

Hydrogen Production Tax Credit makes low-carbon hydrogen competitive with legacy production

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Global Energy Transition [Brian Murphy](#)

The recently passed Inflation Reduction Act includes a new clean hydrogen Production Tax Credit, or PTC, that Platts Analytics expects to stimulate immense investment in the sector through the 2020s.

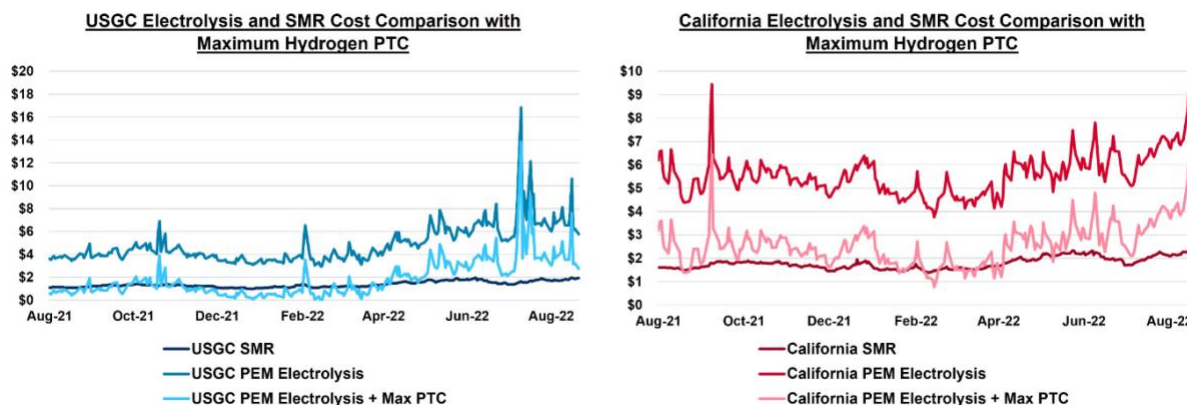
The PTC's value is dependent on emissions intensity (see table), although the methodology for measuring emissions is yet to be determined. Projects that do not meet defined wage and other eligibility requirements will receive 20% of the full PTC value. Projects built before 2027 will receive the full credit for 10 years, while projects beginning construction between 2027 and 2032 will receive the credit for a prorated period. Combined with direct investments from last year's Bipartisan Infrastructure Law and expanded use of the DOE's Loan Programs Office, the US government has laid the groundwork for rapid growth in the clean hydrogen industry and long-term emissions reductions across multiple sectors.

Emissions (kg CO ₂ -e / kg H ₂)	Full Production Tax Credit Value (\$/kg H ₂)
<0.45	\$3.00
0.45 – 1.50	\$1.00
1.50 – 2.50	\$0.75
2.50 – 4.00	\$0.60
4.00 – 6.00	\$0.45

The Department of Energy has been instructed to develop a measurement, certification and verification scheme to apply the PTC to existing projects. A major challenge of such a scheme is how to account for embodied emissions of the renewable power and water electrolyzers, and the chosen approach could determine which PTC tier a project is eligible for. The IRA's emissions thresholds are ambitious: 0.45 kg CO₂-e/kg H₂ is a nearly 95% reduction from the most efficient SMR facilities (excluding methane emissions). While the maximum \$3.00/kg H₂ PTC will likely only be available to projects using water electrolysis powered by renewables, the lower PTC tiers will still allow many projects using carbon capture and sequestration, or CCS, to undercut prices from existing steam methane reforming, or SMR, production.

S&P Global Commodity Insights' hydrogen price data shows that for projects on the Gulf Coast, the maximum PTC would have made hydrogen from Proton-Exchange Membrane, or PEM, electrolysis cheaper than traditional SMR on 52% of trading days in the past year (see figure). With the PTC, hydrogen production prices would have fallen as low as \$0.10/kg H₂ (\$0.88/MMBtu). Many of the days where PEM prices were higher than SMR were in Summer 2022 when regional electricity spot market prices increased due to high cooling loads. Electrolysis projects currently in development are

often structured to minimize exposure to electricity spot markets, usually using PPAs, and the full PTC will make many of these projects immediately competitive with SMR.



The PTC is applied equally across the country, and thus the impact will be mediated by regional costs for natural gas and renewables, electricity market structure, and access to hydrogen demand. For example, in California the hypothetical electrolysis plant above would have been cheaper than SMR on only 11% of days in the past year due to higher market electricity prices.

While the PTC is on the books at least through 2032, S&P Global projects that average costs for renewables-powered electrolysis will fall below \$3/kg H₂ by 2030. Thus, low-cost projects could become highly profitable in the late 2020s, and the prospect of that windfall should incentivize significant investment in the near term. The IRA also allows developers to stack credits to further drive down costs. For instance, a hydrogen project procuring exclusively renewable electricity could claim investment and/or production tax credits for both clean hydrogen and clean electricity, as long as the renewables and hydrogen facilities are separate entities. Platts Analytics expects newly available PTCs for renewable power to increase the likelihood of low (<\$10/MWh) and even negative renewable power prices. Flexible electrolyzer operation would allow hydrogen projects to take advantage of otherwise curtailed power, providing cheap clean hydrogen that can spur demand in new sectors such as power generation (especially long-duration storage), industrial heat or transportation.

The IRA also offers significant incentives for fossil carbon-based projects using CCS. Assuming upstream methane emissions are not considered in the measuring methodology, qualifying CCS facilities are likely to fall into the 0.45-1.5 kg/kg band of emissions, eligible for a \$1.00/kg PTC. For hydrogen facilities, the PTC value will greatly exceed both the CO₂ Capture Credit and the Investment Tax Credit, which SPGCI estimates are valued at \$0.07/kg H₂ (assuming sequestration) and \$0.03-0.06/kg H₂ (depending on plant lifetime), respectively. The IRA does not allow plants to claim both the CO₂ Capture Credit and the hydrogen PTC. SPGCI price models show that CCS adds a 30% cost premium to hydrogen production, or \$0.30/kg H₂- \$0.65/kg H₂ depending on natural gas prices. A facility receiving a \$1.00/kg H₂ PTC could therefore have a lower cost basis than a facility without CCS, incentivizing investment in enabling CO₂ capture, transportation, and sequestration technologies.

The IRA's methane emissions fees should also incentivize investment in leak reduction, reducing a major source of concern with CCS projects. Large plants (>85 mt/day) with upstream emissions of 3% of consumption would pay \$0.094/kg H₂ in methane fees, offsetting some of the gains from the

PTC. A facility using a supply chain that leaks 10% of consumption would pay \$0.31/kg H₂. As the methane fee rises to \$1,500/mt in 2026, the production fee increases to \$0.563/kg H₂ in 2026, offsetting a majority of the PTC.

Overall, the PTC is a strong incentive that makes clean hydrogen production from both electrolysis and fossil gas with CCS immediately cost-competitive with existing SMRs. The PTC is also available through 2032, providing industry stakeholders with a clear regulatory framework to guide long-term investment decisions. The clear regulation and incentive structure should stimulate significant investment in the near term from firms hoping to capture windfall profits in the late 2020s, as our projections suggest electrolysis production costs will fall below \$3.00/kg H₂ through industry scale-up.