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The Clean Hydrogen Production Credit: How the Incentives are Structured

The Inflation Reduction Act of 2022 (IRA; P.L. 117-169) enacted a new tax credit for the production of “clean” hydrogen. Widespread adoption of hydrogen fuel may reduce economywide greenhouse gas (GHG) emissions, especially in sectors that have traditionally proven difficult to decarbonize, such as trucking, steel manufacturing, and cement production. This *In Focus* provides background information on hydrogen fuel and the clean hydrogen production credit, also known as “the 45V credit” based on its Internal Revenue Code (IRC) section.

The Basics of Hydrogen Fuel

Hydrogen currently fulfills important uses in chemical plants and oil refineries, but does not deliver energy services to firms and consumers other than in demonstration-scale quantities. However, a future economy using hydrogen as a fuel could offer an alternative that provides the numerous modern energy services associated with fossil fuels. In addition to providing a fuel for transportation, hydrogen could support industrial processes or building operations, or become part of the energy infrastructure by storing energy. The hydrogen energy value chain spans resource extraction, production, storage, transportation, and final conversion and end use. Demonstrations of hydrogen technology and the value propositions based on hydrogen continue to emerge, ranging from one-off funded projects to public-private partnerships in the United States and abroad.

Using money provided by the Infrastructure Investment and Jobs Act (IIJA; P.L. 117-169), the Department of Energy (DOE) announced seven finalists for the initial \$7 billion of Regional Clean Hydrogen Hubs funding on October 13, 2023. CRS Report R47289, *Hydrogen Hubs and Demonstrating the Hydrogen Energy Value Chain*, by Martin C. Offutt, provides more information on hydrogen hubs and their role in the hydrogen value chain.

Credit Eligibility Requirements

Taxpayers producing clean hydrogen at qualifying facilities may receive the clean hydrogen production credit (CHPC) based on the amount of clean hydrogen produced, the lifecycle carbon dioxide equivalent (CO_{2e}) emissions rate of the hydrogen through the point of production, and the taxpayer’s compliance with prevailing wage and apprenticeship requirements. For GHGs other than CO₂, the *carbon dioxide equivalent* is the quantity of CO₂ that would produce the same amount of global warming over a set time period as the non-CO₂ GHG. Credits are available for 10 years after a facility is placed in service.

To be classified as a *qualified* facility, the facility in question must be owned by the taxpayer, produce *qualified*

clean hydrogen (QCH), and have begun construction prior to 2033. QCH cannot have a lifecycle greenhouse gas emissions rate greater than 4 kilograms of CO_{2e} per kilogram of hydrogen through the point of production. If a facility placed in service before 2023 did not initially produce QCH, but is modified to produce QCH before 2033, and if those modifications are charged to the taxpayer’s capital account, then the facility qualifies for the credit. Without additional modifications, changing the fuel source would not be considered a capital expense and therefore would not make a facility eligible for the credit.

Tax-exempt entities including nonprofits, local governments, and rural electric cooperatives may receive direct cash payments in place of traditional income tax credits. Taxable entities may also elect to receive direct cash payments for five years, starting with the year a facility is placed in service. Taxable entities cannot make this election after 2032. Finally, the CHPC is *transferable*, meaning that credits may be sold from one business to another for cash. Businesses of all types, including businesses not in the energy sector, may buy credits. Once bought, credits cannot be resold to a third entity.

CHPC Credit Values and “Cliffs”

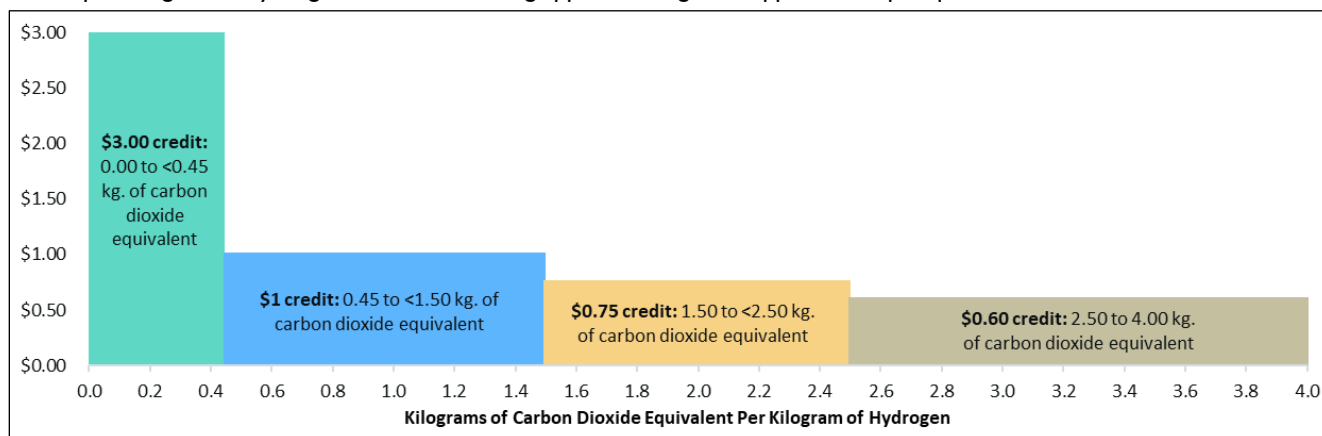
For taxpayers meeting prevailing wage and apprenticeship requirements as described under 26 U.S.C. §45V, the maximum credit is \$3 per kilogram of QCH, adjusted annually for inflation. Taxpayers producing QCH with lifecycle GHG emissions below 0.45 kilograms of CO_{2e} (through the point of production) are eligible for the full \$3 credit. Taxpayers may receive partial credits of

