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Internal Revenue Service
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Room 5203, P.O. Box 7604
Ben Franklin Station, Washington, DC 20044

Comments on Credits for Clean Hydrogen and Clean Fuel Production

1) Credit for Production of Clean Hydrogen.
   1) Clean Hydrogen. Section 45V provides a definition of the term "qualified clean hydrogen." What, if any, guidance is needed to clarify the definition of qualified clean hydrogen?

      It would be helpful to clarify what emissions must be considered when calculating the lifecycle GHG emissions rate and what technologies and feedstocks can be use in the production of clean hydrogen. For example, is hydrogen made from renewable natural gas considered to have a carbon intensity of 0 kg of CO2e per kg of hydrogen?

      a) Section 45V defines "lifecycle greenhouse gas emissions" to "only include emissions through the point of production (well-to-gate)." Which specific steps and emissions should be included within the well-to-gate system boundary for clean hydrogen production from various resources?

         Per the GHG protocol, it should include scope 1 emissions (direct emissions from the facility producing the clean hydrogen), scope 2 emissions (indirect emissions associated with purchased or acquired energy, like electricity, steam, heat, cooling. Generated offsite and consumed by the facility producing the clean hydrogen), and Scope 3 emissions – upstream only (indirect emissions associated with the purchase of feedstock like natural gas). Scope 3 emissions – downstream (those that occur after the product leaves the facility) are difficult to calculate and report and are relatively small in comparison to the emissions from hydrogen production; therefore, they should be excluded from the definition of "qualified clean hydrogen".

      b)
         i. How should lifecycle greenhouse gas emissions be allocated to co-products from the clean hydrogen production process? For example, a clean hydrogen producer may valorize steam, electricity, elemental carbon, or oxygen produced alongside clean hydrogen.

            Given that GHG emissions are reported based on the mass of CO2e molecules, and that the co-products might be valuable for different reasons (not all have an energy value)

then the GHG emissions should be allocated based on the mass of hydrogen and co-products produced. In the case of electricity as co-product, typically the process excess heat is used to produce steam which in turn is use to run steam turbines to generate electricity so it makes sense to allocation the CO2e emissions to the generated steam and subsequently to electricity.

ii. How should emissions be allocated to the co-products (for example, system expansion, energy-based approach, mass-based approach)?

Mass-based approach.

iii. What considerations support the recommended approaches to these issues?

- The mass of CO2e emitted is what's considered GHG emissions, so allocating this mass to the mass of co-products produce seems justifiable
- Not all co-products have an energy value to base the allocation on energy content

c)

i. How should lifecycle greenhouse gas emissions be allocated to clean hydrogen that is a by-product of industrial processes, such as in chlor-alkali production or petrochemical cracking?

No comments.

ii. How is byproduct hydrogen from these processes typically handled (for example, venting, flaring, burning onsite for heat and power)?

No comments.

d) If a facility is producing qualified clean hydrogen during part of the taxable year, and also produces hydrogen that is not qualified clean hydrogen during other parts of the taxable year (for example, due to an emissions rate of greater than 4 kilograms of CO2-e per kilogram of hydrogen), should the facility be eligible to claim the § 45V credit only for the qualified clean hydrogen it produces, or should it be restricted from claiming the § 45V credit entirely for that taxable year?

The facility should be allowed to claim the § 45V credit only for the qualified clean hydrogen it produces.

e) How should qualified clean hydrogen production processes be required to verify the delivery of energy inputs that would be required to meet the estimated lifecycle greenhouse gas emissions rate as determined using the GREET model or other tools if used to supplement GREET?

Clean hydrogen production processes should be required to the origin of their energy inputs, for example, if using renewable power then a proof of RECs retired on behave of the entity and during the taxable year in question or a proof of a VPPA agreement for the taxable year in question.

i. How might clean hydrogen production facilities verify the production of qualified clean hydrogen using other specific energy sources?

This very much depends on the technology used. In the case of electrolysis of water, renewable or carbon free electricity consumption and water usage can both be used to verify the production of qualified clean hydrogen.

ii. What granularity of time matching (that is, annual, hourly, or other) of energy inputs used in the qualified clean hydrogen production process should be required?

