December 2, 2022

RE: International Council on Clean Transportation comments on the **Inflation Reduction Act (IRA) of 2022 Clean Hydrogen and Clean Fuel Production Tax Credit**

These comments are submitted by the International Council on Clean Transportation (ICCT). The ICCT is an independent nonprofit organization founded to provide unbiased research and technical analysis to environmental regulators. Our mission is to improve the environmental performance and energy efficiency of road, marine, and air transportation, in order to benefit public health and mitigate climate change. We promote best practices and comprehensive solutions to increase vehicle efficiency, increase the sustainability of alternative fuels, reduce pollution from the in-use fleet, and curtail emissions of local air pollutants and greenhouse gases (GHG) from international goods movement.

The ICCT welcomes the opportunity to provide comments on the Department of the Treasury and Internal Revenue Service's (IRS) IRA guidance. We commend the agency for its collaborative approach in drafting guidance and willingness to evaluate the full scope of lifecycle emissions associated with clean fuel production. The comments below respond to questions posed in Notice 2022-58 regarding lifecycle emissions accounting and crediting. These comments offer several observations and recommendations for the agency to consider, including harmonizing emissions accounting methodologies with Clean Air Act statutory guidance and ensuring that clean fuel production delivers verifiable and additional climate benefits relative to a business-as-usual case.

We would be glad to clarify or elaborate on any points made in the below comments. If there are any questions, Treasury and IRS staff can feel free to contact Jane O'Malley (j.omalley@theicct.org) and Dr. Stephanie Searle (stephanie@theicct.org).

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Summary of key recommendations

The IRA presents a tremendous opportunity for the U.S. to expand its production capacity for alternative clean fuels. Section 45V offers significant funding for clean hydrogen while Section 45Z expands the bio- and renewable diesel tax credit to new markets along with increasing its value. Guidance developed by the Department of the Treasury during the implementation phase will be critical to ensure that expected growth in clean fuel markets delivers on the intent of the legislation to provide economic, social, and climate benefits. We summarize three high-level recommendations to meet these goals below:

1. **We strongly recommend the Treasury Department consult the Environmental Protection Agency (EPA) on lifecycle analysis for both the § 45V and § 45Z tax credits**. Treasury is required to account for direct and significant indirect emissions associated with clean fuel production under Sections 45V(c)(1)(A) and 45Z(b)(1)(B)(i) of IRA legislation. This requirement is pursuant with the Clean Air Act Section 211(o)(1)(H); equivalent methodology has been adopted under the federal Renewable Fuel Standard (RFS) program. EPA is the federal agency with the most extensive experience with lifecycle emissions accounting from its experience implementing the RFS.

2. **It is critical that § 45V tax credit eligibility be limited to hydrogen production from clean and additional electricity to avoid the risk of double counting.** Hydrogen production will not meaningfully reduce greenhouse gas (GHG) emissions if it diverts renewable electricity from other uses; the renewables should be additional to what would have been consumed in a business-as-usual scenario. We strongly recommend the Treasury Department clarify that renewable electricity used for hydrogen receiving the § 45V tax credit cannot be used to meet other policy goals, such as state Renewable Portfolio Standards (RPS). A direct link between the hydrogen producer and the renewable electricity generator is best demonstrated using a power purchase agreement (PPA). We recommend the renewable electricity generator be prohibited from generating renewable energy attribute certificates (i.e., RECs), or, if they are generated, that they are required to be retired for the purposes of using the § 45V tax credit. These requirements should be verified by a third-party auditor.

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3. **We recommend the Treasury Department issue guidance requiring the use of the CORSIA lifecycle methodology for aviation fuels to determine § 45Z tax credit eligibility.** CORSIA was developed with input from a diverse set of international stakeholders in a highly collaborative process. CORSIA provides flexibility for fuel producers to exceed default lifecycle emission reduction values and is consistent with CAA Section 211(o)(1)(H) methodology, which is required for the 45Z tax credit. CAA methodology requires accounting for direct and significant indirect lifecycle emissions impacts associated with the full fuel lifecycle.

