



CRA Insights: Energy

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Hydrogen market development in the United States: Creating value from the Inflation Reduction Act of 2022

Senators Manchin and Schumer introduced the Inflation Reduction Act of 2022 on July 27, 2022, after much back and forth regarding the future of a bill with climate provisions listed in the Build Back Better (BBB) initially introduced in 2021.¹ While the Inflation Reduction Act has a more limited scope regarding climate-related initiatives, it still includes substantial provisions meant to accelerate the development of a clean hydrogen market in the United States. Critically, the bill includes the Production Tax Credit (PTC) for the development of clean hydrogen production projects, as described in in Table 1.

Table 1: Detail of PTC Structure

Life Cycle GHG emission rate	<0.45 kg CO ₂ e/kg-H ₂	0.45-1.5 kg CO ₂ e/kg-H ₂	1.5-2.5 kg CO ₂ e/kg-H ₂	2.5-4 kg CO ₂ e/kg-H ₂
Applicable %	100%	33.4%	25%	20%
Base Credit Rate	\$0.6/kg-H ₂	\$0.2/kg-H ₂	\$0.15/kg-H ₂	\$0.12/kg-H ₂
Bonus Credit Rate	\$3/kg-H₂	\$1/kg-H ₂	\$0.75/kg-H ₂	\$0.6/kg-H ₂

Importantly, the bill maintains the \$3/kg maximum PTC for clean hydrogen production.² For reference, \$3/kg of hydrogen is roughly equivalent to \$22-26/MMBtu on an energy basis. Moreover, the bill also includes a direct payment provision for the tax credit received by the clean hydrogen production project. As the name suggests, this direct payment provision is a direct “payment against the tax

¹ United States Senate, H.R. 5376, “Inflation Reduction Act of 2022,” URL: https://www.democrats.senate.gov/imo/media/doc/inflation_reduction_act_of_2022.pdf

² Similar to the initial BBB language, this bill does not allow a hydrogen production tax credit for a production facility that includes carbon capture equipment.

imposed...equal to the amount of such credit.” This provision is meant to accelerate the deployment of clean hydrogen production technologies by reducing barriers to investment.

While this news is generally positive for the clean hydrogen sector, there are still significant outstanding issues facing the deployment of these tax credits. Critically, it is still not clear how the carbon emissions from the hydrogen production process will be accounted for. For example, while it may appear that the emissions from hydrogen produced via a direct connection to a renewable energy asset should be equal to zero – the actual emissions are likely going to be greater than zero as the bill language specifically calls out “lifecycle” emissions associated with the production of this hydrogen.³

If the hydrogen production asset is connected to the power grid, this evaluation becomes complex; the carbon intensity⁴ of the asset depends on both the source and sink of the energy and can also change over time.⁵ The bill specifically calls on the Secretary of Energy to codify the carbon accounting process within a year of the bill being signed.

While the introduction of this bill has many interested in how various energy markets will develop, it is worth focusing on how this may impact the clean hydrogen market, and those looking to participate in it. Through our work with clients, we see the following commercial issues arising:

1. While it is easy to simply subtract \$3/kg from the hydrogen production cost and pass these savings through to the customer, from a commercial perspective, investors will likely want to share this value with the customer in order to improve returns from the project rather than passing the value along to the customer. How should a producer look to split this tax credit to share value with the off-taker, but still reserve value to drive bankability of the project? We are working on behalf of a client directly engaging with potential off-takers and negotiating off-take contracts which include the splitting of the PTC via the off-take price – balancing the value created by this credit.
2. As stated, the form of carbon accounting for hydrogen production in the United States is unclear. The bill mentions the Greenhouse gases, Regulated Emissions, and Energy in Transportation (GREET) model as a tool to measure emissions from production pathways, but final details regarding the methodology will need to be shared. In contrast to the European model, in which the European Commission initially released stringent rules associated with clean hydrogen production, the bill provides emission targets for clean hydrogen production but not much information regarding the methodology associated with measuring these emissions.⁶ We have been helping clients evaluate emissions from their proposed projects based on the project operations and underlying power market dynamics within the region. We have found that the calculated emissions differ materially based on the temporal and geographic resolution associated with the measurement methodology.
3. Similarly, it is unclear how renewable energy credits (RECs) or power purchase agreements (PPAs) will play into the carbon accounting mechanism that is ultimately proposed. While it is theoretically possible to develop hydrogen production assets in regions where there are significant amounts of

³ Upstream emissions associated with the production of power or leaks from the natural gas system would be considered – the bill specifically mentions “well-to-gate” emissions.

⁴ Carbon intensity represents the marginal emissions of carbon at each point on the grid, which can vary both locationally and temporally.

⁵ As an example, the carbon intensity of CAISO is lower in the spring as more hydropower is being produced the system when snow melts.

⁶ Note the rules regarding the methodology for emissions accounting for renewable hydrogen have not been finalized in Europe, only introduced.

renewable energy, some of these production centers are in remote regions of the country. As a result, there may be a geographic disconnect between hydrogen production and demand centers. Consequently, RECs may enable the project to qualify for the PTC tiers in the bill. We have helped clients analyze REC procurement and PPA design in to maximize value from the PTC.

4. The market for clean hydrogen in the United States in 2030 will ultimately differ based on whether this PTC passes through Congress. Clearly, the tax credit will make clean hydrogen more competitive versus alternatives for different end uses. As demand materializes within new end-use sectors, so too will geographic diversity of this demand. This diversity will drive investment decisions in hydrogen production projects and potentially connective infrastructure to move hydrogen from low-cost production regions to demand centers. We have helped clients think through these market development issues and develop infrastructure investment strategies within the sector.

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