Time matching should be annual to be aligned with taxable years.

2) Alignment with the Clean Hydrogen Production Standard. On September 22, 2022, the Department of Energy (DOE) released draft guidance for a Clean Hydrogen Production Standard (CHPS) developed to meet the requirements of § 40315 of the Infrastructure Investment and Jobs Act (IIJA), Public Law 117-58, 135 Stat. 429 (November 15, 2021).The CHPS draft guidance establishes a target lifecycle greenhouse gas emissions rate for clean hydrogen of no greater than 4.0 kilograms CO2-e per kilogram of hydrogen, which is the same lifecycle greenhouse gas emissions limit required by the § 45V credit. For purposes of the § 45V credit, what should be the definition or specific boundaries of the well-to-gate analysis?

The boundaries of the well-to-gate analysis should be limited to the emissions associated with the feedstocks and inputs into the facility and the emissions generated by the facility. It should exclude any emissions that occur downstream of the facility and/or those related with the usage or transportation of the clean hydrogen.

4) Recordkeeping and Reporting.
   a) What documentation or substantiation do taxpayers maintain or could they create to demonstrate the lifecycle greenhouse gas emissions rate resulting from a clean hydrogen production process?

This is very process dependent. In the case of electrolysis of water, taxpayers could maintain records of renewable electricity purchases (RECs and/or VPPAs, etc.) and water consumption.

   b) What technologies or methodologies should be required for monitoring the lifecycle greenhouse gas emissions rate resulting from the clean hydrogen production process?

A mass balance accounting of the emissions associated with the feedstock and other inputs and that of the facility emissions.

c) What technologies or accounting systems should be required for taxpayers to demonstrate sources of electricity supply?

Taxpayers should provide the facility actual power consumption and the proof of renewable or carbon free electricity purchases (via RECs, VPPAs or other means)

d) What procedures or standards should be required to verify the production (including lifecycle greenhouse gas emissions), sale and/or use of clean hydrogen for the § 45V credit, § 45 credit, and § 48 credit?

This is very process dependent. In the case of electrolysis of water, clean hydrogen production can be verified by renewable electricity and water consumption. It can also be verified by the hydrogen sales and/or the consumption of hydrogen in downstream processes. The amount of clean hydrogen produced can be measured before it is consumed in any downstream process. Ultimately, the amount of hydrogen consumed in downstream processing can be estimated/confirmed by the amount of product made. For example, using the clean hydrogen to make ammonia, the amount of clean hydrogen consumed can be estimated from the amount of ammonia produced.

e) If a taxpayer serves as both the clean hydrogen producer and the clean hydrogen user, rather than selling to an intermediary third party, what verification process should be put in place (for example, amount of clean hydrogen utilized and guarantee of emissions or use of clean electricity) to demonstrate that the production of clean hydrogen meets the requirements for the § 45V credit?

Clean hydrogen production requirements can be demonstrated by:

- Renewable electricity consumption
- Water consumption
- Metering of hydrogen production before it is consumed in another process
- Quantity of product produced from clean hydrogen can be used to estimate the amount of clean hydrogen consumed

f) Should indirect book accounting factors that reduce a taxpayer's effective greenhouse gas emissions (also known as a book and claim system), including, but not limited to, renewable energy credits, power purchase agreements, renewable thermal credits, or biogas credits be considered when calculating the § 45V credit?

Yes, they should be considered provided there is sufficient and adequate proof of existence and purchase of such factors.

g) If indirect book accounting factors that reduce a taxpayer's effective greenhouse gas emissions, such as zero-emission credits or power purchase agreements for clean energy, are considered in calculating the § 45V credit, what considerations (such as time, location, and vintage) should be included in determining the greenhouse gas emissions rate of these book accounting factors?

Considerations to be included:

- Time: same calendar year as taxable year. The amount of electricity consumed must be offset by the amount of renewable electricity supply to the grid in the same calendar year and regardless of timing (demand is continuous through out the day and solar and wind power generation are not)
- Location: renewable electricity needs to supply any grid in the US
- Vintage: renewable electricity production and credits need to be generated on the same year as the taxable year

Respectfully,

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Executive Vice President, General Counsel & Secretary