4. **We recommend the Treasury Department issue guidance clarifying that the accounting of indirect emissions for non-aviation fuel is required to determine 45Z tax credit eligibility.** As with the 45V tax credit, the 45Z tax credit requires the use of lifecycle methodology consistent with CAA Section 211(o)(1)(H), which includes "significant indirect emissions." The GREET model only assesses the direct emissions impacts of fuel production and does not calculate significant indirect emissions impacts such as indirect land use change and feedstock substitution and thus cannot be used as the only lifecycle analysis tool for determining 45Z eligibility. If GREET is used to assess direct emissions, additional analysis of indirect emissions must be combined with GREET. One option would be to utilize the RFS lifecycle methodology for the assessment of indirect emissions.

We expand upon these recommendations and provide specific examples to illustrate possible scenarios in the discussion below. Where applicable, we respond to specific questions posed in the "Request for Comments…" document (Notice 2022-58).

Section 2.01 Responses on the Clean Hydrogen tax credit

Under the IRA, the definition of "qualified clean hydrogen" is restricted to fuel that is produced and sold within the United States and fuel that has a maximum lifecycle greenhouse gas emissions rate of 4 kilograms carbon dioxide equivalent per kilogram of hydrogen. Within this definition, the term lifecycle emissions is defined in Section 45V(c)(1)(A) pursuant with Section 211(o)(1)(H) of the Clean Air Act (CAA). Here, lifecycle emissions are defined as the "aggregate quantity of greenhouse gas emissions (including

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direct emissions and significant indirect emissions such as significant emissions from land use changes)...related to the full fuel lifecycle".

The IRA directs Treasury to use the "GREET model developed by Argonne National Laboratory or a successor model" to calculate the well-to-gate emissions associated with clean hydrogen production. The GREET model is commonly used as a tool to calculate lifecycle GHG emissions, but its quantification methodology falls short of the definition listed in the CAA. GREET estimates in detail direct emissions associated with fuel production including the well-to-gate system boundary as described in the "Request for Comments…" document. However, it does not capture the indirect emissions effects associated with alternative fuels production. These impacts can be very significant due to global integration and cross-sector linkages among fuel supply chains. Thus, the use of GREET alone cannot sufficiently meet the requirement for "lifecycle emissions" for determining eligibility for the § 45V tax credit in the IRA. We recommend the Treasury Department issue guidance clarifying that indirect emissions must be assessed and accounted for in addition to the direct emissions estimated by the GREET model.

Significant indirect emissions research has historically been focused on indirect land use change, or the emissions related to growing food- and feed-based crops for biofuels within a globally integrated market. Increasing demand for agricultural commodities such as corn and soybean oil adds pressure to global markets, raising global prices and incentivizing increased conversion of natural lands to new cropland globally to increase supply of these goods. The additional conversion of natural lands, such as forest and grassland, to cropland results in significant GHG emissions from burning biomass and disturbing soils. These GHG emissions are the indirect land use change emissions of biofuels. EPA accounted for these indirect emissions in its 2010 Regulatory Impact Analysis of the Renewable Fuel Standard.[1] This involved an in-depth modeling analysis of biofuel production pathways and the relationship between fuel inputs, intermediates, end-products, and substitutes on global land expansion. Beyond ILUC, EPA has accounted for the indirect effects that occur when a feedstock that is consumed in non-transport markets is replaced with a substitute

[1] U.S. Environmental Protection Agency (EPA), "Renewable Fuel Standard: Final Regulatory Impact Analysis" (Washington, DC: U.S. EPA, 2010), https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P1006DXP.txt.

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material to meet biofuel demand.[2] Significant indirect emissions accounting under the RFS is not limited to these examples. **Thus, we strongly recommend that the Treasury Department consult with EPA on the lifecycle methodology, especially for indirect emissions, for determining § 45V eligibility.**

Growth in the U.S. clean hydrogen sector is expected to place significant burden on regional transmission grids and could result in increased production of fossil-based resources to meet rising demand. Many hydrogen producers may source electricity from the regional grid rather than through a direct, off-grid connection. If a clear link is not established between these parties and additional electricity demand is met by fossil-based sources, the lifecycle GHG emissions of the hydrogen will be far higher than if the hydrogen was produced using additional renewable electricity. We offer two recommendations to minimize these risks below.

