 45VH2-GREET model to adopt differentiated transmission and distribution loss rates and have a category for hydrogen production facilities that are co-located with their source of clean electricity.

D. Special Rules for Early Projects

The CHFC's members are committed to the advancement of a net-zero CO_2 economy that is supported by infrastructure across the supply chain to fully scale clean hydrogen production and use in the U.S. To realize this goal, Treasury should create special rules for a limited window of time to facilitate the development of a limited number of first-mover projects to deploy and thereby foster the necessary investments in infrastructure and markets to enable the creation of a domestic clean hydrogen industry.

CHFC recommends for projects that are placed in service within five years of the issuance of final rules (e.g., 1/1/2030), there will be no incrementality requirements for any new or existing clean electricity generator, deliverability requirements limited to within one of the six North American Electric Reliability Corporation regions, and a taxpayer will be able to use annual time-matching of EACs for the entire ten-year credit claiming period (as noted above). This time –window with special rules will allow a limited number of clean hydrogen production facilities, generally already under development, to be placed in service, demonstrate feasibility, and allow for necessary infrastructure, supply chains and markets to be developed. Any emissions associated with the limited pool of initial projects will be small and accelerate the ability of clean hydrogen to deliver emissions reductions in end-use sectors.[23]

E. Ability to Not Claim Tax Credit for All Hydrogen Produced in a Year

Section 1.45V(a)(8)(iii) "Emissions through the point of production (well-to-gate). The term emissions through the point of production (well-to-gate) means the aggregate lifecycle GHG emissions related to hydrogen produced at a hydrogen production facility during the taxable year through the point of production," states that the lifecycle analysis of emissions applies to all hydrogen produced at the facility. With documentation, taxpayers should be able to exclude certain hydrogen produced at the facility from the calculation of GHG emissions if the certain hydrogen produced is not receiving a tax credit. Equipment failure or loss of an expected electricity source may require a taxpayer to exclude specific amounts of hydrogen from the calculation to enable the balance of the hydrogen produced to qualify for the credit.

3. Issues Impacting Electrolytic Clean Hydrogen Production

The Proposal allows for the use of EACs generated within the same calendar year that the taxpayer's hydrogen production facility uses electricity to produce hydrogen until January 1, 2028; after that date, EACs must be generated in the same hour that the taxpayer's hydrogen

[22] U.S. Energy Information Administration, https://www.eia.gov/tools/faqs/faq.php?id=105&t=3
[23] Wilson Ricks et al. 2023 *Environ. Res. Lett.* 18 014025

production facility uses electricity to produce hydrogen. The Proposal offers no evidence that the date of January 1, 2028 is realistic. Additionally, Treasury notes significant uncertainty as to when a nationwide hourly system for tracking EACs may be available and notes that even when the tracking software infrastructure is in place, it will likely take additional time for efficient hourly EAC markets and transactional structures to develop. For these reasons, Treasury should be conservative in selecting the date for required hourly matching of EACs.

The CHFC believes that January 1, 2030 is the earliest date that a nationwide hourly EAC tracking system and its associated markets and structures could be available. This will likely be only five years after final rules are issued. Further, the CHFC believes that whatever temporal matching requirement (annual or hourly) is required when a project begins construction must remain in effect for the entire ten-year credit claiming period for a hydrogen production facility (i.e., allowing the EAC time-matching requirement in place at the begin-construction date for the duration of the tax credit claiming period).

The timeline for development of renewable energy projects to enable a robust EAC system is likely to increase beyond the current five to seven years as investment in the grid to interconnect these projects is not occurring quickly enough. A hydrogen production project will not be able to reach financial closure without having a high degree of certainty as to its sources of eligible zero-CO_2 emission electricity. One of CHFC's federal policy principles is to ensure federal incentives are designed to provide certainty for financial investment. Requiring a facility to comply with an hourly time-matching requirement at some point during its planned 45V credit claiming period effectively means it must secure hourly-matched EACs for that time to begin construction. As the Proposal notes, that is not currently possible. Adequate clean electricity resources to provide hourly EACs for hydrogen production have yet to be built. Also, the CHFC advises that Treasury must issue a public report on the status of the availability of a nationwide hourly EAC tracking system and its associated markets and structures at least twelve months prior to 1/1/2030 date. If the report finds that such a system, markets, and/or structures are not available nationwide, the date for required hourly EAC time-matching must be delayed by at least one year. When Treasury finds that the system, markets, and/or structures to enable hourly time-matching of EACs exist nationwide, the requirement for EAC hourly time-matching can begin one year later.

An additional important consideration is that the proposed transition date from annual to hourly time-matching of January 1, 2028 is not in alignment with the operational dates of the clean hydrogen hubs, as noted in our comments in Section 1.A.3.

