February 26, 2024

Internal Revenue Service
CC:PA:LPD:PR (REG–117631–23), Room 5203
P.O. Box 7604
Ben Franklin Station, Washington, DC 20044

The Honorable Secretary Janet Yellen
U.S. Department of the Treasury
1500 Pennsylvania Avenue NW
Washington, D.C. 20220

The Honorable William M. Paul
Acting Chief Counsel
Internal Revenue Service
1111 Constitution Ave, NW
Washington D.C., 20224

Re: Notice of Proposed Rulemaking, Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election To Treat Clean Hydrogen Production Facilities as Energy Property

Dear Secretary Yellen and Acting Chief Counsel Paul,

World Wildlife Fund (WWF) appreciates the opportunity to submit comments in response to the Department of Treasury REG–117631–23.

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.

WWF is a co-convener of the Renewable Thermal Collaborative (RTC). The RTC is a global coalition of companies, institutions, and governments committed to decarbonizing thermal energy use by scaling up renewable heating and cooling technologies at their facilities. It was founded in 2017 and is facilitated by the Center for Climate and Energy Solutions, David Gardiner and Associates, and the World Wildlife Fund. RTC members and sponsors include many companies in the U.S. and the world across a diverse range of industries, including leaders in the food and beverage, pharmaceutical, consumer packaged goods, paper, chemicals, higher education, building materials, and automotive sectors. RTC members include global industrial and institutional energy users representing more than $3 trillion in market capitalization. The RTC also includes various solutions providers and experts, including renewable thermal technology developers, project financiers, consultants, utilities, and more.

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 is already having devastating impacts in the United States and globally, and it is only growing worse. A clean hydrogen economy is an important part of the solution as we seek to transition rapidly away from fossil fuels, prevent the worst impacts of climate change, and ensure a secure, prosperous, and healthy future for all Americans. We appreciate the opportunity to provide feedback on implementing the clean hydrogen production tax benefits of the Inflation Reduction Act.

Overview of WWF's Comments

The Inflation Reduction Act's Section 45V Clean Hydrogen Production Credit has the potential to significantly lower the production cost of green hydrogen. It could make green hydrogen more cost-competitive relative to fossil-based hydrogen in the U.S. and natural gas in some states[1]. The tax credits will be critical to accelerate the development and deployment of clean hydrogen for various use cases.

The three-pillar framework of incrementality, temporal matching, and deliverability in the proposed rulemaking mark a significant step towards ensuring the IRA clean hydrogen production tax credit meaningfully contributes to emissions reduction, enhances U.S. leadership in clean and competitive manufacturing, supports decarbonization of the U.S. electricity grid, and provides U.S. taxpayers the best value for their tax dollars. However, meeting these requirements is still challenging for clean hydrogen producers in the near term. Getting the highest level of tax credit is essential for them to compete with the fossil alternative, accelerate the decarbonization of the hydrogen industry, and scale green hydrogen as a decarbonization solution for other sectors.

Setting attainable and predictable eligibility rules is critical in getting clean hydrogen off the ground. Therefore, WWF recommends 1) more accurate accounting for methane leakage in the GREET model, 2) creating additional flexibility for the three pillars of electrolytic hydrogen, and 3) stringent emissions accounting and sustainability requirements for Renewable Natural Gas (RNG) and biomass used for hydrogen production to ensure environmental integrity.

GREET Model

WWF supports updating the 45VH2-GREET Model annually to reflect the changing electricity grid average emissions and better data about the upstream emissions from fossil-based hydrogen pathways, particularly the upstream methane leakage rate.

Several peer-reviewed studies[2] have shown that the 0.9% methane leakage rate in the current GREET model significantly underestimated the reality. WWF recommends that Treasury, the Department of

[1] "The Renewable Thermal Vision", Renewable Thermal Collaborative, November 2022. https://www.renewablethermal.org/vision/

[2] Alvarez et al. found a national average leak rate of 2.3%. Alvarez, Ramón A., et al. "Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain." Science, vol. 361, no. 6398, July 2018, pp. 186–88. science.org (Atypon), https://doi.org/10.1126/science.aar7204.
Lin et al. found a steady leak rate of 6-8% over six years in the Uinta Basin. Lin, John C., et al. "Declining Methane Emissions and Steady, High Leakage Rates Observed over Multiple Years in a Western US Oil/Gas Production

Energy, and the Environmental Protection Agency work together to improve the monitoring, tracking, and accuracy of estimates for the methane leakage from the natural gas sector and move toward basin- or operator-specific measurements rather than the national average.