Power purchase agreement (PPA) requirement

PPAs come in many forms and are commonly used by renewable energy developers and electricity customers to reduce exposure to variable electricity prices and meet clean energy targets. Using a PPA, customers agree to pay a fixed price over a set time period from a designated electricity generation source. Although PPAs can be signed by parties located in vastly different geographic areas (i.e., synthetic PPA), we recommend that the § 45V tax credit be limited to parties located within the same geographic region (e.g., load balancing authority). This can help to avoid worsening grid imbalances and curtailment in areas where clean electricity supply exceeds demand.

PPAs are a more reliable method than other compliance mechanisms such as RECs to ensure that clean power is coming from a traceable source. PPA contract design is familiar to developers and producers and could be implemented under § 45V credit guidance with little administrative burden. **We recommend that the Treasury Department issue guidance requiring the use of PPAs to demonstrate renewability of the electricity used for hydrogen production for eligibility for the § 45V tax credit.**

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[2] U.S. Environmental Protection Agency, "Renewable Fuel Standard Program: Grain Sorghum Oil Pahtway," Pub. L. No. 40 CFR Part 80, EPA–HQ–OAR–2017–0655; FRL–9981–57– OAR (2018), https://www.govinfo.gov/content/pkg/FR-2018-08-02/pdf/2018-16246.pdf.

Prohibit the use of renewable energy credit (REC) sales

However, PPAs alone are not robust enough to ensure that clean hydrogen uses additional renewable electricity and has no significant indirect emissions effects. Renewable electricity production in many states is coupled with a renewable energy credit (i.e., REC), that can be sold on the market and later "retired" to demonstrate compliance with state and local renewable energy targets. These targets are often codified in state legislation as Renewable Portfolio Standards (RPSs). Without clear guidance to the contrary, there is a significant risk that clean electricity that is claimed by a hydrogen producer using a PPA could also be claimed by an obligated party subject to RPS targets. This would lead to double counting and indirect emissions effects.

To illustrate, suppose a state has set an RPS target that would require 40 MW of renewable electricity to be dispatched, and hydrogen electricity demand within that state is 10 MW, half of which are supplied by non-renewable power from e.g. natural gas. If the entirety of new hydrogen electricity demand is claimed using RECs submitted to the local utility, then only 35 MW of renewable power is delivered to other customers, short of the 40 MW target set in RPS legislation. In net, this would result in an increase of 5 MW of non-renewable electricity delivered to the regional transmission grid and associated high lifecycle GHG emissions.

We recommend the Treasury Department issue clear guidance prohibiting the sale of RECs generated from the renewable electricity used for clean hydrogen for the purpose of the § 45V tax credit to other parties. This could be accomplished by any or a combination of three pathways:

- Prohibit the generation of RECs by renewable electricity generators for the amount of renewable electricity used for hydrogen production claiming the § 45V tax credit. The link between the renewable electricity generator and the hydrogen production would be demonstrated by a PPA and verified by a third-party auditor;
- Require any RECs generated for the renewable electricity used for hydrogen production to be retired by the hydrogen producer when claiming the § 45V tax credit, when a PPA is used to demonstrate the link between the renewable electricity generator and the hydrogen producer. This would be verified by a third-party auditor;

- If the Treasury Department choses to allow RECs to be used to demonstrate the renewable attribute of grid-derived electricity used for hydrogen production when claiming the § 45V tax credit (this is not recommended), then require the RECs to be retired by the hydrogen producer when claiming the § 45V tax credit. This would be verified by a third-party auditor.

Our recommendation is consistent with the California Low-Carbon Fuel Standard (LCFS) guidance on low-carbon electricity.[3] Under the LCFS, electricity must be generated within the Western Interconnection region and RECs and other environmental attributes must be retired to claim LCFS credits and demonstrate RPS additionality. At the federal level, this electricity would remain eligible to incur other financial benefits such as the federal clean fuel production tax credit.

