

## IRS Finalizes Hydrogen Tax Credit Regulations

*The final regulations adopt the general framework established in the proposed regulations issued in December 2023, but with several significant modifications.*

### Key Points:

- The final regulations modify the “three pillars” to include new pathways for incrementality, delay the implementation of the hourly temporal matching requirement to 2030, and clarify regional deliverability requirements.
- The final regulations establish a framework enabling the use of natural gas alternatives to reduce the carbon intensity of clean hydrogen.
- The Department of Energy released a new version of the 45VH2-GREET model.

### Overview of 45V Credit

On January 3, 2025, the Department of the Treasury and the IRS issued final regulations for the clean hydrogen tax credit (the 45V Credit).

The 45V Credit is a production-based federal income tax credit calculated according to the amount of qualifying hydrogen a taxpayer produces in the United States and sells or uses (either within or outside of the United States) during a 10-year period beginning on the date the hydrogen facility is placed in service. Both the production and sale or use must be verified by an accredited third party verifier.

The annual 45V Credit is determined by first multiplying the total kilograms (kgs) of qualifying hydrogen produced during the year by the applicable credit rate (\$0.60/kg, or \$3.00/kg if the facility began construction before January 29, 2023 or meets the prevailing wage and apprenticeship requirements), and then multiplying that number by an “applicable percentage” derived from the lifecycle greenhouse gas (GHG) emissions rate of the hydrogen production process. The lifecycle GHG emissions rate is generally determined under the latest publicly available version of the 45VH2-GREET model developed by Argonne National Laboratory and published by the Department of Energy (DOE), although taxpayers can seek a provisional emissions rate (PER) from the DOE if the relevant hydrogen production pathway is not reflected in the model.

As illustrated in the table below, processes resulting in a lifecycle GHG emissions rate of less than 0.45 kg of carbon dioxide equivalent (CO<sub>2</sub>e) per kg of hydrogen qualify for the full 45V credit rate, while

processes with emissions rates of between 0.45 kg and 4 kg CO<sub>2</sub>e per kg of hydrogen qualify for credits at a reduced rate.

Taxpayers can elect to claim an investment tax credit (ITC) instead of the 45V Credit worth up to 6% (or 30%, if the facility began construction before January 29, 2023 or meets the prevailing wage and apprenticeship requirements) of their eligible basis in the hydrogen production facility, subject to a similar downward adjustment for emission rates of between 0.45 kg and 4 kg CO<sub>2</sub>e per kg of hydrogen. The ITC is claimed 100% in the taxable year in which the hydrogen facility is placed in service.

The table below illustrates the lifecycle GHG emissions rates and corresponding 45V Credit and ITC amounts.

Lifecycle GHG Emissions Rate	45V Credit Percentage and Amount	ITC Credit Percentage
Greater than 4kg CO <sub>2</sub> e per 1kg of H <sub>2</sub>	0% – \$0	0%
2.5 kg – 4 kg	20% – \$0.12/kg or \$0.60/kg	1.2% or 6%
<2.5 kg – 1.5 kg	25% – \$0.15/kg or \$0.75/kg	1.5% or 7.5%
<1.5 kg – 0.45 kg	33.4% – \$0.20/kg or \$1.00/kg	2% or 10%
<0.45 kg	100% – \$0.60/kg or \$3.00/kg	6% or 30%

The 45V Credit and the ITC may be sold to a third party for cash. In addition, taxpayers may elect to receive the value of the 45V Credit as a tax refund for the first five years of the 10-year credit period.

### Modifications to the “Three Pillars”

The 2023 proposed regulations established that a taxpayer can only treat a hydrogen facility’s use of electricity as coming from a specific electric generating unit for purposes of determining the lifecycle GHG emissions rate if the taxpayer acquires and retires qualifying energy attribute certificates (EACs) for each unit of electricity claimed from the source. Electricity that is not tied to an EAC is deemed to come from the regional utility grid, even where that electricity is generated and delivered behind the meter. In other words, hydrogen facilities are still required to procure EACs from directly connected electricity generating units.