Temporal matching and Incrementality of Electrolytic Hydrogen

1. Temporal matching

Early green hydrogen projects still face challenges related to hourly matching, including an underdeveloped hourly-matching tracking system, lack of access to additional renewable assets to meet the hourly matching requirements, and the cost premium of hourly-matched electricity etc. These challenges could significantly delay the urgently needed investment and progress to scale green hydrogen.

To support early projects, WWF recommends that for clean hydrogen projects placed in service before 2028, Treasury issue the tax credit to the specific volumes of hydrogen that meet the temporal matching requirements rather than according to the average lifecycle GHG emissions rate of all hydrogen produced at a qualified clean hydrogen production facility on an annual basis. Hydrogen projects need to demonstrate long-term financial viability to secure investment. Therefore, even with the phase-in period, projects must show they can meet the temporal matching requirements from the beginning. Granting the tax credit on a volume basis would allow early hydrogen projects the flexibility to determine the levels of hourly matching that make financial, infrastructure, and business sense and the long-term certainty to secure the investment they urgently need to accelerate the growth of the clean hydrogen industry. For projected placed in service before 2028, hydrogen producers should have the right but not the obligation to switch to a facility average at any point for the remainder of the credit period. For projects placed in service after the beginning of 2028, tax credits should be issued according to the average lifecycle GHG emissions rate of all hydrogen produced at a qualified clean hydrogen production facility on an annual basis to ensure that the tax credit creates incentives for new clean hydrogen projects.

For projects placed in service after the beginning of 2028, WWF recommends a 5% fixed allowance for non-hourly matched low-carbon electricity to allow for grid operation uncertainties. Analysis also shows that the cost increases drastically to meet the last 5-10% of the hourly matching requirement[3]. This would help clean electrolytic hydrogen become more cost-competitive while still meaningfully contributing to decarbonizing the electricity grid.

Energy storage is critical to lower the cost of hourly matching. Behind-the-meter energy storage directly modifies the load of a hydrogen production facility, i.e., the electricity load would be reduced when

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Basin." Scientific Reports, vol. 11, no. 1, 1, Nov. 2021, p. 22291. www.nature.com, https://doi.org/10.1038/s41598-021-01721-5.
Chen et al. found a 9% leak rate in the New Mexico Permian Basin. Chen, Yuanlei, et al. "Quantifying Regional Methane Emissions in the New Mexico Permian Basin with a Comprehensive Aerial Survey." Environmental Science & Technology, vol. 56, no. 7, Apr. 2022, pp. 4317–23. ACS Publications, https://doi.org/10.1021/acs.est.1c06458.

[3] "Decarbonizing the grid with 24/7 clean power purchase agreements", McKinsey&Commpany, May 2022. https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/decarbonizing-the-grid-with-24-7-clean-power-purchase-agreements

using the battery. WWF recommends that off-site energy storage be considered a load modification as part of a clean energy portfolio that taxpayers can use to comply with hourly matching requirements.

2. Incrementality

Long permitting and approval processes and interconnection queues for new renewable projects create risks for green hydrogen projects to meet the incrementality requirements. WWF recommends that the IRS extend the incrementality requirements for the commercial operating date of the electricity generating facility from 36 months to 48 months before the hydrogen production facility is placed in service.

As the Treasury points out, negative wholesale prices increased from 2.3% of hours in 2018 to 6.3% in 2022—a nearly 30% average annual increase. At this recent growth rate, negative wholesale prices will reach over 10% of hours 2024. WWF recommends increasing the 5% fixed allowance for generation from existing low-carbon electricity generators to 10% to better reflect likely futures over the term of the incentive.

Lastly, because the grid will continue to decarbonize, Treasury should create mechanisms to ensure that a sufficiently decarbonized grid meets the incrementality requirement in the future.

Renewable Natural Gas for Hydrogen Production

Renewable Natural Gas (RNG) will be limited in supply and, hence, will not be a scalable production pathway for clean hydrogen. According to RTC's analysis, RNG could meet 2% of the US's total natural gas demand in 2040, about 875 TBtu, most of which will go to gas utilities and be used directly in commercial and industrial sectors. Given the energy loss in converting RNG to hydrogen, supplying the limited RNG to sectors that can use it directly is more efficient than using it to produce hydrogen.

