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Treasury and IRS release proposed guidance on production of clean hydrogen

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On December 22, 2023, the U.S. Department of Treasury (Treasury) and the Internal Revenue Service (IRS) released the much anticipated [proposed regulations](#) regarding section 45V (clean hydrogen production tax credit) and section 48(a)(15) (clean hydrogen production facility energy credit) of the Internal Revenue Code (Code), as enacted by the Inflation Reduction Act of 2022 (IRA). Concurrently with the proposed regulations, the U.S. Department of Energy (DOE) released a [whitepaper](#) on assessing lifecycle greenhouse gas emissions associated with the use of electricity in hydrogen production.

Broadly, Section 45V permits taxpayers who produce qualified clean hydrogen to claim a tax credit (PTC) based on volumes produced. The taxpayer that “owns” the hydrogen production facility at the time the qualified clean hydrogen is produced is eligible to claim the associated PTC (e.g., in the case of a tolling arrangement, the taxpayer providing the tolling service will be eligible to claim the PTC). Section 48(a)(15) allows taxpayers to instead claim an investment tax credit (in lieu of the credit under Section 45V) for the cost of constructing a clean hydrogen production facility (ITC). The proposed regulations will impact taxpayers in each of these categories, and are proposed to apply also to taxpayers who generate electricity from specific renewable or zero-emissions sources that is used to produce qualified clean hydrogen.

The proposed regulations would adopt a relatively strict approach to qualifying for tax credits for clean hydrogen production and will assuredly generate continued debate among stakeholders. Comments on the proposed regulations are due by February 26, 2024, and a public hearing is scheduled for March 25, 2024.

This alert will focus on some of the major requirements for claiming the section 45V PTC in light of the proposed regulations. The requirements for electing and claiming the section 48 ITC with respect to a clean hydrogen production facility will be covered in a separate alert.

Section 45V PTC for the production of clean hydrogen

Section 45V of the Code is technology agnostic and provides a tax credit based on the lifecycle greenhouse gas (GHG) emissions rate of the hydrogen production process, which effectively means that the cleaner the hydrogen, the more credit the taxpayer can claim. Hydrogen producers can claim a PTC of up to US\$3 per kg of clean hydrogen produced during the 10-year period after a hydrogen generation facility is placed in service by meeting lifecycle greenhouse emissions requirements and complying with the prevailing wages and apprenticeship requirements. For each taxable year, the PTC amount will equal (i) the kgs of clean hydrogen produced by the taxpayer in such taxable year multiplied by (ii) the applicable percentage (see Table 1 below) of US\$ 0.60 (subject to an inflationary adjustment). In addition, if the prevailing wages and apprenticeship requirements are met, the PTC amount will be multiplied by 5x.

Table 1. Applicable Percentage

Tier	Lifecycle GHG Emissions Rate (kg of CO ₂ e/kg of H ₂)	Applicable Percentage of \$0.60 (%)	Compliance with section 45V(e)*	Available Tax Credit (US\$/kg of H ₂)
1	0 – 0.45	100%	Yes	\$3
2	0.45 – 1.5	33.4%	Yes	\$1
3	1.5 – 2.5	25%	Yes	\$0.75
4	2.5 – 4	20%	Yes	\$0.6

*prevailing wage and apprenticeship requirements for increased credit amount

Section 45V provides that a qualified clean hydrogen production facility must: (i) be owned by the taxpayer, (ii) produce qualified clean hydrogen, and (iii) commence construction before January 1, 2033. It does not specify the earliest date on which a qualified clean hydrogen production facility must begin construction or be placed in service to be eligible to claim the credit. We note that the credit is only available for qualified clean hydrogen produced after December 31, 2022. Thus, the owner of a qualified clean hydrogen production facility originally placed in service during the 10-year period before December 31, 2022 could claim the section 45V PTC during the portion of the 10-year period that falls after December 31, 2022, provided all other requirements are met. The proposed regulations include requirements around modification and retrofitting of existing facilities in order to qualify for the section 45V PTC and the impact on the placed in service date due to such modification or retrofit.