EACs for electricity from minimal-emitting generators retired for use to comply with 45V program requirements should be allowed to also be used for compliance with other programs (e.g., state renewable portfolio standards).

A. Criteria for Energy Attribute Certificates

1) Incrementality

The members of CHFC continue to believe that incrementality is unnecessary and should be eliminated. All existing generators of clean electricity should be available to provide

electricity for clean hydrogen projects that qualify for the credit. If incrementality is not eliminated, the look-back period should be changed from 3 years to 5 years to provide more opportunities for existing clean electricity projects to provide energy for clean hydrogen projects. (Please see discussion regarding reasons that a 5-year period is appropriate in Section 1.A.1) on page 4.)

2) Deliverability

The Proposal requests comment on additional ways to establish deliverability of electricity from a minimal-emitting generating facility to a hydrogen production facility if they are not located within the same region or located outside the United States. CHFC agrees that a method(s) is needed for this purpose. Treasury should coordinate with DOE to establish a process for taxpayers to provide information to establish that the electricity from a minimal-emitting generating facility can be delivered to a hydrogen production facility in a different region. Given that these instances will be specific in nature, and given the existing framework, hydrogen production facilities can provide supporting documentation from the appropriate entities, such as the ISO, RTO, balancing authority, or energy attribute certificate (EAC) tracking system, to work with DOE and obtain a decision on deliverability and thereby use the emission rate associated with the EAC from that minimal-emitting generating facility outside of the proposed region.

3) Curtailment Safe Harbor

If incrementality is maintained, CHFC members support the Treasury proposal to provide a safe harbor for curtailment. We believe the safe harbor should be increased from 5% to 10% in order to address the growing level of curtailment of minimal-emitting electricity generators (for example, wind, solar, nuclear, and hydropower facilities) in many regions of the country. This safe harbor also raises several administrative issues that will need to be addressed.

First, what is the base for calculating the safe harbor? In order to provide certainty for project developers, they will need to know the amount of clean electricity from pre-look-back facilities that can be used in a qualifying EAC. We would suggest the safe-harbor percentage be applied to the three-year rolling average of electricity production from these electric generating facilities.

Second, for purposes of the EAC, how does the clean electricity producer determine the period in which the electricity is produced for purposes of any time matching rules? CHFC would suggest that the amount of curtailed electricity computed under this safe harbor be allocated evenly across any time matching period in effect for that year.

4. Issues for Fossil and Other Production Methods

A. Final Rule Must Allow Book and Claim Accounting for RNG and Differentiated Natural Gas

The following position on the use of book and claim of environmental attributes for the use of renewable natural gas[24] (RNG) to offset the carbon intensity of hydrogen production under both the Section 45V tax credit and the DOE's proposed CHPS represents the spirit of the CHFC's foundational principles to decarbonize the economy, and to remain technology neutral and focus on reducing CO_2 intensity across the supply chain. The use of lower-CI feedstocks such as RNG for existing hydrogen production should be encouraged to support the cost-effective and rapid deployment of clean hydrogen.

A taxpayer should be able to utilize indirect book accounting factors, i.e. connecting the production and consumption of the physical molecule using contracts and other documentation, to substantiate the use of the feedstocks and energy inputs that were included in the GREET model lifecycle analysis (LCA) of the clean hydrogen production process. An entity that holds environmental attributes tied to the RNG used to produce clean hydrogen should be required to retire the attributes for purposes of the Internal Revenue Code.

Allowance of market-based mechanisms using the GREET model to determine the LCA of the feedstock is consistent with legislative intent for section 45V, as articulated in a colloquy between Senator Wyden and Senator Carper:

> Mr. CARPER. "In section [45V], the term 'lifecycle greenhouse gas emissions' for a qualified hydrogen facility is determined by the aggregate quantity of greenhouse gas emissions through the point of production, as determined under the most recent Greenhouse gases, Regulated Emissions, and Energy use in Technologies—GREET—model. It is also my understanding of the intent of section [45V], is that in determining 'lifecycle greenhouse gas emissions' for this section, the Secretary shall recognize and incorporate indirect book accounting factors, also known as a book and claim system, that reduce effective greenhouse gas emissions, which includes, but is not limited to, renewable energy credits, renewable thermal credits, renewable identification numbers, or biogas credits. Is that the chairman's understanding as well?
>
> Mr. WYDEN. Yes." See Congressional Record, Aug. 6, 2022, p.4165.

Book and claim mechanisms are used today. The use of book and claim is also consistent with many state regimes, such as California's Low Carbon Fuel Standard (LCFS) system and is employed with strict record keeping requirements across the U.S. and internationally.[25] It is used in nearly all North American renewable gas procurement programs and is included in the Environmental Protection Agency's (EPA's) Renewable Fuel Standard (RFS).

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[24] CHFC uses the term renewable natural gas (RNG) interchangeably with all forms of biogas, defined as a gaseous fuel produced through fermentation or other processes using organic matter.