The twelve questions Treasury posed in the proposed rulemaking highlight the complexity of the RNG production, value chain, and environmental integrity concerns. WWF urges Treasury to work with key stakeholders and thoroughly research the issues before finalizing the rules for RNG under the 45V clean hydrogen production tax credit.

If the Treasury decides to allow additional sources of RNG beyond landfill gas under the 45V tax credit, WWF recommends the following to ensure that the use of RNG in hydrogen production delivers genuine climate benefits and does not create incentives to generate more waste or support the growth of Concentrated Animal Feeding Operations (CAFOs).

1. Lifecycle emissions of RNG

Land use change emissions, including deforestation and losses of other land classes such as wetlands and grasslands, must be included in the GREET model. The Treasury should incorporate accounting rules aligned with the Greenhouse Gas Accounting Protocol Land Sector and Removals Guidance. Land use change can be considered negligible only when the source of the RNG is a waste product (e.g., food or animal waste) that has no other market value than the production of RNG.

Treasury should not allow negative carbon intensity scores regardless of the counterfactuals included in the GREET model for assessing the lifecycle GHG emissions of RNG-produced hydrogen. The negative carbon intensity of some RNG would create a perverse incentive in favor of conventional natural gas hydrogen production. We are extremely concerned that negative carbon intensity scores of some RNG would allow conventional natural gas hydrogen producers to receive a higher level of tax credits without meaningfully decarbonizing their production. This would undermine the intention of the tax credit to scale clean hydrogen production pathways.

WWF also recommends that RNG be held to the standards proposed in the GREET model section of this comment letter on methane leakage tracking and reporting as conventional natural gas if transported with a common carrier natural gas pipeline.

Conservative default parameters should be used to assess biogas and RNG-based Provisional Emissions Rates (PERs) unless they provide third-party verified or peer-reviewed evidence otherwise.

2. First productive use

WWF supports stringent rules and verification on the first productive use for RNG to ensure the incentivized RNG is truly incremental and a proper hierarchy of use for RNG.

3. Book and Claim

Treasury should further research the need for geographic boundary requirements before allowing an RNG book-and-claim under the 45V tax credit to confirm whether there would be different emissions impacts across geographies.

4. Proper waste management

Food is the single largest input by weight into US municipal landfills and incinerators, where it has significant social and environmental impacts. Food waste produces not only high levels of methane emissions as it decomposes but also local air and water pollutants from both landfilling and incineration. An estimated 80% of these municipal incinerators are in lower-income areas and on Indigenous lands, where they disproportionately affect underserved communities and communities of color[4].

The tax credit for RNG under 45V should be part of an overall strategy to reduce food waste, prevent new food and organic material from going into landfills, increase waste-to-animal feed, organics recycling, composting of food waste, and capture methane emissions from existing food waste.

[4] "Invest in Prevention and Keep Waste out of Landfills." *Zero Food Waste Coalition*, https://zerofoodwastecoalition.org/action/invest-in-prevention-and-keep-waste-out-of-landfills/. Accessed 23 Feb. 2024.

Biomass Gasification for Hydrogen Production

Land use change, including deforestation and losses of other land classes such as wetlands and grasslands, is a significant part of the lifecycle emissions of biomass and must be included in the GREET model for biomass gasification hydrogen production. The Treasury should incorporate accounting rules aligned with the Greenhouse Gas Accounting Protocol Land Sector and Removals Guidance.

Only waste-derived biomass should be eligible for the 45V tax credit. Purpose-grown biofuel crops and harvesting of stem wood (i.e., whole trees) do not deliver genuine climate benefits. They could lead to further deforestation, displacement of food crops, or environmental degradation. The footprint of bioenergy can be substantially reduced by using biomass residues and waste to avoid using additional land for energy crops. Forest Stewardship Council (FSC) certification, Roundtable on Sustainable Biomaterials (RSB) certification, or FSC-controlled wood standards should be applied to any biomass used for hydrogen production to ensure that the lands from which the biomass is derived are managed well. Land use change can be considered negligible only when gasification uses waste biomass that has no other market value than hydrogen production.

Conclusion

Green hydrogen will be an important component of a clean energy economy and a net-zero future. WWF strongly supports the incentives under Section 45V of the Inflation Reduction Act. We appreciate the opportunity to provide input as the Treasury implements this landmark climate and energy legislation, and we are happy to answer any questions or provide any follow-up information that may be helpful.

Sincerely,

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