The section 45V PTC applies to only “qualified clean hydrogen.” To qualify (a) the hydrogen production process must have a greenhouse gas (GHG) emissions rate of no more than 4 kgs of carbon dioxide equivalent per kg of produced hydrogen (see Table 1 above), (b) the hydrogen must be produced in the U.S. or a U.S. territory and in the ordinary course of business of the claiming taxpayer, (c) the hydrogen must be for sale or use (hydrogen held in storage following production is not disqualified from being considered produced for sale or use) and (d) the production and sale or use of the hydrogen must be verified by an unrelated party. Importantly, the sale or use of the qualified clean hydrogen can occur outside of the U.S., meaning producers can export clean hydrogen and still claim a PTC. Notably, use of hydrogen to produce electricity that is then directly or indirectly used to produce more hydrogen or venting or flaring of hydrogen are not qualifying “uses” of hydrogen for the PTC. The proposed regulations include anti-abuse rules that would deny the availability of section 45V credits for hydrogen production undertaken for the purpose of exploiting 45V and not for productive use.

The regulations provide that the verification report must be signed and dated by the qualified verifier no later than (i) the due date, including extensions, of the Federal tax return for the taxable year during which the hydrogen undergoing verification is produced or (ii) in the case of a hydrogen credit first claimed on an amended return, the date on which the amended return is filed. Thus, while the 45V PTC is determined with respect to the qualified clean hydrogen produced during the applicable taxable year, the verification of the production and sale or use of such hydrogen may occur in a later taxable year, but verification must be completed within the timeframe for filing an amended return. The verification report will need to be attached to the taxpayer's Form 7210 (Clean Hydrogen Production Credit) and included with the taxpayer's Federal tax return for each qualified clean hydrogen production facility. This report must be prepared by a qualified verifier and be accompanied by a production attestation, sale and use attestation and conflict attestation from the qualified verifier.

Lifecycle Greenhouse Gas Emissions

The amount of 45V PTCs that a taxpayer can claim depends on the lifecycle GHG emissions rate of the hydrogen production process. This rate includes emissions only through the point of production (well-to-gate), which means the aggregate lifecycle GHG emissions related to hydrogen produced at a hydrogen production facility during the taxable year through the point of production. It covers emissions associated with feedstock growth, gathering, extraction, processing and delivery to a hydrogen production facility as well as emissions associated with the hydrogen production process (including electricity used by the production facility and any capture and sequestration of any carbon dioxide generated at the production facility).

The lifecycle GHG emissions rate is determined: (a) separately for each hydrogen production facility a taxpayer owns, (b) as of the close of each respective taxable year in which hydrogen production occurs and for the total hydrogen produced during such taxable year at the applicable facility, and (c) in accordance with the most recent 45VH2 GREET model (*see below*). If the lifecycle GHG emissions rate has not been determined using the most recent 45VH2 GREET model (i.e., hydrogen production pathway not included in most recent 45VH2 GREET model), the taxpayer can file a provisional emissions rate (PER) petition (*see below*) for a determination of the lifecycle GHG emissions rate with the Secretary of the Treasury and rely on such rate during applicable period until the lifecycle GHG emissions rate is determined under the most recent 45VH2 GREET model.

45VH2 GREET Model

45VH2-GREET model refers to the 2023 Argonne National Laboratory Greenhouse gases, Regulated Emissions, and Energy use in Technologies (GREET) model that was released by the DOE solely to determine emissions rates for section 45V PTCs, together with a [manual](#) for its use. Importantly, the emissions rate is calculated using the "most recent" 45VH2 GREET model, which is defined to mean the version of the model that is publicly available on the first day of the taxpayer's taxable year in which the hydrogen for which the PTC is claimed is produced (if a new version becomes available during an applicable taxable year, the taxpayer has the option to use the new model in its determination). This means that the method of calculating the emissions rate of a given hydrogen production facility can change over the 10-year period due to changes in new versions of the 45VH2 GREET model. This can create some uncertainty over the amount of PTC a hydrogen producer can claim over the 10 year period. The proposed regulations request comments on the method of determining the appropriate 45VH2 GREET model (e.g., if a new 45VH2 GREET model is released in the middle of a taxable year).

