World Wildlife Fund

1250 24th St. NW
Washington, DC 20037-1193

Phone: 202-293-4800
Fax: 202-293-9211

www.worldwildlife.org

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Secretary Janet Yellen
U.S. Treasury Department
1500 Pennsylvania Avenue NW
Washington, DC 20220

Submitted via regulations.gov

Re: Request for Information (RFI) - Credits for Clean Hydrogen and Clean Fuel Production (Notice 2022-58)

Dear Secretary Yellen,

World Wildlife Fund (WWF) submits these comments to the U.S. Treasury Department and the Internal Revenue Service (IRS) regarding its Request for Comments on Credits for Clean Hydrogen and Clean Fuel Production (Notice 2022-58).

Headquartered in Washington, DC, WWF-US is an independent affiliate of the international WWF Network. WWF-US works in 100 countries and is supported by 1.2 million members in the United States and more than five million supporters globally.

For more than a decade, WWF has worked on reducing aviation emissions around the world. As a member of the International Coalition for Sustainable Aviation, WWF staff serve as technical experts under the International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection. WWF is also one of the co-conveners of the Renewable Thermal Collaborative (RTC).[1] The RTC serves as the leading coalition for organizations that are committed to scaling up renewable heating and cooling at their facilities and dramatically cutting carbon emissions. Green hydrogen, with its high heating value and high flame temperature during combustion, is a good option for supplying high-temperature heat to industrial processes. WWF staff lead the RTC's Green Hydrogen Working Group which brings together energy buyers, solutions providers, and other key stakeholders to better understand the technical and economic potential for scaling green hydrogen for industrial process heat and identify concrete joint actions, including policy engagement, market development, and pilot projects to scale green hydrogen.

The climate crisis has had devastating impacts in the United States and globally, and a clean fuel economy is needed to prevent the climate crisis's worst impacts and ensure a secure, prosperous, and healthy future for all Americans. Therefore, we are thankful for the opportunity to provide feedback on the implementation of the energy tax benefits included in the Inflation Reduction Act.

<u>Overview of WWF Comments for Clean Hydrogen Production Tax Credits</u>

Although green hydrogen production technologies are commercial, the production of green hydrogen is still very small in the US and globally. The IRA Clean Hydrogen Production tax credits make green hydrogen more cost-

competitive relative to fossil-based hydrogen in the US and natural gas in some states[2]. The tax credits will accelerate the development and deployment of clean hydrogen for various use cases.

To ensure that the green hydrogen tax credit delivers genuine climate and environmental benefits, enhances US leadership in clean and competitive manufacturing, supports decarbonization of the US electricity grid and delivers US taxpayers the best value for their tax dollars, the tax code must ensure stringent requirements for reporting the use of renewable electricity in the production of green hydrogen. WWF recommends that the IRS incorporate holistic hydrogen sustainability principles which minimize impact on nature and contribute to a just energy transition. Specifically, WWF recommends that the IRS set clear standards for the renewable electricity needed to claim the maximum green hydrogen tax credit. The standard should require green hydrogen producers to:

- Demonstrate they have matched on an hourly basis the generation of the renewable electricity they use for green hydrogen production; and
- source the renewable electricity production from the same grid region as the hydrogen production.

In a few places, hourly matching is possible immediately. In others, it will take some time for the renewable energy certifiers to develop this capability. WWF is open to allowing other matching periods during a phase-in, but only if that phase-in period is temporary and producers claiming the credit during the phase-in period must meet the hourly matching requirement when the phase-in period ends. Failing this, WWF opposes any phase-in period and recommends an immediate hourly matching requirement. Without hourly matching, the green hydrogen tax credit could lead to greater emissions than without the tax credit.

More detailed comments may be found below to the specific questions in Notice 2022-58.

.01 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?

(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?

A well-to-gate approach is not sufficient in evaluating the full lifecycle impacts of hydrogen projects: transportation and end-use of hydrogen could also have significant emissions footprint. A proper accounting methodology will ensure that IRA provides the right incentives for hydrogen to be transported and used in the where most impactful. When evaluating a hydrogen project, full lifecycle emissions must be considered, including Land Use, Land-Use Change and Forestry (LULUCF) for the hydrogen site and production energy sources, upstream emissions, direct emissions from hydrogen production, and emissions from the transport and storage of hydrogen (including leakage), and the use of hydrogen (including NOx emissions).

Beyond emissions, the IRS should also consider working in collaboration with DOE and other key stakeholders to incorporate holistic sustainability principles to ensure that hydrogen projects receiving tax credits will:

- Avoid negative impacts on water, land use, and biodiversity by proper siting of hydrogen projects and production energy sources.
- Consider and ensure safe and environmentally friendly disposal of brine where sea water is used for production.
- Ensure that critical raw minerals needed for renewable energy & electrolyzer equipment have been ethically & sustainably sourced.
- Involve, consult and benefit local communities likely to be affected by hydrogen production.