Building in the above protections would ensure that the lifecycle emissions of clean hydrogen remain below the 4 kg CO_2e/kg H_2 threshold at little administrative cost. Alternatively, failing to implement a PPA + REC retirement requirement could have significant emissions impact if that electricity was generated from a fossil-based resource. The resulting hydrogen would not deliver the GHG emission reductions intended by the IRA. For example, electrolytic hydrogen pathways certified under the California LCFS range between 1.26 – 19.74 kgCO_2e/kg H_2 depending on the source of electricity generation utilized.[4]

Temporal matching

Another consideration to prevent significant indirect emissions impacts from clean hydrogen production is the use of temporal matching. Because electricity supply and demand patterns fluctuate diurnally, an electrolyzer that operates during periods of low renewable resource supply could trigger demand for additional fossil-based electricity on the regional transmission grid (i.e. fossil fuel peaker plants). Although new, clean electricity built to power this same electrolyzer unit may lower the emissions intensity of the

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[3] CARB, "Book-and-Claim Accounting for Low-CI Electricity," April 2019, https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/guidance/lcfsguidance_19-01.pdf.

[4] CARB, "CA-GREET3.0 Lookup Table Pathways Technical Support Documentation," August 13, 2018.

grid during periods of high renewable resource supply, on balance the emissions impacts may be far greater than a scenario where supply and demand were temporally matched.

This is because some types of renewable electricity, namely wind and solar, are produced intermittently. Sometimes the intermittency of one renewable electricity generator may balance out that of another (e.g. a time when it is windy but not sunny), but overall, the increased supply of wind and solar electricity on the grid will result in greater amounts of electricity being curtailed (e.g. when it is very sunny and electricity demand is not high). If no temporal matching is required, a hydrogen producer claiming the use of renewable electricity through RECs or a synthetic PPA over the grid may operate at all hours of the day and year, even while the renewable electricity generator is not generating. Curtailed renewable electricity creates a supply gap that will be filled by the lowest cost electricity generator. It is most likely that this supply gap will occur during times of low availability of renewable electricity on the grid (i.e. when it is not windy or sunny) and thus natural gas peaker plants are the most likely substitute. The purpose of temporal matching requirements would be to avoid this problem.

For example, suppose a hydrogen producer has a synthetic PPA with a solar electricity generator for 1,000 MWh per year. The solar generator generates the 1,000 MWh and delivers it to the grid, but sometimes that solar power is delivered to the grid at very sunny times when solar power exceeds demand. The grid operator curtails some of that electricity, for example 100 MWh per year. The hydrogen producer uses 1,000 MWh of electricity from the grid each year, but only 900 MWh of useable solar power is delivered and used on the grid. This creates a gap of 100 MWh of additional electricity demand that is not supplied by the solar electricity generator and will be filled by the lowest cost electricity generator. The hydrogen would thus effectively be produced using 90% solar and 10% natural gas power. This would result in significant indirect GHG emissions.

The indirect emissions from a lack of temporal matching in hydrogen production was illustrated by a recent study. Ricks et al. used an electricity systems capacity expansion model to estimate the economic and emissions impact of various electricity certification schemes on the levelized cost of clean hydrogen. Authors modeled the impact of hourly and annual matching on the cost and emissions associated with electrolytic hydrogen production relative to a scenario with no policy requirements. They estimated that hourly matching could lead to more than 20

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$kgCO_2e/kg\ H_2$ in GHG emissions savings relative to a scheme where no certification was used. This corresponds with 19.7 kg $kgCO_2e/kg\ H_2$ under the no requirements scenario and -0.8 $kgCO_2e/kg\ H_2$ under the hourly matching scenario. Estimates also assume a median hydrogen sale value and geographic correlation.