The current 45VH2 GREET model includes eight hydrogen production pathways: (1) steam methane reforming (SMR) of natural gas with carbon capture and sequestration (CCS), (2) autothermal reforming (ATR) of natural gas with CCS, (3) SMR of landfill gas with CCS, (4) ATR of landfill gas with CCS, (5) coal gasification with CCS, (6) biomass gasification with corn stover and logging residue with no significant market value with CCS, (7) low-temperature water electrolysis using electricity and (8) high temperature water electrolysis using electricity and potential heat from nuclear power plants. The proposed regulations acknowledge that this is not an exhaustive list of all hydrogen production technologies that are currently, or may be in the future, of commercial interest or commercially viable and that future versions of 45VH2 GREET model may include other hydrogen production pathways.

Certain parameters of the 45VH2 GREET model are fixed assumptions (i.e., background data), which cannot be changed by taxpayers. Items such as upstream methane loss rates and emissions associated with power generation from specific generator types will not vary based on input provided by the taxpayer for a given production facility due to difficulty in verifying such data. The Treasury and IRS are seeking comments on readiness of verification mechanisms that could see some of the fixed/background data be converted to foreground data (i.e. input from hydrogen producers that can vary project to project) in the future releases of 45VH2 GREET model.

Provisional Emissions Rate (PER) Petition

If a hydrogen producer is using a hydrogen production pathway that is not included in the most recent 45VH2 GREET model (e.g. consuming feedstock or utilizing hydrogen production technology), it can file a petition with the Secretary of the Treasury in order to obtain a PER. A petition may not be filed if the feedstock and hydrogen production technology are represented in the 45VH2 GREET model, even if the producer disagrees with the underlying assumptions, i.e. background data, or the calculation approach used in the model. To use the PER process, the hydrogen production pathway that the taxpayer is utilizing must either consume a feedstock that is not represented in 45VH2-GREET or use a hydrogen production technology that is not represented in the 45VH2-GREET.

To the extent a hydrogen producer's PER petition is pending and at such time its hydrogen production facility's pathway is included in an updated 45VH2 GREET model, its PER petition will be automatically denied. Once a PER is determined, it can be used by the taxpayer beginning with the first taxable year in which it was determined and for subsequent taxable years (during 10-year period) provided all other requirements continue to be met and until the lifecycle GHG emissions rate has been determined under the most recent 45VH2 GREET model.

Powering the Clean Hydrogen Production Facility

The power source for a hydrogen production facility will directly impact the lifecycle GHG emissions rate of the produced hydrogen and consequently the value of PTCs the hydrogen producer can claim owing to induced grid emissions. If the power source is co-located with the hydrogen production facility (e.g. if there is a wind or solar farm that is developed for the purpose of powering the hydrogen production facility), determining the emissions rate is straightforward. However, producers frequently purchase grid power (which may come from any source – renewables, natural gas, coal, nuclear, etc.) as well as renewable energy certificates (RECs). Generators of clean electricity can sell such power bundled or unbundled, meaning they can sell the power and its related environmental attributes together or separately.

The proposed regulations allow the use of RECs and other energy certificates (collectively referred to as “Energy Attribute Certificates” or “EACs”) in order to reduce the emissions impact of electricity used in hydrogen production for the purposes of claiming 45V PTCs, but only if three pillars or attributes are met: (i) incrementality, (ii) temporal matching and (iii) deliverability (*see below*). In addition, the EACs must be issued by a qualified EAC registry or accounting system and their acquisition and retirement must be recorded therein. The following EAC registries are currently qualified: ERCOT, MIRECS, M-RETS, NAR, NEPOOL-GIS, NYGATS, NC-RETS, PJM-GATS and WREGIS.

