



Final regulations on clean hydrogen production credit and related energy credit

Initial observations and analysis

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The U.S. Treasury Department and IRS on January 3, 2025, issued the highly anticipated [final regulations](#) (T.D. 10023) regarding the credit for the production of clean hydrogen under section 45V, and the associated energy credit under section 48(a)(15). Read [TaxNewsFlash](#)

The final regulations apply to tax years beginning after December 26, 2023, which is the date the proposed regulations were published in the Federal Register. For tax years beginning after December 31, 2022, and on or before December 26, 2023, taxpayers may choose to apply the final regulations so long as they are applied entirely and in a consistent manner. As provided in the initial report (read [TaxNewsFlash](#)) the final regulations provide rules for:

- Determining lifecycle greenhouse gas emissions (GHG) rates resulting from the hydrogen production processes
- Petitioning the IRS for a provisional emissions rate
- Verifying production and sale or use of qualified clean hydrogen
- Modifying or retrofitting existing hydrogen production facilities to obtain a new placed in-service date for purposes of the credit
- Using electricity from certain renewable zero-emissions sources to produce qualified clean hydrogen
- Irrevocably electing to treat part of a specified clean hydrogen production facility instead as property eligible for the energy credit

Treasury and IRS on December 22, 2023, released [proposed regulations](#) (REG-117631-23) regarding these rules. Approximately 30,000 comments were submitted in response to the proposed regulations. Read a [KPMG report](#) that provides initial observations and analysis on the proposed regulations.

Credit basics

The section 45V credit is a production tax credit (PTC) that is generally determined based on the amount of clean hydrogen produced during the 10-year period following the date the production facility is placed in service, and the emissions intensity of the process used to produce the hydrogen. To be eligible, the hydrogen produced must have 4 kg of CO₂e per kg of hydrogen produced or less, and the credit amount is higher when the hydrogen production process' emissions are lower. The maximum credit rate is \$3/kg of hydrogen produced.¹ In lieu of the clean hydrogen production tax credit, a taxpayer can elect to treat the facility (or a portion of the facility) as energy property under section 48. (The energy percentage would range from 1.2 to 6% base rate and 6 to 30% bonus rate depending on the type of clean hydrogen that is produced.)

Qualified hydrogen facility

As is the case with many credits provided in the IRA, the definition of a qualified facility is the starting point for certain requirements and determinations, including the applicability of the prevailing wage and apprenticeship rules to certain assets, interaction with other tax credits, as well as the determination of when the taxpayer has demonstrated that construction has begun on a facility.

The general definition of facility in the proposed regulations relied on the concept of “functional interdependence” by indicating that a single production line includes all components of property that function interdependently to produce qualified clean hydrogen. Several commenters expressed concerns about specific fact patterns where it was not clear whether certain assets would be included in the qualified

¹ The section 45V (or section 48 in lieu of section 45V) credit rates are subject to meeting the prevailing wage and apprenticeship requirements. A base credit rate is available if the requirements are not satisfied, and a 5x higher bonus credit rate is available if the requirements are satisfied.

facility, for example, instances with mixed-used facilities, or existing plants or utilities where hydrogen production equipment is later added, among other examples.

To ease the determination of what equipment is included, the final regulations add to this definition the phrase “through a process that results in the lifecycle GHG emissions rate used to determine the credit.” This addition to the definition attempts to clarify that all equipment used to produce the qualified clean hydrogen for which the section 45V credit is determined is included as part of the qualified clean hydrogen facility. Accordingly, the final regulations have updated the examples to reflect this change.

Additionally, the intent of the proposed rules was to exclude upstream feedstock production and recovery equipment, such as RNG production equipment, from the definition of facility. So, for clarity, the final regulations add “feedstock-related equipment, including production, purification, recovery, transportation, or transmission equipment” to the list of items excluded from the definition of facility.

KPMG observation

The definition of a qualified hydrogen facility, and what should be included within the boundaries thereof, should not be confused with the definition of what falls within the well-to-gate analysis for the purposes of calculating the greenhouse gas emissions (GHG) rate of the hydrogen produced. These two definitions are separate and distinct from one another, and the definition of a qualified facility for federal income tax purposes is a much narrower definition.

45VH2-GREET

The amount of the section 45V credit is determined based upon the lifecycle GHG emissions rate of all hydrogen produced at a qualified clean hydrogen production facility during the tax year. Accordingly, this determination is to be made following the close of each tax year to include all hydrogen production from the year.

As provided in the proposed regulations, and adopted in the final regulations, the lifecycle GHG emissions rate for the purposes of section 45V is determined under 45VH2-GREET, or the most recent 45VH2-GREET model. Shortly after the publication of the final regulations, a [new 45VH2-GREET model](#) was released.

