LOW IMPACT HYDROPOWER INSTITUTE

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February 23, 2024

Ms. Holly Porter
Associate Chief Counsel (Passthroughs and Special Industries)
U.S. Department of the Treasury, Internal Revenue Service
Ben Franklin Station
P.O. Box 7604, Room 5203
Washington, DC 20044
Submitted via www.regulations.gov, REG–117631–23

Re: Request for Comments on Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property (REG–117631–23)

Dear Ms. Porter,

The Low Impact Hydropower Institute (LIHI) commends the U.S. Department of Treasury (Treasury) for establishing a strong foundation of Proposed Regulations[1] for implementing the federal clean hydrogen production tax credit under the Inflation Reduction Act (26 U.S.C. Section 45V) and appreciates the opportunity to provide comments to strengthen these regulations further. LIHI supports the Treasury's use of the 3 design pillars—incrementality, temporal matching, and deliverability—to ensure that the billions of dollars in public funding[2] support truly clean electrolytic hydrogen production, rather than hydrogen production that either shifts greenhouse gas (GHG) emissions elsewhere at best or increases GHG emissions at worst.[3] However, these 3 design pillars are insufficient to ensure that hydropower-based electrolytic hydrogen production does not inadvertently harm the nation's river systems. This historic investment in climate change mitigation must be consistent with, rather than at the expense of, ecosystem conservation. To that end, these comments outline additional safeguards to ensure that only hydropower that operates in a socio-environmentally responsible manner qualifies for clean hydrogen production.

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[1] Internal Revenue Service, U.S. Treasury, Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, Notice of Proposed Rulemaking and Notice of Public Hearing, December 26, 2023, p. 89232. Available at: https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf

[2] U.S. National Clean Hydrogen Strategy and Roadmap, p. 1. Available at: https://www.hydrogen.energy.gov/docs/hydrogenprogramlibraries/pdfs/us-national-clean-hydrogen-strategy-roadmap.pdf

[3] Ricks, W., Xu, Q. and Jenkins, J.D. 2023. Minimizing emissions from grid-based hydrogen production in the United States. *Environmental Research Letters*, *18*(1), p.014025; EPRI and GTI Energy, 2023. Impacts of IRA's 45 V Clean Hydrogen Production Tax Credit. Available at: https://www.epri.com/research/products/000000003002028407; *See* generally, November 21, 2023, Supplemental Comments of Earthjustice, Notice 2022-58, Request for Comments on Credits for Clean Hydrogen and Clean Fuel Production.

Background on the Low Impact Hydropower Institute

LIHI is a national 501(c)(3) organization that was established in 1999 with a mission to recognize and support hydropower that prioritizes environmental, recreational, historical, and cultural resource protection.[4] LIHI advances this mission by offering the *only* science-based program in the United States for certifying hydropower facilities that avoid or significantly reduce their socio-environmental impacts and that invest in river stewardship beyond regulatory compliance. LIHI has served as a unique bridge between the hydropower industry and the environmental community and has independently reviewed and certified over 300 hydropower facilities in 24 states and 101 rivers based on eight Low Impact Hydropower criteria.[5]

Over the last two decades, LIHI's experience of certifying Low Impact Hydropower facilities has highlighted a critical need to balance climate adaptation and conservation outcomes. Hydropower is a key renewable energy resource that has a pivotal role to play in the nation's clean energy future. Its strategic value is more important than ever in a 24/7 clean generation scenario since it can operate at all hours of the day and often ramps up when wind and solar generation are unavailable.[6] Yet, hydropower operations can have serious impacts on river systems and the people, fish, and wildlife that depend on them. Without rigorous guardrails, hydropower's strategic role in climate change mitigation risks exacerbating these impacts and undermining conservation goals.

As the nation invests in critical climate change mitigation strategies, including through the federal clean hydrogen tax credit, it is vital to only support hydropower that concurrently prioritizes ecosystem and climate outcomes. To that end, these comments outline additional safeguards for hydropower that the Treasury should adopt, encompassing both 'new' hydropower generation as well as any existing hydropower generation that may qualify for clean hydrogen production in limited circumstances.

Safeguards for Hydropower to Qualify as an Eligible Resource for Clean Hydrogen Production

1. **For a 'new' hydropower facility, the Treasury should require that facility to obtain a low impact certification according to science-based criteria[7] to be eligible as supporting 'qualified clean hydrogen' production.**

Under the Treasury's Proposed Regulations, electricity generation from 'new' hydropower facilities—ones that involve uprates and/or new equipment additions at pre-

[4] Low Impact Hydropower Institute. About us. Available at: https://lowimpacthydro.org/about-us-2/
[5] Low Impact Hydropower Institute. Criteria & Standards. Available at: https://lowimpacthydro.org/criteria-standards/
[6] *See* for example, CAISO's Supply Trend for April 19, 2023, where a sharp decline in renewable generation is met with an increase in hydropower generation. Available at: https://www.caiso.com/TodaysOutlook/Pages/supply.html
[7] *See* for example, Low Impact Hydropower Institute. Criteria & Standards. Available at: https://lowimpacthydro.org/criteria-standards/

existing dams or water delivery structures[8]—would meet the incrementality requirement.[9] Due to several recent legislative and regulatory efforts, an explosion of such 'new' hydropower generation is likely to occur in the coming years. On the legislative side, new laws have unlocked an unprecedented level of funding to enhance hydropower generation. Under the Bipartisan Infrastructure Law of 2021, for instance, over $700 million in funding is available for hydropower facilities to undertake a wide range of projects—from powering non-powered dams to making efficiency and environmental improvements—to enhance hydropower production at existing dams.[10] On the regulatory side, efforts are underway to streamline the development of certain kinds of hydropower projects, such as Oregon's House Bill 3097 that was signed into law in 2023 and that would expedite in-conduit hydropower development.[11] These efforts will likely result in the creation of thousands of megawatts[12] (MW) of 'new' hydropower generation that would meet the requirements for 'qualified clean hydrogen.'

