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# Hydrogen project commercialization in the United States: 45V guidance and assessing operating risk for electrolyzer projects

In August 2022, we published Hydrogen Market Development in the United States: Creating Value from the Inflation Reduction Act of 2022**,** which provided a detailed overview of the clean hydrogen tax credit codified by the Inflation Reduction Act of 2022. In the intervening period, the US Department of the Treasury and Internal Revenue Service (IRS) have been developing guidance to assist the market in determining whether the hydrogen produced from their project could qualify for the production tax credit (PTC). The PTC is potentially substantial so long as the produced hydrogen has a carbon intensity that falls within the thresholds shown in Table 1 below.

**Table 1. Detail of PTC structure**

| Life cycle GHG emission rate | <0.45 kg CO2e/kg-H2 | 0.45-1.5 kg CO2e/kg-H2 | 1.5-2.5 kg CO2e/kg-H2 | 2.5-4 kg CO2e/kg-H2 |
|---|---|---|---|---|
| Applicable % | 100% | 33.4% | 25% | 20% |
| Base credit rate | $0.6/kg-H2 | $0.2/kg-H2 | $0.15/kg-H2 | $0.12/kg-H2 |
| Bonus credit rate | **$3/kg-H2** | $1/kg-H2 | $0.75/kg-H2 | $0.6/kg-H2 |

## Proposed 45V Guidance

The proposed 45V guidance from the Treasury and IRS, released on December 22, 2023, details the key parameters required for a hydrogen producer to prove their produced hydrogen will ultimately qualify for the PTC. While the guidance discusses many aspects of how this tax credit will be deployed, three key parameters to consider include: (i) incrementality, (ii) temporal matching, and (iii) deliverability. We detail each of these issues in the *CRA Insights* below.

## Incrementality

Incrementality, which is referred to as additionality in other jurisdictions can be characterized as the development of new power capacity to meet new demand for power. In the context of 45V, a new power generation resource is considered "incremental" if the asset's commercial online date is not more than 36 months before the hydrogen production asset's commercial online date.[1]

## Temporal matching

Temporal matching requires power used to produce hydrogen to have been generated within the same stated time period as the hydrogen production itself. The proposed guidance details that for produced hydrogen to qualify for the PTC, as depicted in the table above, the asset operator must prove the renewable power consumed to produce the hydrogen was produced in the same year (annual true-up) through the end of 2027 and in the same hour beyond 2028.[2]

## Deliverability

Similarly, the power used to produce hydrogen must be produced in the same region as the hydrogen production asset. Notably, the guidance specifically calls out that the regions considered for the deliverability provision are the same as those defined in the DOE's National Transmission Needs Study. See a map of these zones in Figure 1 below.[3]

**Figure 1. Geographic zones considered in 45V Guidance[4]**


[1] US Department of the Treasury, December 2023, "Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property," pdf pp. 106-107, URL: 2023-28359.pdf (federalregister.gov)

[2] US Department of the Treasury, December 2023, "Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property," pdf pp. 106-107, URL: 2023-28359.pdf (federalregister.gov)

[3] US Department of the Treasury, December 2023, "Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property," pdf p. 31, URL: 2023-28359.pdf (federalregister.gov)

[4] US DOE, October 2023, "National Transmission Needs Study," p. iii, URL: https://www.energy.gov/sites/default/files/2023-12/National%20Transmission%20Needs%20Study%20-%20Final_2023.12.1.pdf

### Energy Attribute Certificates ("EACs")

The guidance also clearly details the need for EACs to be considered "under certain conditions in documenting purchased electricity inputs and assessing emissions impacts of electricity used in the production of hydrogen for purposes of the section 45V credit."[5] These EACs are essentially a "tradable contractual instrument" that hydrogen producers can use to claim that the produced hydrogen meets the criteria set out in the guidance – notably regarding the three parameters described above.

## Supporting clients and assessing operating risk

Without proving each of the above thresholds have been met, the hydrogen producer cannot qualify for the stated PTC. Given the magnitude of the PTC, the potential value at stake, and customer sensitivity to the overall price of hydrogen production, it is critical that the hydrogen producer ensure they have structured their system architecture and power supply portfolio to maximize the probability of qualifying for the full PTC.

This issue is core to the three challenges we identified in our August 2022 publication: (1) crafting appropriating pricing structures within off-take agreements, (2) carbon accounting to determine whether produced hydrogen falls under any of the above thresholds, and (3) structuring a portfolio of renewable supply that balances the probability of qualifying for the PTC with capital costs.

We developed CRA H2Risk to help clients navigate the uncertainty associated with qualifying for the PTC, both from the perspective of the financial community and the development community. Leveraging CRA's foundational power system modeling suite and cutting-edge machine-learning techniques, CRA H2Risk assesses an electrolyzer project's operating risk in the face of clean hydrogen PTC qualification. Given the hourly matching requirement for clean hydrogen production beginning in 2028, those in the development process must pay particular attention to their proposed portfolio of renewable power supply to produce electrolytic hydrogen. The disconnect between procured renewable power and the proposed quantity of hydrogen to be sold under the off-take agreement could significantly impact the foundational project economics due to non-qualification for the clean hydrogen production tax credit.

Learn more about how CRA H2Risk can help you assess project operating risk and support decision making during the electrolyzer project commercialization process:
**https://www.crai.com/industries/energy/crah2risk/**

## About CRA's Energy Practice

Charles River Associates is a leading global consulting firm that offers strategic, economic, and financial expertise to major corporations and other businesses around the world. CRA's Energy Practice provides services to a wide range of industry clients, including utilities, ISOs, RTOs, large customers, and investors. The Energy Practice has offices in Boston, Düsseldorf, London, Munich, New York City, Toronto, and Washington, DC. Learn more at **www.crai.com/energy**.

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[5] US Department of the Treasury, December 2023, "Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property," pdf p. 27, URL: 2023-28359.pdf (federalregister.gov)

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