Some commenters expressed concern that a changing 45VH2-GREET model would make it difficult to estimate credits for the duration of the credit period. Therefore, the final regulations provide flexibility to taxpayers by allowing the option to make an irrevocable election to use the version of the 45VH2-GREET model that was in effect on the date when construction of the hydrogen production facility began for the remaining tax years within the 10-year credit period. The preamble to the final regulations advises that taxpayer may look to existing begin construction notices applicable to section 45, 45Q and 48 for guidance on the beginning of construction for section 45V.

Energy attribute certificates (EACs)

The proposed regulations introduced, and the final regulations maintain that EACs (a form of which are renewable energy certificates (RECs)) may be considered in determining the emissions from purchased electricity for purposes of the section 45V credit, however guardrails apply. The final regulations maintain the three requirements (often referred to as the “three pillars”) for a qualifying EAC, similar to those adopted in the EU in its clean hydrogen regulations. This includes the adoption of incrementality, temporal matching, and deliverability requirements.

Notably, the final regulations do not create an exception from these qualifying EAC requirements for hydrogen facilities that have dedicated, co-located sources of clean electricity. The final regulations provide that the requirements are still necessary for co-located clean electricity sources because behind-the-meter sources could create induced emissions if such sources involve pre-existing generation that was grid-

connected or was used for a purpose other than hydrogen production. In these situations, such sources would result in induced emissions if they were diverted to hydrogen production.

While this still may prove challenging for hydrogen producers to satisfy while the industry catches up to these requirements, the final regulations differ from the proposed regulations by providing the following flexibilities for taxpayers:

Incrementality

Generally, this requires that the electricity-generating facility responsible for the electricity at a qualified hydrogen production facility must have a commercial operation date or an increase in rated nameplate capacity (uprate) of no more than three years before the relevant hydrogen production facility is placed in service.

The final regulations offer some flexibility in meeting this requirement, including the following:

- **Qualifying nuclear reactors:** Up to 200 megawatt hours (MWh) of electricity per operating hour from a "qualifying nuclear reactor" will be deemed incremental, irrespective of the reactor's age. A "qualifying nuclear reactor" is defined as a plant in an unregulated market or a single-unit plant that (a) has satisfied the section 45U credit financial test for any two years between 2017 and 2021, as determined for any one owner of the reactor; and (b) either (i) includes a behind-the-meter hydrogen production facility or (ii) possesses a 10-year enforceable offtake contract. An enforceable contract is one that is legally binding under state law against the taxpayer or a predecessor and does not restrict damages to a predetermined amount (e.g., through a liquidated damage clause).
- **CCS retrofit rule:** Electricity from a facility operational for over 36 months is considered incremental if the facility has carbon capture and sequestration equipment (CCS) qualifying under section 45Q (i.e., carbon is captured and stored securely in geological formations and used as described in section 45Q(f) and/or implementing regulations) that has been activated within the 36-month timeframe.
- **Qualifying states:** Taxpayers can treat electricity from facilities in a qualifying state as incremental. A qualifying state has a qualifying electricity decarbonization standard and a qualifying GHG cap program. A qualifying electricity decarbonization standard is one that (i) targets 100% clean retail electricity or equivalent GHG emissions by 2050 for the majority of eligible electricity supplied to the state and (ii) includes policies or requirements to achieve that target, such as a renewable portfolio or clean energy standard. A qualifying GHG cap program is a legally binding program with annual obligations and a declining cap over time, applying to the majority of in-state power sector emissions over 25,000 metric tons of CO₂e and associated imports, ensuring that (a) allowance prices in a state-run auction do not fall below \$25 per metric ton of CO₂e and (b) the GHG emissions cap cannot be exceeded for less than \$90 per metric ton of CO₂e (both amounts adjusted for inflation). The final regulations state that currently, only California and Washington meet these criteria.

Temporal matching

This requirement generally provides that taxpayers should align the clean hydrogen produced with the clean power that represents the generated EAC. The proposed regulations required hourly matching, with a transition rule based on annual matching until 2028. Treasury and the IRS extended this transition period to 2030, acknowledging the limited availability of hourly tracking. The final regulations permit the use of energy storage to adjust the temporal profile if (i) the electricity represented by an EAC is discharged from a storage system in the same hour the taxpayer's CHPF facility uses electricity for hydrogen production and (ii) the storage system is in the same region as both the CHPF and the electricity-generating facility.