- Implement proper health and safety standards.
- Support local climate strategies and decarbonization plans.

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

(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?

(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?

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

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

(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?

(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?

WWF recommends that the IRS:

1. Leverage existing tracking systems, including Renewable Energy Certificates (RECs) systems, for reporting and verifying clean hydrogen production from various renewable electricity sourcing options, including Power Purchase Agreements (PPAs), on-site, etc.

2. Allow indirect book accounting with hourly time matching. WWF is open to phasing in the **hourly matching** requirement within a reasonable time after promulgation (e.g., 3 years).

A study by Princeton University has shown that matching electricity consumption on an hourly basis with locally procured, "additional" clean generation is required to ensure emissions saving from clean hydrogen production. Without more granular temporal matching (e.g., hourly), increasing hydrogen production will incentivize not only new and additional renewable electricity but also increases in coal and gas as marginal generators in the system. According to this study, without hourly matching of local, additional renewable electricity, emissions from grid-based electrolysis are roughly double those of grey hydrogen[3].

Many other studies have pointed out the deficiencies of annual matching, largely owing to mismatches between the profile of renewable energy supply and energy demand[4]. Without hourly, location-based matching, producers will be incentivized to match 100 percent of their annual demand with RECs from the lowest-cost sources that may have been generated far from the actual grid where hydrogen is being produced and only for portions of the year.

REC registries are adapting to growing demands for granularity, making hourly matching across the United States increasingly feasible. M-RETS, which currently covers 15 states across the Midwest and is expanding to the entire West, has offered hourly RECs since January 2021. PJM GATS, another widely used registry, expects to offer hourly RECs by the end of 2022.

If the IRS deems immediate hourly matching infeasible, WWF recommends that the phase-in period should be no longer than three years after promulgation. At the end of the phase in period, all producers should be required to meet the hourly matching requirement, and there should be no exemptions for existing producers to use a longer matching period. Hourly matching will help further accelerate a transition that is already well underway and send a strong signal to the green hydrogen and renewable electricity markets.

3. Allow indirect book accounting within the same balancing authority

   Renewable electricity and associated RECs should be sourced from generation within the same balancing authority of the hydrogen production site to ensure that renewable capacity is being developed in the regions where there is demand. This is an increasing expectation in renewable electricity sourcing and should be incorporated into the requirements for qualified clean hydrogen production today[5].

<u>Overview of WWF Comments for Clean Fuel Production Credit</u>

Sustainable aviation fuels are a key component of the decarbonization of the aviation sector. Of the nearly 100 billion gallons of aviation fuel consumed by commercial airlines in 2019[6], 99.9% was fossil jet fuel. Scaling sustainable aviation fuels beyond first-generation biofuels will require advanced technologies and fuel pathways that do not currently exist at production scale, adding risk and cost to financing feedstock and fuel production. For the Clean Fuel Production Credit to play a significant role in the development of this sector, incentivized fuels must have low life cycle emissions and adhere to widely accepted sustainability safeguards. These safeguards are particularly necessary for crop-based biofuels, which can trigger large land-use impacts and indirect emissions through the conversion of natural ecosystems. The existing Renewable Fuel Standard (RFS) highlights the risk of promoting crop-based biofuels to accelerate advanced fuel production. Congress's General Accounting Office concluded in 2019 that the RFS increased food prices, provided little to no emissions benefit, and failed to promote advanced biofuels[7]. Additional research concludes that the RFS led to a net increase in GHG emissions compared to petroleum fuels due to accelerated land conversion[8]. To maximize the impact of the Clean Fuel Production Credit and properly incentivize the highest quality aviation fuels, life cycle methodological choices must be rigorous and properly consider induced land use change, and the sustainability certification of fuels established under the general requirements for the International Civil Aviation Organization Carbon Offsetting and Reduction Scheme for International Aviation must be carried out as intended. More detailed comments may be found below to the specific questions in Notice 2022-58.

.02 Clean Fuel Production Credit (§ 45Z).

(2) Establishment of Emissions Rate for Sustainable Aviation Fuel. Section 45Z(b)(1)(B)(iii) provides that the lifecycle greenhouse gas emissions of sustainable aviation fuel shall be determined in accordance with the Carbon Offsetting and Reduction Scheme for International Aviation or "any similar methodology which satisfies the criteria under § 211(o)(1)(H) of the Clean Air Act (42 U.S.C. 7545(o)(1)(H)), as in effect on the date of enactment of this section." What methodologies should the Treasury Department and IRS consider for the lifecycle greenhouse gas emissions of sustainable aviation fuel for the purposes of § 45Z(b)(1)(B)(iii)(II)?