The study's modeling of a policy scenario that used annual temporal matching had nearly the same emissions impacts of the no requirements scenario; thus, annual temporal matching is not much better than no temporal matching. Major hydrogen developers in the U.S. and Europe have embraced an hourly matching approach[5] and preliminary studies have estimated that this mechanism would have low administrative cost burden.[6] **Thus, we recommend the use of temporal matching at periods of an hour or less for § 45V tax credit implementation.**

While we highly recommend the Treasury Department consult with EPA on lifecycle methodology, including on indirect emissions, we note that indirect emissions can be difficult and controversial to assess. If the above requirements we recommend for a) preventing double counting of renewable electricity used for hydrogen production and b) requiring hourly or finer temporal matching for hydrogen for the § 45V tax credit are implemented, we do not believe that there would be significant indirect emissions remaining for hydrogen produced from electrolysis. Thus, indirect emissions assessment for electrolysis hydrogen could be avoided, but only if these two requirements are established. However, indirect emissions assessment would still be necessary for other hydrogen pathways, such as hydrogen derived from biogas or other biomass sources, which could still carry significant land use change emissions.

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[5] Max Andrews, "The Future of Energy Certificates: Putting a Precise Timestamp on Green Power," July 1, 2021, https://www.statkraft.com/newsroom/news-and-stories/archive/2021/the-future-of-energy-certificates-putting-a-precise-timestamp-on-green-power/; Nikolaus J. Kurmayer, "Google Wants More Restrictive 'green' Hydrogen Rules," www.euractiv.com, November 3, 2022, https://www.euractiv.com/section/energy/news/google-wants-more-restrictive-green-hydrogen-rules/.

[6] Wilson Ricks, Qingyu Xu, and Jesse D. Jenkins, "Enabling Grid-Based Hydrogen Production with Low Embodied Emissions in the United States" (Zenodo, October 10, 2022), https://doi.org/10.5281/zenodo.7183516.

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Response to questions

(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. (ii) How should emissions be allocated to the co-products (for example, system expansion, energy-based approach, mass-based approach)? (iii) What considerations support the recommended approaches to these issues?

We recommend that emissions from hydrogen co-products such as steam and electricity be allocated on an energy basis while emissions from co-products with significant economic value be allocated using a market-based approach. The reason is that market value is the basis on which operators are making decisions about the production process. For example, suppose an operator can change her production process to produce more or less hydrogen at the expense of a chemical product. In this example, the hydrogen represents 10% of the mass of the total product slate but 50% of the total value of the production chain. If the market price of hydrogen doubles, this operator is likely to increase the production of hydrogen because it accounts for so much of her revenue, even though its mass is small. Because it is the value of the hydrogen co-product that drives production decision-making, the hydrogen should bear the burden of production emissions on a value basis. The reason it is appropriate to allocate emissions on an energy basis for energy co-products is because a) the market prices of energy co-products tend to be fairly similar on an energy basis, and b) it is easier to use energy-based allocation rather than market-based because market values fluctuate. If the co-products of hydrogen are not energy products, then an energy-basis is not possible, and, as demonstrated above, using a mass-based allocation approach is so inappropriate that the market value-based allocation approach is worth the added administrative burden.

For materials that are classified as a co-product, GREET typically adopts an energy allocation methodology if materials are suitable as a fuel for electricity production and market-based allocation using a 5-year average retail price if a co-product has significant economic value (e.g., glycerin) and is not suitable to be used as a fuel.

For co-products that are recycled back within the process stream (e.g., heat, electricity), and for by-products, wastes and

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residues, we recommend the use of a system expansion LCA approach to offset emissions associated with primary fuel production. ICF International published a detailed overview of LCA allocation methodology used within the California Low Carbon Fuel Standard (LCFS), federal Renewable Fuel Standard (RFS), and other major fuels regulations.[7] LCFS and RFS methodology are largely consistent with the default GREET model for categorizing materials as either co-products or byproducts. Wastes and residues are not strictly defined within GREET documentation and are treated the same as byproducts. Within GREET, byproducts are defined as secondary products with little economic value whereas co-products have significant economic value that drive decision making. Byproducts are often assigned zero upstream emission impacts in lifecycle analysis, but analysts are increasingly using system expansion to account for the often significant indirect emissions from the use of by-products for biofuels. For example, EPA has started to do this in its rulemakings.[8]

(1)(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?