[25] See, e.g., CA LCFS: RESO 18-34 LCFS Attachment A, Final Reg Order (ca.gov).

The California LCFS program specifically allows that "RNG injected into the common carrier pipeline in North America (and thus comingled with fossil natural gas) can be reported as dispensed as bio-CNG, bio-LNG, or bio-L-CNG, or as an input to hydrogen production, without regards to physical traceability." CHFC notes its position is that RNG injected into a natural gas pipeline system (not a common carrier pipeline) meets that requirement. Additionally, RNG quantities injected into the pipeline must be substantiated in the pathway application and subsequent Annual Fuel Pathway Reports that link the environmental attributes of RNG with the corresponding quantities of natural gas withdrawn.[26]

1) Practical restrictions of book and claim accounting for RNG.

Treasury should provide for a practical book-and-claim accounting system under Section 45V, consistent with Congressional intent for implementation of the tax credit.

i. Deliverability/Physical Tracing

CHFC recommends that direct receipt of RNG to a clean hydrogen producer not be required to qualify for the credit, nor should book-and-claim accounting be combined with pipeline flow restrictions regarding physical traceability (as long as the RNG is injected into a commercial gas pipeline system). Limiting book-and-claim accounting based on the physical flow of pipelines is inconsistent with the contractual basis for claims of using RNG and should not affect the RNG use claim of the entity holding the environmental attributes. Lastly, environmental attributes associated with the RNG that is being used to produce clean hydrogen to comply with the Section 45V CO_2 intensity requirements should be allowed to be used for other programs such as the renewable fuels standard program or state-based programs.

RNG production facilities can be located throughout the country and may not be close to the site where the clean hydrogen will be produced. RNG can be distributed to the hydrogen production site through a gas pipeline system. Federal regulations allow entities to inject and withdraw RNG or natural gas anywhere on the system. Since the RNG can be both injected and stored in the gas pipeline network, book-and-claim accounting allows end users to contract for and receive credit for the RNG and its associated environmental attributes even if the end user does not physically receive the RNG to its facility. Although the reduction of emissions associated with the CO_2 intensity (CI) of the RNG may not be avoided directly at the hydrogen production facility, equal emissions are avoided throughout the gas pipeline system in the other end uses consuming the RNG. Book-and-claim accounting should be allowed so long as the environmental attributes of the RNG are not also being claimed by another party for the 45V tax-credit.

For example, a clean hydrogen producer located in Texas should be able to contract with an RNG producer in California to purchase the RNG and its associated environmental attributes for use in its clean hydrogen production process if the RNG is injected into the gas pipeline system. Even if it cannot be demonstrated that the RNG is delivered directly to the clean hydrogen producer in Texas, the purchase of the environmental attributes will demonstrate that the clean hydrogen is produced with the CI of the RNG (calculated using the GREET model

[26] California LCFS 95488.8 (i)(2)(A) and (B)

requirements). Again, the end result is that the introduction of the low CI RNG into the gas pipeline system results in the use of lower CI gas by a user on the system.

ii. Time Matching

Hourly time matching does not apply to the book-and-claim delivery of RNG, since RNG does not have to be used as it is produced to realize its environmental benefits and can also be stored over long periods of time and drawn on when needed. For record keeping purposes, CHFC proposes RNG's environmental attribute credits must be used within a year of the RNG injection into the gas system.

iii. Incrementality

The CHFC's position on incrementality is that it not be required, given the output from existing RNG projects is usually contracted for, so new users of RNG for clean hydrogen projects will likely have to find additional RNG supplies. In cases where a contract ends or there is no contract (for purchase of the RNG and for the environmental attributes associated with the source of RNG), RNG from existing sources should be allowed to participate in the 45V tax credit on the same basis as a new source.

B. The 45VH2-GREET 2023 Model is Inadequate.

The 45VH2-GREET model has too many parameters of hydrogen production processes locked down as fixed assumptions that may not be changed by the user (i.e., "background data"). The Proposal defines background data as parameters for which bespoke inputs from hydrogen producers are unlikely to be independently verifiable with high fidelity. The standard H2-GREET model allows for some of these parameters to be input by the user. One example is the distance of pipeline transmission, whether for natural gas or RNG derived from LFG; 45VH2-GREET 2023 mandates the national average length of the pipeline transmission, 680 miles, when this distance is easily verified when specific sources of gas are utilized for a production facility (e.g., LFG, or facility located near a gas processing facility).