- \$1 per kilogram of QCH if the CO_{2e} emissions rate is from 0.45 kilograms to less than 1.5 kilograms;
- \$0.75 per kilogram of QCH if the CO_{2e} emissions rate is from 1.5 kilograms to less than 2.5 kilograms;
- \$0.60 per kilogram of QCH if the CO_{2e} emissions rate is between 2.5 and 4.0 kilograms.

Figure 1 shows how the CO_{2e} emissions rate affects the value of the CHPC. The CHPC includes four “credit cliffs”—points at which the value of the credit rises or falls based on small changes in CO_{2e} emissions. Policy cliffs can provide inconsistent incentives for behavioral changes, depending on the proximity to the given cliff. In the case of the CHPC, such cliffs are combined with flat or unchanging credit values over much wider ranges of CO_{2e} emissions. For example, the CHPC increases significantly when taxpayers reduce their CO_{2e} emissions from 0.46 to 0.44 kilograms (per kilogram of hydrogen); on the other hand, producers have no incentive to reduce their emissions from 0.44 to 0.00 kilograms.

Figure 1. Value of the Clean Hydrogen Production Credit, by Carbon Dioxide Equivalent Emissions

Credit per kilogram of hydrogen for a firm meeting applicable wage and apprenticeship requirements

**Source:** CRS analysis of 26 U.S.C. §45V.**Notes:** Values displayed are before reductions for the use of tax-exempt bonds.

CHPC amounts are reduced by four-fifths for producers failing to meet prevailing wage and qualified apprenticeship requirements. These requirements, like the CO₂e emissions formula, create credit cliffs around fixed labor standards. To satisfy the wage requirements, laborers and mechanics constructing, altering, or repairing a facility must be paid wages at or above the “prevailing wage” (as determined by the Secretary of Labor) of workers performing similar work in the same locality. The apprenticeship requirements stipulate that registered apprentices must provide at least 10%, 12.5%, or 15% (depending on the year when construction begins) of the labor hours associated with constructing, altering, or repairing any facilities claimed under the CHPC. Under the “good faith effort exception,” firms meet the apprenticeship requirements if they request apprentices from a registered program and either do not receive a response within five business days or are denied for reasons other than their refusal to comply with the requirements.

The CHPC is also reduced by the share of financing coming from tax-exempt bonds, up to a maximum reduction of 15%. For example, if 10% of project financing comes from tax-exempt bonds, the credit amount is reduced by 10%; if 25% of project financing comes from tax-exempt bonds, the credit amount is reduced by 15%.

Fiscal Costs

In December 2023, the Joint Committee on Taxation (JCT) projected that the CHPC would reduce federal revenues by \$4.7 billion from FY2023 through FY2027. The JCT estimated that approximately \$2.2 billion of this amount would come in the form of direct payments to hydrogen producers.

Recent Developments

The Treasury Department and the IRS published a notice of proposed rulemaking (NPRM) and notice of public hearing on December 26, 2023. The proposed rule was preceded by

IRS Notice 2022-58, in which the Treasury Department and IRS requested comment on 59 questions related to the CHPC. The proposed IRS rule conforms to statute, requiring that GHG emissions—including only CO₂, methane, and nitrous oxide—be calculated through the point of production (well-to-gate) as determined under the most recent Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model developed by Argonne National Laboratory or a successor model.

Generally, the calculation of CO₂e emitted when making hydrogen with electricity and water—a process known as electrolysis—uses the CO₂e emissions of the regional electricity grid. Taxpayers wishing to attribute their emissions to a specific electricity generating facility rather than the grid may do so provided they meet three conditions and are verified by an unrelated party (26 U.S.C. §45V(c)(2)(B)(ii)). These conditions are enumerated in the proposed “Eligible Energy Attribute Certificate [EAC] Requirements” and include incrementality, deliverability, and temporal matching. In the NPRM, incrementality generally involves establishing that the source of electricity is no more than three years old (potentially implying that new “increments” of energy were added to the grid). Deliverability is met if the electricity is generated in the same region as the hydrogen is produced, with regions defined in DOE’s National Transmission Needs Study. The temporal matching requirement necessitates the taxpayer support any claim that the incremental source of electricity was actively generating and dispatching electricity in the same hour as the hydrogen was produced. Under the proposed rulemaking, the hourly temporal requirement will begin after 2027; until then, an annual requirement will be used.

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