Qualifying EACs must satisfy a concept commonly referred to as the “three pillars.” Under the proposed regulations, this generally required that:

- the generating facility achieved its commercial operation date not more than 36 months before the hydrogen facility was placed in service (Incrementality);
- before January 1, 2028, the electricity represented by the EAC was generated in the same calendar year in which it was used and, on and after January 1, 2028, in the same hour (Temporal Matching); and
- the electric generating facility was in the same region as the hydrogen production facility (Deliverability).

The final regulations leave the three pillars framework intact, but make significant modifications to each of the requirements.

### **Incrementality**

The final regulations generally rejected the concept of exceptions to the Incrementality rule or an extension of the 36-month lookback period, but open three new pathways for qualification.

#### **First pathway**

The first new pathway is through the use of carbon capture technology, which should generally reduce emissions even in the presence of increased load due to hydrogen production. The final regulations clarify that electricity represented by an EAC from an older electric generating facility that is retrofitted with carbon capture equipment placed in service within 36 months of the hydrogen facility being placed in service now meets the Incrementality requirement. Notably, the carbon capture can be paired with both geologic sequestration and CO<sub>2</sub> utilization, but in both instances must meet 45Q requirements.

#### **Second pathway**

The second new pathway is through electricity produced by certain nuclear facilities. One of the major criticisms of the proposed regulations was that the Incrementality requirement effectively prohibited aging nuclear plants from participating in the hydrogen market as an electricity supplier. The final regulations change course by permitting certain nuclear reactors to act as a qualifying source of EACs even if they are more than 36 months older than the hydrogen facility. The nuclear reactor must satisfy a financial test and meet certain other requirements designed to identify those reactors most at risk of retirement and for which revenues from a hydrogen facility would materially contribute to continued operation. Only up to 200 megawatt hours of electricity per operating hour from each nuclear reactor may be treated as meeting the Incrementality rule unless the reactor is treated as having integrated operations with one or more other reactors. The cap is intended to ensure that the hydrogen producer's purchases of electricity do not extend beyond that needed to reduce retirement risk and do not unnecessarily divert the electricity from other uses on the grid.

#### **Third pathway**

The third new pathway is for electricity represented by an EAC in which both the electric generating facility and the hydrogen facility are located in a US state with both qualifying decarbonization standards (e.g., a zero-emissions retail sales target by 2050 or earlier) and a GHG cap program. The final regulations identify California and Washington as currently qualifying under this pathway. Additional states may qualify in the future, but multi-sector cap programs must adhere to a specified carbon allowance price floor and an emissions exceedance penalty floor designed to avoid induced power sector GHG emissions. The final regulations notably rejected the requests to extend this exemption beyond the Incrementality pillar to Temporal Matching and Deliverability, meaning that hydrogen facilities in California and Washington must still satisfy these pillars. The District of Columbia, the Commonwealth of Puerto Rico, Guam, the US Virgin Islands, American Samoa, and the Commonwealth of the Northern Mariana Islands are treated as states for purposes of the rule.

Although the modifications to the Incrementality requirement are not as extensive or flexible as some had hoped, the new pathways under the final regulations open new opportunities for carbon capture projects, nuclear plants, and electric generation projects in California and Washington to participate in the hydrogen market.

## Temporal Matching

One of the most heavily criticized aspects of the proposed regulations was the requirement to shift from annual EAC matching to hourly EAC matching beginning January 1, 2028, despite the lack of reliable tracking systems for hourly matching at the time the proposed regulations were issued. The final regulations delay the hourly matching requirement by two years, to 2030, to allow more time for the market to develop EAC tracking systems with the required functionality. Hourly matching will begin in 2030 regardless of when a hydrogen facility began construction or was placed in service.

