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IRS Leans “Green”: Much-Awaited Section 45V Guidance Creates New Opportunities for Hydrogen Markets

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On December 22, 2023, the Internal Revenue Service (IRS) published long-awaited proposed regulations for hydrogen tax credits under Internal Revenue Code (Code) Sections 45V and 48. The proposed regulations address many gating questions, including providing rules for determining lifecycle greenhouse gas (GHG) emissions rates resulting from hydrogen production processes and the introduction of qualified “energy attribute certificates” (EACs) to ensure feedstock electricity source eligibility. Of note, the proposed regulations adopt a stringent approach to feedstock electricity source eligibility, raising important considerations for hydrogen producers, developers and investors.

The proposed regulations also provide guidance on the verification of the production and sale or use of clean hydrogen, modifying or retrofitting existing hydrogen production facilities, electing the Section 48 investment tax credit in lieu of the Section 45V production tax credit, and the interaction between Section 45Q and Section 45V tax credits.

These regulations are proposed to apply to taxable years beginning after December 26, 2023. Taxpayers may generally rely on these proposed rules for taxable years beginning after December 31, 2022, and until the date the final regulations are published. The US Department of the Treasury and the IRS are accepting written comments on the proposed regulations until February 24, 2024.

In this article, we begin by sharing key takeaways from the proposed regulations as they apply to

taxpayers who are hydrogen producers, developers and investors. Then, we provide a brief overview of Section 45V and a high-level summary of the proposed regulations' substantive content.

IN DEPTH

KEY TAKEAWAYS FROM THE PROPOSED REGULATIONS

The proposed regulations provide a step forward in structuring eligible feedstock source criteria for the hydrogen production process. Yet, the regulations also display incompleteness as evidenced by the IRS's requests for comments across several material areas, providing time for taxpayers to interpret the rules and respond accordingly.

Despite the need to further flesh out the guidance, these current rules will impact the hydrogen and energy markets, which may require significant rethinking of the existing development and infrastructure of hydrogen energy production projects. **As such, we outline some key considerations for hydrogen producers, developers and investors alike:**

- The IRS has interpreted the statutory emissions requirements very conservatively. Many industry players were hoping for more flexibility regarding temporal matching and additionality. The IRS's preamble makes clear that it seeks to avoid inducing additional emissions-producing electricity through hydrogen production. Still, the IRS presented myriad questions and requests for comments where it is open to interpretive flexibility—presumably so long as it aligns with the policy against inducing emissions. While an initial review of the proposed regulations may be disappointing to some developers, a deeper read of the remaining unanswered questions suggests that the final regulations may be more favorable in some of the details.
- The proposed regulations do not provide any meaningful guidance on the emissions rate determination from hydrogen production pathways that may use renewable natural gas (RNG) or other fugitive sources of methane (such as from a coal mine). However, the proposed regulations' preamble states that the IRS anticipates that biogas or biogas-based RNG must originate from the first productive use of the relevant methane for purposes of Section 45V tax credit eligibility. Also in the preamble, the IRS presented a significant number of questions and comments regarding these feedstocks without incorporating them into the proposed regulations. Affected taxpayers, especially those who contemplate or utilize derivative uses of RNG, should carefully review their current positions and provide relevant comments to the IRS.
- The IRS is soliciting comments on the mechanisms used to verify emissions related to hydrogen production, specifically for fossil fuel-powered electricity generation with carbon capture and sequestration (CCS) and biomass-powered electricity generation. The IRS has delineated these types of electricity generating units as having highly variable or uncertain GHG emissions. Affected taxpayers should fully consider the requested comments and provide feedback as necessary.
- The three-pronged "pillars" test (discussed below) is arguably incomplete. Taxpayers should closely examine the three prongs, consider their many implications and seek to supply comments as necessary. Some notable considerations include the following:

