Comments and Responses to IRS Notice 2022-58

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We appreciate the opportunity to provide comments on the Department's proposed Tax Credits for Clean Hydrogen and Clean Fuel Production under Section 45V. As a startup materials processing, hydrogen producing and battery company, Lyten has a keen interest in ensuring that the guidelines promulgated by the IRS encourage the full breadth of clean hydrogen producers.

As an introductory statement, we strongly support guidelines which recognize that expanding the amount of clean hydrogen in our nation's energy portfolio is critically important. And, further, owing to the complexity of the clean hydrogen production process and the large number of small and large clean hydrogen producers who will be availing themselves of the 45V project and production credit, that the guidelines be as easy to understand and comply with as possible.

Introductory Comment on the Use of the Greet Model in Determining CI

While the GREET model is complex, it provides a recognized framework for life cycle analysis that is included in the Inflation Reduction Act (IRA) statute. The following considerations regarding the use of GREET are worthy of your consideration as you review the broad array of comments from various parties in connection with the implementation of 45V.

- DOE (or the IRS) could publish standard values for defined fuel pathways to make compliance with the IRA statue more straightforward. For example: 1) water electrolysis with 100% renewable power, or 2) biomass gasification with a threshold for fossil energy inputs, could each receive a standard value for GHG intensity.
- GREET provides a recognized basis for the upstream life cycle factors of many fuels and energy carriers. The following are well understood and could be taken from GREET at face value:

  - Well to gate for natural gas and other process fuels. Improving the CI for pipeline natural gas or diesel used in transport would be very challenging.
  - Statewide GHG intensity for electric power (notwithstanding the use of RECs). The values are available in GREET. Life Cycle Analysis (LCA) practitioners should avoid using eGRID power values that do not include upstream emissions.
  - Carbon intensity of corn ethanol used to produce hydrogen is readily adjusted to reflect process energy inputs, CO_2 capture, and other factors in the fuel cycle.

    - The indirect land use emissions from the CCLUB model are in GREET by reference.
    - Regenerative agriculture practices in the Feedstock CI Calculator (FD-CIC) are in GREET by reference.
    - The balance of nitrogen fertilizer shares and fertilizer shares requires further evaluation to assure that nitrogen and phosphate represented as the corn farming input aligns with the fertilizer shares
    - Fugitive emissions from ethanol T&D should be treated on a carbon neutral basis.

- The GREET carbon balance for organic waste to RNG requires further evaluation. A totality of emissions approach would account for CO_2 emissions from landfills as well as biofuel production.
- Fugitive emissions from vegetable oils and ethanol should result in zero non-biogenic CO_2 emissions.

Section Specific Comments

01. Credit for Production of Clean Hydrogen

Section(1)(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.

Recommendation

Allocation methods are a critical component of life cycle analysis as energy inputs and emissions are distributed towards other products and co-products thereby reducing the carbon intensity of hydrogen. The life cycle analysis ("LCA") method should reflect the environmental impact of the production process which is described in the ISO standards cited by DOE.

Many allocation methods are considered within LCA frameworks, including substitution or displacement as well as mass, energy, or economic allocation. Given the reference to GREET in the IRA, the frameworks within GREET would provide the most appropriate choices for allocation methods. Further, applying the GREET frameworks would be better than using other LCA approaches such as the EPA Renewable Fuel Standard (RFS) or even the ISO standard which are controversial and complicated to evaluate.

The system expansion or substitution approach is recommended under ISO 14044 because it represents most closely the environmental impact of the co-product. Challenges to the substitution method include situations where the life cycle of the co-product is unknown or not identified. The co-product must be sold or productively used for a substitution credit to be valid. The constraint regarding sales of co-products has been implemented under the California Low-Carbon Fuel standard (LCFS) where evidence of sales of electric power, corn distillers' grains from ethanol, and glycerin from biodiesel are required. Note that factoring co-products into allocation methods also requires the productive use of the material. The substitution method is implemented in numerous pathways in GREET as well as regulatory frameworks. Most notably corn DGS as well as export electric power from sugarcane ethanol receive substitution credits under the LCFS and this approach is the primary method available in the GREET model.

In the case of hydrogen production, export steam, electric power, solid carbon, and high value
hydrocarbons and other gases are potential co-products. If electric power were a co-product, the substitution credit is so similar with the credit deployed in cellulosic ethanol

and sugarcane pathways, that this method would be used without question. The analysis effort should allow for co-products such as steam, electric power, high value hydrocarbons, elemental carbon, oxygen, and exotic materials such as helium. Upstream life cycle data for materials that are not in GREET are available from commercial life cycle databases.

Many of the co-products that would be produced from hydrogen are available in the GREET1
and GREET2 models. In order to implement a substitution credit, the product must be sold for
productive use. In the case of oxygen from electrolysis, GREET provides upstream life cycle data for the substitute value of oxygen based on production in an Air Separation unit (See ASU Tab in GREET1_2022). Double counting issues should be avoided if the oxygen is used to produce another fuel subject to the CHPS. For example, if oxygen from an electrolyzer is sent to a biomass gasifier, which then produces a low carbon fuel, allocating emissions to hydrogen and oxygen based on economic value is the best approach. In this case the CI of hydrogen is
reduced and the biomass gasification system receives a relatively low CI source of oxygen.