## Deliverability

The final regulations retain the proposed regulations' framework for regional boundaries, and add a definitive table to further clarify the relevant regions. The regulations also clarify that an electric generating facility and a hydrogen facility are located in the same region if they are both interconnected to the balancing authority (or authorities) that are in the same region, regardless of geographic location. For example, a hydrogen facility interconnected to the East Kentucky Power Coop, Inc. balancing authority and an electric generation facility interconnected to the Ohio Valley Electric Corp. balancing authority meet the Deliverability requirement because the balancing authorities are each in the Mid-Atlantic region as reflected in the table. The final regulations also permit cross-region delivery in certain circumstances where there is adequate tracking and verification. The final regulations note that regions may change over time, but a safe harbor will be offered.

## Use of Low-Carbon Feedstocks

The proposed regulations did not specifically address the use of low-carbon gas feedstocks in the production of clean hydrogen, though the Treasury Department requested comments on the topic. The final regulations contain a detailed framework allowing taxpayers to utilize low-carbon feedstocks such as biogas, renewable natural gas (RNG), coal mine methane, and fugitive methane in the production of clean hydrogen.

The final regulations allow book and claim accounting for use of low-carbon, but will ultimately require development of an EAC-like framework that is suitable to track gas EACs. Such a framework can only be utilized to produce clean hydrogen once approved by the Secretary of the Treasury, and in no event before January 1, 2027. However, once adopted, gas-related EACs will be subject to a monthly balancing and a requirement that the gas is produced in the contiguous United States. The final regulations drop the "first productive use" requirement in the proposed regulations in favor of an alternative fate analysis that assesses the likelihood of alternative productive use.

The final regulations notably rejected venting as an alternative fate for all natural gas alternatives because it would not account for the prevalence of flaring and productive use. Instead, the following alternative fates are assigned to natural gas alternatives, with concomitant implications for primary feedstock carbon intensity: landfills — flaring; wastewater — flaring; coal mine methane — flaring; animal waste — specified carbon intensity score; and fugitive methane — productive use.

For animal waste, the final regulations select a carbon intensity score of -51 grams of CO<sub>2</sub>e per megajoule (MJ) (prior to both upgrading from biogas to RNG and compression), regardless of the type of animal manure and project design. This score overstates the carbon intensity of RNG produced from certain animal waste projects (e.g., dairy and swine manure anaerobic digesters).

This elevated score, combined with the inability to blend with fossil natural gas in a single "process," creates significant headwinds for certain RNG producers seeking feedstock supply agreements with

hydrogen facilities. The alternative fate assigned to fugitive methane renders its carbon intensity equivalent to that of fossil gas, eliminating an incentive for hydrogen producers to use fugitive methane as feedstock. The final regulations do not allow consideration of site-specific alternative fates and carbon intensity due to concerns about substantiation, verification, and the burden on federal resources (i.e., to review PER petitions).

## Updates and Modifications to the GREET Model

On January 15, 2025, the DOE released a new version of the 45VH2-GREET model with an accompanying user manual.

Taxpayers must generally use the GREET Model as of the end of each taxable year in which hydrogen is produced, which introduces some uncertainty, as projects will be exposed to changes in the GREET Model. The final regulations provide a safe harbor that allows a developer, by irrevocable election, to use the GREET Model in effect at the time construction began on the hydrogen production facility. The rule provides certainty to taxpayers that a viable pathway that existed when construction began will continue for the duration of the credit period.

The final regulations analyze the production of clean hydrogen on a process-by-process basis. The carbon intensity, and therefore the available tax credits, must be determined for each process, with one key result being that gas feedstocks with “significantly different attributes” (i.e., carbon intensities) cannot be blended to produce hydrogen with an overall qualifying carbon intensity. For example, if a steam methane reformer uses both RNG and fossil natural gas to produce hydrogen, then the natural gas-to-hydrogen pathway will be considered one process and the RNG-to-hydrogen a separate and distinct process — each with different lifecycle GHG emissions rates. However, the final regulations allow electricity with different carbon intensities to be blended to produce hydrogen with an overall qualifying carbon intensity because Treasury and DOE do not consider electricity to be a primary feedstock for hydrogen production.