    - The IRS seeks comments on how existing higher-emitting electricity generating facilities (pertinently, an existing fossil fuel electricity generating facility after the addition of CCS) that make upgrades to subsequently deliver minimal-emitting electricity can qualify under the incrementality prong and the modification requirement as a new clean power source. Affected taxpayers, especially those involved in the capture and sequestration of carbon dioxide emissions in the hydrogen production or reformation process, should take note and consider providing comments.
    - The incrementality prong would effectively ignore feedstock generation from *existing* clean power sources. The IRS seeks comments via three potential pathways[1] in which to properly consider such existing clean power sources for satisfaction of the incrementality prong. All three pathways concern avoiding the retirement or curtailment of existing clean power sources, with pertinent regards to nuclear generating facilities given the identified risk of nuclear fleet retirement. Affected taxpayers, especially nuclear producers, should carefully reassess their positions on asset retirements and infrastructure development in light of the proposed regulations and provide comments.
- The proposed definition of "facility" and guidance on the interaction between Section 45Q and Section 45V provide welcomed clarity. Taxpayers should review their positions with respect to potential claims of both the Section 45Q and Section 45V tax credits, especially as it pertains to co-located equipment.
- The proposed regulations would impose significant recordkeeping requirements, including verification and attestation mandates that would involve tracking raw emissions data in accordance with either the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model or the provisional emissions rate (PER) petition, tracing placed-in-service dates, substantiating the hourly matching method and documenting past credits claimed pursuant to Section 45Q, among other things.[2] Taxpayers should closely examine such requirements and structure their plans accordingly.

BACKGROUND: SECTION 45V CLEAN HYDROGEN PRODUCTION TAX CREDIT

With the enactment of the Inflation Reduction Act of 2022 (IRA) came the genesis of Code Section 45V. Section 45V provides a production tax credit for the production of "qualified clean hydrogen" during the 10-year period commencing on the date the qualified clean hydrogen facility is placed in service. The Section 45V tax credit is a four-tiered incentive credit offering up to $3 per kilogram of qualified clean hydrogen produced.[3] The credit rate is tied to the GHG emissions rate from the production of hydrogen and is most generous where the emissions rate is less than 0.45 kilograms of CO2e per kilogram of hydrogen, eventually phasing out when the emissions rate is greater than 4 kilograms of CO2e.

The allure of such a generous incentive, in conjunction with the unanswered questions and ambiguity surrounding Section 45V, has generated great controversy and debate since enactment of the IRA. For background, the production of energy from hydrogen requires another energy input (*i.e.*, a feedstock) to power the hydrogen energy production. The core of the tension lies in accounting for the feedstock electricity source used in the hydrogen production. How "green" must the feedstock source be? The market assumed the statute would not be interpreted to require on-site newly built renewable energy as the sole feedstock electricity source directly powering the hydrogen facility. Beyond that, there has been much discussion about, for instance, whether the tax credit would require "additionality" (*i.e.*, construction of new on- or off-site renewable energy generation facilities), geographic proximity between the hydrogen facility and the renewable energy facility, and/or time matching requirements between the energy used at the hydrogen facility and the energy generated at

the renewable energy facility. Without answers from the IRS, the domestic hydrogen development market has mostly been in a holding pattern. The IRS's approach to these questions was necessary for hydrogen developers and investors to determine prospective project economics to move forward with (or elect to abandon) hydrogen production in the United States.

Acknowledging the need for comprehensive guidance, the IRS's long-awaited proposed regulations aim to quell any ambiguity.

PROPOSED REGULATIONS: ADAPTING THE CLEAN HYDROGEN PRODUCTION TAX CREDIT RULES

Defining "Facility"

For purposes of Section 45V, the proposed regulations would define "facility" to mean a single production line that is used to produce qualified clean hydrogen, including all components of property that function interdependently to produce qualified clean hydrogen. "Facility" would not include equipment that is used to condition or transport hydrogen beyond the point of production, or electricity production equipment used to power the hydrogen production process.