As explained above, **we recommend using system expansion in the lifecycle analysis to account for the emissions associated with the production of clean hydrogen as a by-product, and that this should be done on an energy or market value basis.**

(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?

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[7] ICF International, "Waste, Residue and By-product Definitions for the California Low Carbon Fuel Standard" (Washington, D.C.: International Council on Clean Transportation, January 27, 2016), https://theicct.org/publication/waste-residue-and-by%e2%80%90product-definitions-for-the-california-low-carbon-fuel-standard/.

[8] U.S. EPA, "Renewable Fuel Standard Program: Grain Sorghum Oil Pathway," EPA-HQ-OAR-2017-0655 § (2018).

We recommend that the facility be eligible to claim the § 45V credit only for the qualified clean hydrogen it produces. This constraint grants flexibility to hydrogen producers during periods of high demand (e.g., grid congestion) or low renewable resource potential (e.g., offpeak hours) that would increase lifecycle emissions over a limited timeframe. This flexibility may be necessary for many grid-connected hydrogen producers to remain economically viable if strict temporal matching is required (which we recommend). In this case, the hydrogen producer may not claim the § 45V tax credit for hydrogen produced during times when the contracted renewable electricity generator is not generating, but the producer could at least sell this hydrogen product at market price to generate some revenue during those hours.

We recommend that the term facility be restricted to represent a unique process supply chain at a single location. For example, a company that has co-located a steam methane reformer (SMR) plant with an electrolyzer unit producing blue (SMR + carbon capture and sequestration) and green (renewable electrolysis) hydrogen, respectively, would represent two separate hydrogen facilities.

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

We recommend that hydrogen producers follow guidance laid out under the California LCFS program for submission and verification of energy input data. Under the LCFS Tier 1 certification process, fuel producers must enter the most recent two years of operational data into GREET and submit documentation detailing all input and output materials, and equipment efficiencies (e.g., CO_2 capture rate) utilized during the production process. These materials are then reviewed by a third-party verification body which grants or denies approval for certification by the state agency (i.e., CARB). Hydrogen is currently considered to be an emerging fuel that CARB staff has limited experience of certifying and must undergo a more rigorous Tier 2 certification process.

Acknowledging the regulatory updates that are anticipated under the California LCFS program,[9] we recommend that Treasury or an appointed federal agency review and certify hydrogen projects consistent with CARB's Tier 1 certification process.

(3)(a) At what stage in the production process should a taxpayer be able to file such a petition for a provisional emissions rate?

We recommend that Treasury adopt methodology pursuant to Section 95488.9 of the California LCFS regulation for provisional emissions certification.[10] Under the LCFS, hydrogen producers typically file for a certified emissions rate once they have obtained two years (i.e., 24 months) of operational data. However, hydrogen producers may be eligible for a provisional emissions rate after obtaining only 3 months of operational data. Provisional emissions rate certification applies to both new hydrogen facilities and facilities that have implemented a significant change to their process that may alter the carbon intensity of the final fuel. The application process for provisional pathways including the submission of process energy inputs and outputs, equipment data, and third-party verification remain the same as for certified pathways.

Pursuant with LCFS regulation, we recommend that a provisional CI be updated with a certified CI once 24 months of operational data are obtained. Tax credit revenue should be subject to adjustment if the provisional CI is found to be lower than the operational CI. If the provisional CI is found to be higher than the operational CI, facilities should not be granted retroactive credit generation.

(6)(c) Coordination with § 45Q. Are there any circumstances in which a single facility with multiple unrelated process trains could qualify for both the § 45V credit and the § 45Q credit

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[9] CARB, "LCFS Public Workshop: Concepts and Tools for Compliance Target Modeling," https://ww2.arb.ca.gov/sites/default/files/2022-11/LCFSPresentation.pdf.