Deliverability

This requires qualifying EACs to represent electricity that was produced by an electricity generating facility that is in the same region as the relevant hydrogen production facility. The proposed and final regulations define the term “region” to mean a United States region derived from the National Transmission Needs Study that was released by the DOE on October 30, 2023. To provide further clarification, the final regulations also provide a table of various authorities and their corresponding regions.

Electricity-generating source and CHPF are in the same region if both are electrically interconnected to a balancing authority (or authorities) in the same region, as identified in the table. Treasury and the IRS plan to update the table periodically, but no more than annually, through guidance published in the Internal Revenue Bulletin. The Final Regulations also include a special rule for cross-region deliveries, allowing an eligible EAC to meet the deliverability requirement when it can be tracked and verified, subject to additional conditions.

KPMG observation

Many industry participants were anxiously awaiting whether, and in what form, the so-called “Three Pillars” would maintain their structure. The additional flexibility afforded in the final regulations will hopefully allow for investments to move forward, and for the industry to have more time to create an infrastructure to track the requirements as provided.

Gas EACs

The proposed rules provided limited guidance addressing hydrogen production pathways that use renewable natural gas (RNG) or other fugitive sources of methane (for example, from coal mine operations) for purposes of the section 45V credit. The term RNG refers to biogas that has been upgraded to be equivalent in nature to fossil natural gas. Fugitive methane refers to the release of methane through, for example, equipment leaks, or venting during the extraction, processing, transformation, and delivery of fossil fuels to the point of final use, such as coal mine methane or coal bed methane.

The final regulations do contemplate and describe the use of “gas EACs” for purposes of determining the emissions associated with RNG feedstocks. These certificates represent the attributes of RNG or coal mine methane and must be acquired and retired in a qualified gas EAC registry or accounting system.

A gas EAC can be traded separately from the gas it represents and retired by its owner. An “eligible gas EAC” must be registered on one qualified system and provide specific information to evaluate RNG or coal mine methane attributes for lifecycle GHG emissions.

In the final regulations Treasury and the IRS state that it is anticipated that it will take about two years for electronic registries to develop systems that meet the requirements in the final regulations. These systems are expected to be ready no earlier than January 1, 2027. Once available, the Secretary will assess whether an existing system complies with the regulations. Until this determination is made, book-and-claim accounting for renewable natural gas and coal mine methane will not be allowed.

The final regulations provide further rules on how these “eligible gas EACs” will procedurally be tracked and meet the Three Pillars.

Provisional emissions rate

If the lifecycle GHG emissions rate of the hydrogen produced at a facility has not been determined by 45VH2-GREET then the taxpayer may use a provisional emissions rate (PER) as determined by the Secretary of Treasury. The initial version of 45VH2-GREET does not model every possible fuel as a

feedstock nor does it represent all hydrogen production technologies that are currently of commercial interest.

A taxpayer may not continue to use the PER process if its feedstock and hydrogen production technology are represented in a version of the 45VH2-GREET model, even if the taxpayer disagrees with the underlying assumptions or calculation approach used by the most recent 45VH2-GREET.

The final regulations provide that a taxpayer can, however, make an irrevocable election effective for the remaining credit period to "lock in" to the version of the 45VH2-GREET model that first included the taxpayer's production pathway.

The final regulations also provide a special rule which allows taxpayers to receive a provisional emissions rate before starting construction. A taxpayer can rely upon the provisional emissions rate for their entire credit period under the final rules. This special rule is limited to taxpayers who obtained an emissions value before the date when construction of their facility began because these taxpayers began construction in reliance on their PERs. Taxpayers who began construction before obtaining an emissions value did not do so in reliance on their PERs and therefore, as a temporal matter, did not need to lock-in their PERs in order to secure financing to begin construction.

Also, taxpayers can now submit a class 3 front-end engineering and design study as an indication of project maturity instead of a class 5 study, which means more taxpayers can apply for a provisional emissions rate sooner in their development process. The final regulations provide procedures for obtaining a PER process, which includes a requirement for taxpayers to request an emissions value from the Department of Energy (DOE).

Procedures for verification of qualified clean hydrogen production and sale or use

The final regulations largely adopt the rules in the proposed regulations relating to verification.

A verification report must be prepared by a qualified verifier, and the report must contain certain specified information regarding the production process and amounts, as well as information concerning the verifier's qualifications and conflicts of interest.

A qualified verifier means any individual with accreditation from the American National Standards Institute National Accreditation Board or as a verifier under the California Air Resources Board Low Carbon Fuel Standard program. If a transfer election has been made with respect to the 45V credit, then the attestation requirements must be made with respect to the qualified verifier's independence from both the eligible taxpayer and the transferee taxpayer. This will require taxpayers to identify who the credit will be sold to prior to determining the verifier.