"Facility" would also not include any carbon capture equipment associated with the *electricity production process*. Therefore, carbon capture equipment used in the hydrogen production process *that is not associated with* the electricity production process could be within the meaning of "facility" if such equipment was functionally interdependent with the hydrogen production equipment and results in net emissions from the "facility" within the permitted range.[4]

Determination of Emissions Rates: The GREET Model

The proposed regulations would require the determination of gas emissions rates, specifically lifecycle GHGs, in the hydrogen production process to be calculated in accordance with the most recent GREET model from the US Department of Energy's (DOE) Argonne National Laboratory. The GREET model only includes emissions associated with feedstock growth, gathering, extraction, processing and delivery to a hydrogen production facility. The model would also include any other emissions associated with the hydrogen production process, including electricity and any capture and sequestration of carbon dioxide used or generated by the hydrogen production facility (but not the capture and sequestration of carbon dioxide emissions from the electricity production process).[5]

The current GREET model incorporates eight hydrogen production pathways:

1. Steam methane reforming (SMR) of natural gas with potential CCS
2. Autothermal reforming (ATR) of natural gas with potential CCS
3. SMR of landfill gas with potential CCS
4. ATR of landfill gas with potential CCS
5. Coal gasification with potential CCS
6. Biomass gasification with corn stover and logging residue with no significant market value with potential CCS
7. Low-temperature water electrolysis using electricity
8. High-temperature water electrolysis using electricity and potential heat from nuclear power plants

For hydrogen production technology or feedstock not accounted for in the GREET model (such as

biomass feedstock or geologic hydrogen production), an alternative avenue is provided to allow the taxpayer to petition for a PER determination. The PER process is only available when the production technology or feedstock is not covered by the most recent GREET model and is not available solely where the taxpayer disagrees with the underlying assumptions (*i.e.*, background data) or calculation approach used in the GREET model.

Importantly, taxpayers would need to continually ensure that the most recent GREET model is used. If a version of the GREET model becomes publicly available after the first day of the taxable year of production (but still within such taxable year), the proposed regulations grant discretion to the taxpayer to select either version as the "most recent" model.

Eligible Feedstock Electricity Sources: The Three-Pronged "Pillars" Test

The proposed regulations would significantly limit the feedstock electricity source in the hydrogen production process to be from *new* renewable or low-emissions sources. This would be enforced through EACs, which essentially are tradeable instruments that certify that the associated unit of energy production meets the feedstock requirements of Section 45V.

An EAC would be defined to mean a tradeable contractual instrument that is issued through a qualified EAC registry and represents the energy attributes of a specific unit of energy produced. Pertinently, the proposed regulations provide that renewable energy certificates are forms of EACs. The proposed regulations also provide a non-exhaustive list of existing qualified EAC registries.

Because the EAC is tradeable, it may be acquired with or separately from the underlying energy it represents. The EAC would be retired by or on behalf of its owner in connection with the claiming of the underlying attributes represented by the EAC. In simplified terms, when energy is generated that meets the requirements of Section 45V and the proposed regulations, the associated EAC can be traded on a qualified EAC registry. Taxpayers producing hydrogen energy could buy and sell EACs and retire the EAC as appropriate when the underlying energy is intended to be applied toward the hydrogen production. Application of the EAC against the hydrogen production facility thus allows the facility to meet the relevant GHG emissions rate for purposes of establishing the relevant tax credit rate.

EACs must be "qualifying" to properly substantiate the feedstock electricity input in the hydrogen production process from renewable or other zero-emissions sources. A qualifying EAC must be verifiable by an unrelated "qualified verifier." The requirement would apply regardless of whether the electricity generating facility is grid connected, directly connected or co-located.

A qualifying EAC must meet the three-pronged "pillars" test of incrementality, temporal matching and deliverability. The IRS noted that these requirements are important guardrails to ensure that the hydrogen production energy usage reasonably reflects the related emissions. The IRS further noted that without these requirements, there is significant risk that hydrogen production would significantly increase induced grid emissions beyond the allowable levels required to qualify for the tax credits.

Incrementality

In a broad sense, incrementality for the purposes of the proposed regulations means that the feedstock source must be "*new* clean power."

Under this meaning, the incrementality prong would provide that the electricity generating facility

supplying electricity feedstock must be "*new*" or "uprated" with a commercial operations date no earlier than (and within) 36 months of the hydrogen production facility's placed-in-service date. An uprate essentially means an increase in the nameplate capacity so that the generation resulting from any clean power generator's newly added capacity would be considered new sources of clean power.