The final regulations maintain upstream methane emissions rates as non-modifiable background data in 45VH2-GREET consistent with the proposed regulations. However, Treasury and DOE indicate that if data from updated GHG Reporting Program Subpart W reporting is available and verified, they will update 45VH2-GREET to allow use of differentiated methane emission rate reporting (i.e., unlocking use of responsibly sourced gas to lower lifecycle carbon intensity).

Where a hydrogen facility’s production pathway is not included in 45VH2-GREET — that is, if either the feedstock or the production technology is not included — taxpayers may file a petition for a PER. In addition, the final regulations clarify that a taxpayer who has developed a “novel variation” of a hydrogen production pathway included in 45VH2-GREET may use the PER process if their pathway does not meet the definitions of the feedstocks and technologies represented in the model.

## Other Clarifications

- **Hourly accounting:** Taxpayers can elect, beginning in 2030, to determine lifecycle GHG emissions associated with a hydrogen facility’s use of electricity on an hourly basis. This method is intended to mitigate the risk of qualifying EAC shortages (e.g., where EACs are not available to cover a full 24 hours of operation), which could potentially disqualify a greater amount of hydrogen if determined based on annual accounting. The new 45VH2-GREET user manual offers additional information on annual and “sub-annual” accounting.

- **Threshold project maturity to request DOE emissions value** (so as to conserve governmental resources expended to review PER petitions): Taxpayers only need a Class 3 front-end engineering and design (FEED) study to apply for an emissions value from the DOE. This reflects a middle-ground approach, as Class 3 studies can be conducted sooner and are less detailed than a Class 1 or Class 2 study, but reflect a more mature project than a Class 4 or Class 5.
- **Temporal matching for energy storage:** Electricity represented by an EAC will meet the hourly matching requirement that begins in 2030 if it is discharged from a storage system in the same hour the corresponding hydrogen facility uses electricity to produce hydrogen.

## Initial Reactions and Prospect of Congressional Review

A DOE report released on January 16, 2025, indicates that the cost of producing clean hydrogen has increased compared to 2023 estimates, due to higher electricity prices, installation expenses, and capital costs.<sup>1</sup> Tax credits, such as the 45V Credit, will be crucial in offsetting some or all of these cost increases. However, despite these rising cost pressures, reactions to the final regulations were mixed. Some in the hydrogen industry appreciated the increased flexibility compared to the proposed regulations, while others continued to call for broader qualification criteria. Several national environmental groups cautiously supported the final regulations for maintaining the three pillars of Incrementality, Temporal Matching, and Deliverability, though some expressed concerns about potential loopholes for certain producers.

Under the Trump administration, the executive branch could choose to accept the final regulations, initiate a new rulemaking process to amend them, or urge Congress to overturn them using the Congressional Review Act (CRA). The CRA allows Congress to nullify recent federal regulations within a 60-legislative-day window through a simple majority vote, bypassing the Senate filibuster. Although the CRA has only been used to overturn 20 rules since its enactment in 1996, it was employed to overturn 16 rules at the beginning of the first Trump administration in 2017.<sup>2</sup>

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#### Endnotes

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<sup>1</sup> <https://www.energy.gov/lpo/articles/us-department-energy-releases-updated-report-pathways-commercial-liftoff-clean>.

<sup>2</sup> The CRA has been used to overturn one rule in the 107th Congress (2001-02), 16 rules in the 115th Congress (2017-18), and three rules in the 117th Congress (2021-22).

[https://crsreports.congress.gov/product/pdf/IF/IF10023#:~:text=The%20CRA%20has%20been%20used,Congress%20\(2021%2D2022\)](https://crsreports.congress.gov/product/pdf/IF/IF10023#:~:text=The%20CRA%20has%20been%20used,Congress%20(2021%2D2022)).