Further, the 45VH2-GREET 2023 fixes the upstream methane leakage rates for the natural gas supply chain at 0.9% in background data. This is unacceptable. As DOE notes, methane emissions monitoring and mitigation is undergoing rapid change. Many hydrogen production facilities will have access to verified data that documents a methane leakage rate lower than 0.9% and must be able to input actual GHG emission rates. Differentiated natural gas must be able to use a different methane leakage rate. Being unable to do so limits the taxpayer's ability to accurately reflect and be rewarded for the lower CO_2 intensity of the hydrogen produced. Owners or operators of facilities that contain petroleum and natural gas systems and emit 25,000 metric tons or more of GHGs per year are required to report data to EPA's GHG Reduction Program (GHGRP) under Subpart W. The Inflation Reduction Act expanded Subpart W and required revisions to the program so that the reported data can be used to assess excess methane emissions under the Methane Emissions Reduction Program. Subpart W reporters calculate their GHG emissions using specific methodologies required by EPA. Reporting emissions under Subpart W of the EPA's GHGRP will provide data that will be adequate for determining upstream methane leakage rates for purposes of 45V. Given that there is now a fee

imposed on methane emissions that must be reported under EPA's GHGRP, this data should be sufficient to include in the calculation of the CO_2 intensity score. Taxpayers should have the option to use GHG emissions reported through EPA's GHGRP program, the default natural gas methane leakage rate, or supply data that is third-party verified to determine the upstream methane leakage rate to insert as foreground data input into 45VH2-GREET.

45VH2-GREET 2023 does not allow an input for the quantity of co-product steam to exceed 17.6% of the total energy content (LHV) of all steam and hydrogen produced. The amount of steam produced can be measured by meters to be verified, therefore the quantity of co-produced steam should be foreground (variable) data in the model. For methane reformer hydrogen production technologies utilizing carbon dioxide (CO_2) capture and sequestration (CCS), the model does not allow users to account for steam co-products because it assumes that excess steam would be used to power the CCS plant. DOE's Guidelines paper acknowledges that assumption is not correct for all pathways, but that the model cannot evaluate them at this time. The model also assumes the same energy/CO_2 emission penalties for any system utilizing CCS. That is clearly an incorrect assumption as there are different types of CCS systems with different efficiencies (e.g., cryogenic CO_2 capture processes have higher overall efficiency and negligible steam requirements when compared to amine-based systems).

45VH2-GREET is expected to be updated approximately annually and future versions are anticipated to include additional hydrogen production technology pathways not currently represented, as well as refined and updated estimates of background data, however this is not helpful to taxpayers who want to develop early hydrogen production facilities.

The Proposal allows DOE to decline to review a provisional emission rate (PER) application if the feedstock and hydrogen production technology are represented in 45VH2–GREET, even if the taxpayer disagrees with the underlying assumptions (that is, background data) or calculation approach used by the most recent 45VH2–GREET. To use the PER process, the hydrogen production pathway that the taxpayer is utilizing must either be consuming a feedstock that is not represented in 45VH2–GREET (e.g., a type of biomass that is not represented in the model) or using a hydrogen production technology that is not represented in 45VH2–GREET (e.g., pyrolysis). This must be changed. Any hydrogen production facility must be allowed to apply for, and receive, a PER in a timely manner from DOE. To do otherwise penalizes taxpayers who have made investments in differentiated sources of methane (natural gas) or more efficient processes than those assumed in 45VH2-GREET. Without a PER that provides for the CO_2 intensity of the hydrogen production pathway, those projects will not be built, further limiting the creation of a clean hydrogen industry. Taxpayers that invest in ways to create more efficient and lower CO_2 emitting processes should have their efforts recognized and the emissions reductions counted as part of the 45V process. In order for projects to proceed in a timely manner. DOE must issue a PER within 90 days of receiving a complete application for a PER. Once issued, the PER should not be subject to override by a subsequent update to the 45VH2-GREET model for reasons similar to the certainty needed for investment described earlier. The final allowable credit should be based on verifiable emissions intensity of hydrogen produced from the pathway acknowledged by the granted PER.

C. Timing to Apply for a PER

The Proposal states that taxpayers can apply for a PER after a FEED study is completed. Post-FEED study is too late in the process for a project to get a determination of what its likely PER will be. A completed FEED study requires substantial resources and the information necessary for DOE to calculate a PER is known earlier in the project development process. The information DOE should require for a PER application includes: design basis, energy balance, fuel specifications, project capacity, and hydrogen purity specifications.

5. Conclusion

The CHFC appreciates the work that the Treasury Department, IRS, DOE, Argonne National Laboratory, EPA and the Administration have put into the development of the 45V Proposal and the supporting analyses. Given members of CHFC are the forefront of the clean hydrogen industry – developing and investing in clean hydrogen projects – we hope you will consider the recommendations included in our comments. It is essential that Treasury's final rule address the concerns that CHFC's comments raise to enable clean hydrogen investment and project decisions, and to accelerate the ability of clean hydrogen to be an effective tool to mitigate GHG emissions.

Sincerely,

Shannon Angielski

Shannon Angielski, President
Clean Hydrogen Future Coalition