Notably, the incrementality prong would preclude powering hydrogen production from most *existing* electricity generating facilities, regardless of whether such facilities currently exist as renewable or "zero-emissions" sources. However, the IRS noted that it is requesting comments on whether electricity generated by existing facilities dedicated to hydrogen production may be treated as satisfying the incrementality requirement.

Temporal Matching

The temporal matching prong would require that the electricity input consumption be strictly matched to the hydrogen production output on an hourly basis (the hourly matching method).

The proposed regulations would provide a transitional phase-in approach to allow taxpayers to use annual matching for electricity generated before January 1, 2028.[6] For electricity generated after December 31, 2027, the taxpayer must use the hourly matching method. The purpose of the transition rule is to give the EAC market time to develop hourly tracking capability.

Deliverability

The deliverability prong would provide that the electricity generated by the electricity generating facility must be sourced in the same "region" as the hydrogen production facility. A "region" means a US region derived from the National Transmission Needs Study that was released by the DOE on October 30, 2023. For example, electricity sourced from a solar facility in California could not be directly applied to a hydrogen production facility in Louisiana.

Related to the three pillar requirements, the IRS is seeking comments related to minimal-emitting electricity generation that is used for hydrogen production, as well as input on highly variable emissions technology (fossil fuel-powered electricity generation with carbon capture equipment and biomass power electricity generation). The IRS is also seeking comments on how to treat upgraded energy generation equipment and on the addition of carbon capture equipment to existing facilities as it relates to the incrementality requirement. Finally, the IRS is requesting comments on circumstances where the diversion of existing clean emissions generating facilities to hydrogen production is unlikely to result in increased emissions. In short, the EAC requirement and the related three pillars are likely to be included in the final regulations but seem ripe for further clarification in future guidance.

"Sale" or "Use" of Hydrogen in the Ordinary Course of Trade or Business

The proposed regulations would provide that qualifying hydrogen must be produced in the ordinary course of trade or business of the taxpayer for the purposes of production and sale or use verifiable by an unrelated "qualified verifier." Sale or use would mean for the primary purpose of making ready and available for sale or use. Storage of hydrogen following production is expressly included in this meaning. The sale or use of the hydrogen can occur outside the US.

The Section 45V credit arises in the year of hydrogen production notwithstanding that the sale or use, or verification of the sale or use, may occur in a later tax year. However, the credit may only

be *claimed* on a tax return upon satisfaction of all verification requirements for the hydrogen production and subsequent sale or use, among other requirements.

The various verification requirements are comprehensively laid out in the proposed regulations and generally would need to be made under penalties of perjury. The verifier cannot have received a fee based on the value of the tax credits nor be related to the hydrogen producer or otherwise connected to the surrounding transactions.

Placed-in-Service Date for Existing Facilities That Are "Modified" or "Retrofitted"

The proposed regulations would provide possibilities to "adjust" the placed-in-service date for certain existing facilities.

An existing facility originally placed in service before January 1, 2023, but modified to enable the production of qualified clean hydrogen (among other stipulated requirements), will be deemed to have a placed-in-service date on the date the property required to complete the modification is placed in service.

Explicitly excluded from the meaning of facility modification, however, is the mere changing of fuel inputs to the hydrogen production process, such as switching from conventional natural gas to RNG.

Similarly, retrofits to existing property may also establish an adjusted placed-in-service date as of the date on which the new property added to the facility is placed in service, provided that the fair market value of the used property is not more than 20% of the retrofitted facility's total value (*i.e.*, the established 80/20 test).

Section 48 Investment Tax Credit Election

The proposed regulations provide guidance on the election to take the Section 48 investment tax credit for hydrogen in lieu of the Section 45V production tax credit. For taxpayers that are partnerships, the proposed regulations require that the election be made at the partnership level.