Attributes of EACs

The three main requirements of EACs, (i) incrementality, (ii) temporal matching, and (iii) deliverability, are meant to ensure that the increased use of electricity to power hydrogen production using electrolysis does not lead to increased grid GHG emissions, a potential real-world consequence of hydrogen production. These requirements function as guardrails to ensure that the electricity used by hydrogen producers reflects the emissions associated with the specific generators from which the EACs were purchased and retired.

- **Incrementality (or additionality):** the electricity generating facility to which an EAC relates must have begun commercial operations no more than 36 months before the hydrogen production facility for which such EAC is retired was placed in service. This attribute is supposed to ensure that hydrogen producers use new clean power and do not divert existing clean power towards hydrogen production. To the extent an existing electricity generating facility was upgraded (by increasing nameplate capacity) within 36 months before the hydrogen production facility was placed in service, only the incremental increased capacity can count towards the incrementality requirement. The Treasury and IRS are seeking comments on, among other things, whether the incrementality requirement can be satisfied with respect to an existing electricity generating facility if such facility is likely to avoid retirement because of its relationship with a hydrogen production facility (and this could be inclusive of nuclear plants).
- **Temporal matching:** electricity represented by an EAC must be generated in the same hour that the hydrogen production facility consumes electricity from the grid to produce hydrogen. However, the new regulations allow a transition period through December 31, 2027 during which time annual matching is acceptable. This means that until 2028, the electricity represented by a qualifying EAC can be generated in the same calendar year that the hydrogen production facility uses electricity to produce hydrogen. Thereafter, temporal matching will transition to hourly match. The hourly matching requirement is imposed two years earlier than under the [European rules](#), which mandate hourly matching from 2030.
- **Deliverability:** an EAC must represent electricity that was produced by an electricity generating facility that is in the same region as the relevant hydrogen production facility. Regions are derived from the [National Transmission Needs Study released by the DOE in October 2023](#) and are mapped to the actual balancing authorities. The location of the electricity generation source and the location of the hydrogen production facility will be based on the balancing authority to which it is electrically interconnected (and not its geographic location).

To qualify, an EAC must include the following information: (i) a description of the electricity generating facility, including the technology and feedstock used to generate the electricity; (ii) the amount and units of electricity; (iii) the date on which the facility that generated the electricity first began commercial operations; (iv) for electricity that is generated before January 1, 2028, the calendar year in which such electricity was generated; (v) for electricity that is generated after December 31, 2027, the date and hour in which such electricity was generated; and (vi) a unique project identification number or assigned identifier for each EAC that can be used to cross reference any additional electricity generating facility information that may be needed, such as location.

Conclusion

The US has adopted a stricter approach than Europe did earlier this year with respect to the supply-side incentives for the clean hydrogen industry. The opponents of this approach argue that this will lead to increased costs for the clean hydrogen producers and may delay getting the clean hydrogen industry to the scale necessary to play a significant role in the U.S. and global decarbonization goals. However, the proponents of the stricter approach argue points outlined in the DOE's recently released [whitepaper](#), which include that there is a strong likelihood that absent the three pillars hydrogen production using electrolysis would in many cases significantly increase induced grid GHG emissions.

The Treasury and IRS have sought comments on many issues within the proposed guidance and the comment period (ending on February 26, 2024) will surely generate vigorous debate among the stakeholders. In addition, the Treasury and IRS have indicated that future guidance will be released with respect to hydrogen production pathways using biogas and renewable natural gas.

We continue to review the proposed guidance and will be releasing further alerts covering other important aspects of the proposed guidance.

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If you have questions concerning the contents of this alert, or would like more information, please speak to your regular contact at Weil or to any of the following:

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