[10] California Legislature, "Section 95488.9 - Special Circumstances for Fuel Pathway Applications, Cal. Code Regs. Tit. 17 § 95488.9" (2019), https://casetext.com/regulation/california-code-of-regulations/title-17-public-health/division-3-air-resources/chapter-1-air-resources-board/subchapter-10-climate-change/article-4-regulations-to-achieve-greenhouse-gas-emission-reductions/subarticle-7-low-carbon-fuel-standard/section-954889-special-circumstances-for-fuel-pathway-applications.

notwithstanding the prohibition in § 45V(d)(2) preventing any § 45V credit with respect to any qualified clean hydrogen produced at a facility that includes carbon capture equipment for which a § 45Q credit has been allowed to any taxpayer?

Section 45V(d)(2) of the IRA prevents hydrogen producers from claiming both the carbon sequestration and hydrogen tax credit at a single facility. This provision helps direct economic assistance toward clean hydrogen producers in the greatest need of financial support. The ability to stack credits would favor the scale-up of fossil and biomass-based hydrogen pathways as the only facilities eligible for § 45Q and § 45V credit stacking. Unlike electrolytic and nuclear-based pathways, these facilities may have significant upstream emission impacts from methane leakage and CO_2 capture inefficiencies.

We recommend against permitting facilities with multiple unrelated process trains from qualifying for § 45V and § 45Q credit stacking. One exception may be if a producer has co-located two hydrogen projects with independent process streams (e.g., electrolytic and SMR hdyrogen). This producer may then be eligible to receive the § 45V tax credit for one co-located facility and the § 45Q tax credit for the other co-located facility.

Section 2.02 Responses

The § 45Z clean fuel production tax credit provides sustained support for bio- and renewable diesel fuels and targeted support for emerging sustainable aviation fuel (SAF) markets between January 1, 2025 and December 31, 2027. Section (b)(B)(i) states that emission rates should be calculated pursuant with Section 211(o)(1)(H) of the Clean Air Act. This Section also lists specific modeling tools that can be used to calculate these values including the GREET model for non-aviation fuels and the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) for aviation fuels. The Section permits the use of alternative modeling tools as long as CAA lifecycle emissions criteria are satisfied.

Consistent with CAA language, is critical that Treasury accounts for both direct and significant indirect emissions related to the full fuel lifecycle in determining § 45Z credit eligibility. We recommend that Treasury consult with EPA on lifecycle emissions accounting due to the agency's extensive experience evaluating alternative fuels under the RFS. RFS

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lifecycle GHG accounting methodology applies to both on-road transportation fuels that have made up the bulk of credits since the implementation of the program as well as alternative aviation fuels. The RFS assesses direct lifecycle emissions using the GREET model and accounts for significant indirect emissions impacts using exogenous ILUC modeling. RFS guidance also accounts for indirect emissions from feedstock substitution for at least one biofuel pathway.[11] We describe this guidance more in detail in Section 2.01 of this comment document.

Like the RFS, the International Civil Aviation Organization (ICAO) CORSIA program has incorporated direct and significant indirect emissions accounting meeting the requirements of Section 211(o)(1)(H). CORSIA was developed with input from a diverse set of international stakeholders in a transparent, iterative process. Under CORSIA, direct or "core" life-cycle assessment (LCA) values are calculated for the SAF facility in question using GREET or a similar model.[12] Both default and project-specific values may be adopted; default values are a conservative estimate of emissions from common fuel production pathways. Core lifecycle emissions can also be calculated at the project level using a third-party auditor. This consideration provides flexibility to SAF producers to credit process improvements that exceed conventional operating practices.

CORSIA evaluates the significant indirect emissions associated with SAF production using ILUC modeling. CORSIA ILUC values are some of the most recent estimates of indirect SAF impacts that have reached consensus by the international modeling community. CORSIA ILUC values are also subject to updates over time to reflect current data (e.g., average crop yields) and modeling improvements (e.g., double cropping). Alternatively, GREET does not assess ILUC or other indirect emissions. The GREET model presents ILUC estimates for optional use, but these are results copied from another model and presented without transparency. **We recommend that the Treasury Department clarify that the GREET model cannot be used as a standalone tool to assess lifecycle emissions because it does not meet CAA**

[11] U.S. Environmental Protection Agency (2018).