The Section 48 credit is subject to potential recapture for a five-year period. For purposes of the energy percentage used to calculate the Section 48 credit, the proposed regulations would introduce the specific term "designed and reasonably expected to produce" qualified clean hydrogen. In essence, the specified clean hydrogen production facility must produce clean hydrogen through a process that results in the lifecycle GHG emissions rate specified in the annual verification report for the applicable tax year. If actual emissions would push the facility into a different emissions threshold (and correspondingly lower the credit rate), this is a recapture event.

Accordingly, failure to properly obtain and submit an annual verification report or breach certain emissions rate requirements may result in the recapture of the Section 48 credit.[7] Recapture, however, appears to be limited to 20% of the difference between the credit actually claimed and that which would have been available based on actual emissions.

Stacking Section 45Q and Section 45V Tax Credits

The proposed regulations follow the statutory prohibition on the stacking of the Section 45Q and Section 45V credits. This means for any Section 45Q credit taken by the taxpayer, no Section 45V credit is allowed regarding claims on the same facility, and vice versa.

With respect to carbon capture equipment that may be located on the hydrogen production facility, the proposed regulations would provide that a taxpayer could perceivably claim a Section 45V credit on such equipment so long as the equipment is (i) a retrofitted carbon capture equipment deemed to be an "independently functioning process train"[8] satisfying the 80/20 rule under Treasury Regulation § 1.45Q-2(g)(5), and (ii) no new Section 45Q credit has been allowed or claimed for such carbon capture equipment.

Anti-Abuse Provision

The proposed regulations embody a view that the purpose of Section 45V is to provide taxpayers an incentive to produce qualified clean hydrogen for a productive use. In accordance with this view, the proposed regulations would prohibit the Section 45V credit if it is determined that the primary purpose of the production, sale or use of qualified clean hydrogen is to obtain the benefit of the credit in a manner that is "wasteful" or generally inconsistent with the purpose of Section 45V.

The determination of whether a taxpayer is engaged in a wasteful manner of hydrogen production will depend on the particular facts and circumstances. Notably, the proposed regulations would provide an example of "wasteful" use where the taxpayer knows or has reason to know that the production of qualified clean hydrogen will be vented, flared or used to produce hydrogen. The IRS requested comments on whether there are additional anti-abuse safeguards that should be adopted.

Effective Date and Commentary Period

The regulations are proposed to apply to taxable years beginning after December 26, 2023. However, taxpayers may rely on these proposed rules in taxable years beginning after December 31, 2022, so long as they consistently follow the proposed regulations in their entirety and in a consistent manner for all taxable years through the applicability date of the final regulations.

Comments must be received by February 24, 2024. A public hearing has been scheduled for March 25, 2024.

CONCLUSION

While our discussion provides a high-level overview of the substantive content in the proposed regulations, the many potential consequences and implications resulting from them merit additional attention. We plan to follow the development of the proposed regulations and provide relevant updates as necessary.

ENDNOTES

[1] The third pathway provides a proxy for minimal-emitting electricity generators (*e.g.,* nuclear and hydropower facilities) to automatically deem 5% of its power generation as satisfying the incrementality prong. If adopted, nuclear generating facilities would be limited to the 5% threshold.

[2] Any taxpayer contemplating claiming the Section 45V tax credit would also be required to file Form 7210, Clean Hydrogen Production Credit.

[3] Our previous article comprehensively addresses clean hydrogen tax benefits under the IRA.

[4] The maximum permitted range is no more than 4 kilograms of CO2e produced per kilogram of hydrogen. (Section 45V(c)(2)(A).)

[5] Although the proposed regulations define lifecycle GHG emissions by reference to Section 7545(o)(1)(H) of the Clean Air Act, the GREET model narrows the meaning of such emissions to only those emissions "through the point of production (well-to-gate)."

[6] The IRS recognizes that hourly tracking systems for EACs are not currently adequately available and thus the transitional rule is implemented. The IRS solicits comments on the implementation of the hourly matching method as it pertains to the transitional period.

[7] These requirements are expounded in the "emissions tier recapture event" set forth in Prop. Treas. Reg. § 1.48-15(f)(2), 88 Fed. Reg. 89245.

[8] Treas. Reg. § 1.45Q-2(g)(5); *see also* Treas. Reg. § 1.45Q-2(c)(3).

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