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) life cycle assessment methodology and resulting sustainable aviation fuel (SAF) life cycle values are the result of a dedicated international collaboration of experts within the International Civil Aviation Organization (ICAO) Committee on Aviation Environmental Protection (CAEP). The mandate and expertise of the committee is specifically designed to assess and accommodate the unique methodological considerations for different SAF feedstocks and conversion technologies. Deviating from

the CORSIA life cycle methodology introduces significant risks of underestimating fuel emission factors, particularly as it pertains to the induced land use change component, where considerable uncertainty inherently resides. To address this uncertainty CAEP does not rely on a single model for the determination of induced land use change values. Instead, two economic equilibrium modes (GTAP-BIO and GLOBIOM) are employed. The results of the two models are compared for analysis so differences may be investigated, iterated on, and reconciled. CAEP uses this information to modify and update both models. The resulting values of these two models are averaged where the difference is 8.9 gCO_2e/MJ or less, and if greater the lower of the two values is used, plus 4.45 gCO_2e/MJ. The different values derived from these two models demonstrate the risk of relying on a single induced land use change methodology for the purposes of the Clean Fuel Production Credit. Of the twenty-two pathways simulated in both models, eight had a difference of over 20 gCO_2e/MJ, five had a difference of 10-20 gCO_2/MJ, and the remaining nine pathways had a difference of less than ten gCO_2/MJ. Detailed assessments are available in Chapter 5 of the CORSIA Supporting Document "CORSIA Eligible Fuels – Life Cycle Assessment Methodology"[9].

The Treasury Department and the IRS should defer to the CORSIA life cycle methodology whenever possible to avoid underestimating life cycle values and should avoid providing emission factors produced from "similar" methodologies, particularly where such values are already provided under CORSIA. In practice, this means either using the full CORSIA life cycle value only or using the induced land use change component of the CORSIA methodology to supplement "core" life cycle values derived from non-CORSIA methodologies. Failing this approach, any emission factor values derived from a methodology under § 45Z(b)(1)(B)(iii)(II) should derive induced land use change values from the conservative reconciliation of multiple models and those values should be equal to or lesser than the value provided under the CORSIA methodology, where available. Conservative approaches are especially required for biogenic removals inherent in any life cycle methodology, such as soil organic carbon, which could be overestimated and/or reversed with changes to agricultural practices. The Treasury Department and the IRS should consult with EPA for such decisions.

(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?

Power-to-liquid (PtL) SAF (also known as electrofuel, e-fuel, or e-kerosene) is a synthetic drop-in fuel produced with hydrogen and carbon oxide feedstocks. PtL SAF is a promising fuel source in the aviation sector because of its potential for near-zero lifecycle emissions and the sustainability benefits associated with non-biogenic feedstocks. Default emission factors are difficult to derive for PtL SAF because of the variability of "core" life cycle emissions which are dependent in large part on the source of electricity used for electrolysis and the source of carbon oxide feedstocks. CORSIA addresses this variability by allowing producers to calculate and have certified via a third party an actual "core" life cycle value specific to that producer. A similar producer-specific approach should be accommodated under § 45Z(b)(1)(D) for SAF with no applicable default "core" life cycle value established under CORSIA. Excluding this approach may effectively exclude power-to-liquid SAF from the incentives under the Clean Fuel Production Credit. Taking this into consideration, the criteria considered by the Secretary should include (1) the non-existence of a default "core" life cycle value under CORSIA due to the inability or incompatibility of the specific fuel pathway to derive default values and (2) the expected emission reduction potential of the SAF.

(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?

Volume IV to Annex 16 of the *Convention on International Civil Aviation*[10] contains the relevant certification requirements under CORSIA, which should be adhered to, mutatis mutandis, in the case of any similar methodology. This must include adherence to the provisions in Section 2.2.4 of Volume IV, which requires that eligible fuel be certified by an approved certification body (referred to as Sustainability Certification Schemes (SCSs)) included in the ICAO document entitled "CORSIA Approved Sustainability Certification Schemes"[11] to demonstrate that such fuel meets the CORSIA Sustainability Criteria as defined within the ICAO document entitled "CORSIA Sustainability Criteria for CORSIA Eligible Fuels"[12]. Approved certification bodies are demonstrated to have met the requirements included in the ICAO document entitled "CORSIA Eligibility Framework and Requirements for Sustainability Certification Schemes"[13] which, inter alia, includes requirements for documentation management, audit competencies, procedures for monitoring and systems review, transparency, and accreditation. Adherence to these requirements is designed to ensure proper competency, supply chain traceability and information transmission. For avoidance of doubt, please note that certification of qualifying SAF to the CORSIA Sustainability Criteria are core amongst CORSIA's general requirements and must be performed to satisfy § 45Z(f)(1)(A)(i)(II)(AA) and (BB).

World Wildlife Fund thanks the Treasury and IRS for its efforts to implement the clean energy tax benefits in the Inflation Reduction Act in a way that is most reflective of the needs of taxpayers and the environment. We thank you for your attention to these comments and look forward to continuing working with you.

Sincerely,

Marty Spitzer, J.D., Ph.D.
Senior Director, Climate and Renewable Energy
World Wildlife Fund