[12] ICAO, "CORSIA Eligible Fuels - Life Cycle Assessment Methodology," November 2021, https://www.icao.int/environmental-protection/CORSIA/Documents/CORSIA_Supporting_Document_CORSIA%20Eligible%20Fuels_LCA_Methodology_V4.pdf.

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requirements. Adopting GREET or an alternative indirect emissions accounting methodology could lead to a weakening of CORSIA's lifecycle emissions methodology.

The CORSIA framework for estimating SAF LCA emissions can be readily adapted under the lifecycle definition for § 45Z. Using the CORSIA LCA methodology for the § 45Z tax credit would also help harmonize U.S. fuel certification with international standards. This is especially important given that approximately 40% of commercial U.S. aviation fuel is consumed on international flights.[13] **For on-road biofuels, we recommend that Treasury account for the indirect emissions of non-aviation fuel using LCA methodology consistent with the RFS.**

Response to questions

(3) Provisional Emissions Rates. Section 45Z(b)(1)(D) allows the taxpayer to file a petition with the Secretary for determination of the emissions rate for a transportation fuel which has not been established. (a) At what stage in the production process should a taxpayer be able to file a petition for a provisional emissions rate? (b) What criteria should be considered by the Secretary to determine the provisional emissions rate?

We recommend that Treasury adopt methodology pursuant to Section 95488.9 of the California LCFS regulation for provisional emissions certification.[14] Under the LCFS, fuel producers typically file for a certified emissions rate once they have obtained two years (i.e., 24 months) of operational data. However, fuel producers may be eligible for a provisional emissions rate after obtaining only 3 months of operational data. Provisional emissions rate certification applies to both new SAF facilities and facilities that have implemented a significant change to their process that may alter the carbon intensity of the final fuel. The application process for provisional pathways including the submission of process energy

[13] U.S. Energy Information Administration, "This Week In Petroleum," August 26, 2020, https://www.eia.gov/petroleum/weekly/archive/2020/200826/includes/analysis_print.php.

[14] California Legislature, Section 95488.9 - Special Circumstances for Fuel Pathway Applications, Cal. Code Regs. tit. 17 § 95488.9.

inputs and outputs, equipment data, and third-party verification remain the same as for certified pathways.

Pursuant with LCFS regulation, we recommend that a provisional CI be updated with a certified CI once 24 months of operational data are obtained. Tax credit revenue will be subject to adjustment if the provisional CI is found to be lower than the operational CI. If the provisional CI is found to be higher than the operational CI, facilities will not be granted retroactive credit generation.

(4) Special Rules. Section 45Z(f)(1) provides several requirements for a taxpayer to claim the § 45Z credit, including for sustainable aviation fuel a certification from an unrelated party demonstrating compliance with the general requirements of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) or in the case of any similar methodology, as defined in § 45Z(b)(1)(B)(iii)(II), requirements that are similar to CORSIA's requirements. With respect to this certification requirement for sustainable aviation fuel, what certification options and parties should be considered to support supply chain traceability and information transmission requirements?

To meet CORSIA eligibility requirements, fuels must adhere to several principles laid out within CORSIA sustainability criteria guidance documents.[7] These criteria attempt to mitigate both greenhouse gas emissions release and adverse environmental and social impacts associated with SAF production. CORSIA eligible fuel is certified using an approved sustainability certification scheme. As of 2022, this includes the Roundtable on Sustainable Biomaterials (RSB) and International Sustainability and Carbon Certification (ISCC) certification programs.[8] RSB has also been used by economic operators as a voluntary certification scheme under the EU Renewable Energy Directive (RED); a complete list of approved voluntary schemes can be found on the European Commission website.[9] We recommend that § 45Z tax credit eligibility is consistent with the use of certification schemes adopted under CORSIA.

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