The GREET2 model also provides the upstream life cycle GHG emissions for carbon used in vehicle manufacture. The cell Mat_Sum!BU47 provides the GHG intensity for graphite that is used in the production of battery anodes. In instances where carbon is used for this application, a displacement of substitution credit would reflect the environmental impact of carbon production.

Numerous other instances of high value chemical production are possible with hydrogen. We
recommend the use of GREET data to reflect the life cycle value or that the Depart of Energy publish life cycle GHG factors for a range of materials.

Section(1)(e)(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?

Recommendation

Time matching of energy inputs on an annual basis will provide the most flexibility without loss of benefit. If the decision is made that annual time matching is too broad, we strongly advise not going shorter that quarterly due to the administrative challenges and costs of monitoring energy inputs within a narrower window of time.

Section 4 <u>Recordkeeping and Reporting</u>
(d) What procedures or standards should be required to verify the production (including lifecycle gas emissions), sale and/or use of clean hydrogen for the 45V credit?

Recommendation

The sale of clean hydrogen should be subject to a market pricing test, such that only hydrogen sold within a reasonable band of the spot price for Hydrogen in the region where the hydrogen is being sold shall be eligible for the 45V credit.

(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 – as provided for in the GREET model, book and claim should be allowed so that renewable energy credits, power purchase agreements, renewable thermal credits, or biogas credits can be considered when calculating the 45V credit.

A renewable energy certificate (REC), is a market-based instrument that represents the property rights to the environmental, social, and other non-power attributes of renewable electricity generation. RECs are issued to renewable energy producers when one megawatt-hour (MWh) of electricity is generated and delivered to the electricity grid from a renewable energy resource. The producer of renewable energy can monetize its RECs by selling or auctioning them on an exchange-based trading platform. Realizing the proceeds of REC sales as an offset to the cost of generating the renewable MWh lowers the cost of production which will spur additional renewable energy project development.

Because the physical electricity we receive through the utility grid says nothing of its origin or how it was generated, RECs play an important role in accounting, tracking, and assigning ownership to renewable electricity generation and use. On a shared grid—whether the electricity comes from on-site or off-site resources—RECs are the instrument that electricity consumers use to substantiate renewable electricity use claims. RECs can only be claimed once after which time they are extinguished.

In 2022, the notional value of RECs auctioned across various exchanges was nearly $1.0 trillion equaling 50% of the world's energy output and representing 18 billion metric tons of carbon allowance. Because the market for REC's is large, efficient and, possibly most important, transparent, it is very well suited to be used in determining the CI of hydrogen production. While some may argue that a REC does not, in a vacuum, directly create additional renewable energy, allowing the use of REC's in determining the CI of a hydrogen production process, is certainly not decretive to the goals of either the CHPs or the IRA. In fact, the IRA directly references the GREET Model, which undeniably supports the inclusion of RECs in calculating the intensity of a particular pathway.

Although some may argue about the use of RECs for these purposes, including Power Purchase Agreements (PPA's) or structured transactions where additional renewable capacity is clearly created, should
definitely be allowed.

(g) If indirect book accounting factors that reduce a tax-payer'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?

The criteria that RECs should come from a region with an RPS or a new PPA should be required.
A transition period of three years from the time RECs are used to the development of additional renewable resources for PPAs may be appropriate but we do not recommend any more stringent time, location or vintage requirements than these.

Section 5 <u>Unrelated Parties</u>

(a) What certifications, professional licenses, or other qualifications, if any, should be required for an unrelated party to verify the production and sale or use of clean hydrogen for the § 45V credit, § 45 credit, and § 48 credit?

(b) What criteria or procedures, if any, should the Treasury Department and the IRS establish to avoid conflicts of interest and ensure the independence and rigor of verification by unrelated parties?

(c) What existing industry standards, if any, should the Treasury Department and the IRS consider for the verification of production and sale or use of clean hydrogen for the § 45V credit, § 45 credit, and § 48 credit?

Many verification bodies are capable of assessing GHG emissions under § 45V based on experience with existing fuel programs including the California and Oregon LCFS and the EU Renewable Energy Directive. Verifiers who are accredited under the LCFS, ISCC, or RSB verification systems would have the capability of reviewing IRA GHG analyses. Verification bodies currently employ conflict of interest avoidance. Guidance from the California LCFS is suitable. Similar standards of data quality are employed for fuel verifications including requirements for record keeping, chain of custody for feedstock transfers, and data quality assurance.

Section 7 <u>Please provide comments on any other topics related to 45V credit that may require guidance</u>.

In order to not discourage small, startup developers/producers, we strongly recommend that the guidelines do not include a volume minimum of hydrogen that needs to be produced in order to qualify for the credit.