Additionally, section 45V does not deny a credit if the hydrogen is sold or used outside of the United States or a United States territory.

Note that although the section 45V credit is determined with respect to the tax year in which the qualified clean hydrogen is produced, a taxpayer is not eligible to claim the section 45V credit with respect to the production of that hydrogen until all relevant verification requirements, and the verification itself, have been completed for both the production of the hydrogen and the sale or use of that hydrogen. Thus, if verification occurred after the extended return filing deadline for the tax year in which the hydrogen was produced, the taxpayer would need to file an amended return or administrative adjustment request (AAR) to claim the section 45V credit. Some commenters raised concerns about this timing, particularly in light of the requirement that section 6417 direct pay and section 6418 transfer elections are made on originally filed (with extensions) returns. The preamble to the final regulations acknowledges these commenters but note that in most cases the verification process can be completed in a timely manner.

It is also noted in the final regulations that it is required that a verification report must include any other information required by IRS forms or instructions.

Other rules

Anti-abuse rule

The section 45V credit is not allowable if the primary purpose of the production and sale or use of qualified clean hydrogen is to obtain the benefit of the section 45V credit in a manner that is wasteful, such as the production of qualified clean hydrogen that the taxpayer knows or has reason to know will be vented, flared, or used to produce hydrogen.

The final regulations provide the term “productive use” to illustrate this concept. “Productive use” means, with respect to a hydrogen gas stream, a consumption of the hydrogen gas stream in a manner that generates positive economic value, which is determined without regard to the availability of the section 45V credit.

Modifications and 80/20 retrofits

Section 45V(d)(4) provides that facilities that were placed in service pre-2023 and that did not produce clean hydrogen may be treated as newly placed in service if they are modified on January 1, 2023, or later to produce clean hydrogen and that capitalizable expenses were incurred in connection with such modification. The new placed-in-service date is the date the property required for the modification is placed in service. The final regulations confirm that there is no monetary threshold for meeting this requirement but reemphasize that there have to be capitalizable expenses, and that merely changing a fuel input is not a modification for this purpose.

In addition to the modification rule, the proposed regulations also provide that a retrofitted existing clean hydrogen facility may be considered newly placed in service and eligible for a new 10-year credit period, provided the fair market value of the used property is not more than 20% of the facility’s total value (the “80/20 rule”). The final regulations confirm the application of the 80/20 rule but further clarify that the 80/20 rule applies separately to each single production line.

Election to treat clean hydrogen production facility as energy property

Section 48(a)(15) allows a taxpayer that owns and places in service a specified clean hydrogen production facility to make an irrevocable election to claim the section 48 credit in lieu of the section 45V credit for any qualified property placed in service after December 31, 2022, that is part of the facility.

The taxpayer must obtain an annual verification report for the tax year in which the election is made and for each tax year thereafter of the recapture period (of five years).

In the event the facility produces qualified clean hydrogen through a process that results in a lifecycle GHG emissions rate greater than the lifecycle GHG emissions rate such facility was designed and expected to produce, resulting in a reduced energy percentage with respect to such facility, an emissions tier recapture event will occur.

An emissions tier recapture event occurs during any tax year of the recapture period if the taxpayer fails to obtain an annual verification report, the facility actually produced hydrogen through a process that results in a lifecycle GHG emissions rate that can only support a lower energy percentage than the energy percentage used to calculate the amount of the section 48 credit for the year in which the facility is placed in service, or the facility actually produced hydrogen through a process that results in a lifecycle GHG emissions rate of greater than 4 kilograms of CO₂e per kilogram of hydrogen.

The final regulations largely adopt the proposed regulations with respect to the election to claim an ITC under Section 48(a)(15), as there were many areas where there were no comments received by Treasury and IRS. The final regulations do, however, provide that a taxpayer may make an irrevocable election effective for the remaining tax years within the recapture period to treat the latest version of the 45VH2-GREET model available on the date when construction of the specified clean hydrogen production facility began, as the latest 45VH2-GREET model. To clarify, in the case of a facility that is modified to produce qualified clean hydrogen or a facility that is retrofitted in a manner that entitles the facility to a new placed in-service date under (under the 80/20 provisions), the date when construction of the facility began is the date when construction of such modification or retrofit began.

Conclusion

As mentioned earlier, these rules were highly anticipated by many in the clean hydrogen industry. They offer clarity and flexibility in several areas. While the "three-pillars" remain, the regulations provide a clearer path for clients to invest in projects, allowing them to factor these incentives into the project's economics.

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