However, the current design specifications of the three pillars do not guarantee that hydropower facilities with the newly added incremental generation would operate in a manner that puts people and the environment first, especially if the facilities lack regulatory oversight. For instance, a conduit hydropower project with a capacity of 40 MW or less would be exempt from the Federal Energy Regulatory Commission's (FERC) oversight.[13,14] Conventional hydropower projects with a capacity of 10 MW or less, are similarly exempt from FERC's licensing requirements.[15] With proposed legislative changes under discussion in Congress, the

[8] LIHI does not consider hydropower facilities as eligible for Low Impact Certification if they would require the construction of a new dam or diversion if one did not already exist prior to August 1998.
[9] Internal Revenue Service, U.S. Treasury, Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, Notice of Proposed Rulemaking and Notice of Public Hearing, December 26, 2023, pp. 89229–89230. Available at: https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf
[10] *See* https://www.energy.gov/gdo/bipartisan-infrastructure-law
[11] *See* Oregon House Bill 3097. Available at: https://olis.oregonlegislature.gov/liz/2023R1/Measures/Overview/HB3097
[12] For example, a 2023 Pacific Northwest National Laboratory paper identified an estimated capacity of more than 8200 MW that could be readily added to 500 existing non-powered dams, *see* https://www.pnnl.gov/publications/hydropower-potential-non-powered-dams-multi-criteria-decision-analysis-tool-based-grid ; a 2023 Oak Ridge National Laboratory report identified opportunities to develop over 1000 MW of new generating capacity on municipal and agricultural conduits alone, *see* https://www.energy.gov/eere/water/articles/new-assessment-finds-opportunities-conduit-hydropower-development-across-united#:~:text=In%20This%20Report&text=The%20report%2C%20which%20is%20the,industrial%20(378%20megawatts)%20sectors.
[13] Federal Energy Regulatory Commission. Exemptions from Licensing. Available at: https://www.ferc.gov/licensing/exemptions-licensing
[14] It is worth noting that under Section 4(e) of the Federal Power Act as amended by the Electric Consumers Protection Act of 1986, FERC is mandated to give "equal consideration" to power and non-power aspects of a project. By design, the FERC licensing process is insufficient to guarantee that projects will be low impact since the environmental considerations are weighed against the power benefits of a project. In contrast, LIHI's Low Impact Certification solely focuses on the socio-environmental impacts of a project and aims to minimize or avoid such impacts regardless of the project's power characteristics or benefits. When compared to FERC's license requirements, LIHI facilities typically demonstrate voluntary actions, additional accountability, and additional scrutiny (*See* Ames, S.B.J, and M. Fischer. 2020. Low Impact Hydropower Institute 20-Year Review Report. Low Impact Hydropower Institute, Arlington, MA. p. vii).
[15] Federal Energy Regulatory Commission. Exemptions from Licensing. Available at: https://www.ferc.gov/licensing/exemptions-licensing

exemption threshold for conventional hydropower projects may rise further, [16] which in turn may increase the number of projects falling through the net of regulatory oversight.[17]

As the nation advances the much-needed efforts to tackle climate change, it is important to ensure that climate mitigation strategies and conservation efforts are not on a collision course; towards this end, LIHI's Certification Program has served a key role in advancing the inclusion of only socio-environmentally responsible hydropower in both mandatory and voluntary climate programs. Recognizing the unique challenges and impacts of hydropower facilities, several state Renewable Portfolio Standard programs use LIHI Certification as an eligibility criterion for participation in the programs (e.g., Massachusetts, Pennsylvania, Oregon, and Delaware).[18] In voluntary markets, LIHI's science-based Certification Program is required and recognized in the Green-e® Energy Program,[19] RE100,[20] and the U.S. Environmental Protection Agency's (EPA) Green Power Partnership Program (GPP).[21, 22] Out of all available hydropower resources, the U.S. EPA GPP specifically includes LIHI Certified® facilities in the subset of 'green power,' which represents renewable energy resources that provide the greatest environmental benefit.[23]

Given the scope and scale of public investment in clean hydrogen production, it is vital that the Treasury deem 'new' hydropower generation as eligible incremental generation if the hydropower facilities have demonstrably addressed their social and ecological impacts. Failing to do so could have the unintended outcome of using public dollars in a manner that harms the nation's vital river systems, which serve as critical natural infrastructure for adapting to a changing climate.[24]

<u>The Treasury should therefore require 'new' hydropower facilities to obtain low impact certification using science-based criteria, such as LIHI Certification, as evidence of socio-environmentally responsible operation to qualify as eligible incremental clean generation.</u>

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[16] For example, H.R. 4045 proposes to increase the license exemption threshold for projects from 10 MW to 40 MW.

[17] As a point of comparison, the vast majority of existing FERC-licensed hydropower facilities have an operating capacity of 40 MW or less.

[18] Low Impact Hydropower Institute. Green Markets – Compliance. Available at: https://lowimpacthydro.org/green-markets-compliance/

[19] Green-e® Energy, Green-e® Energy Renewable Energy Standard for Canada and the United States Version 4.2., pp. 4–5. Available at: https://www.green-e.org/docs/energy/Green-e%20Standard%20US.pdf

[20] RE100. Technical Criteria, December 12, 2022, p. 7. Available at: https://www.there100.org/sites/re100/files/2022-12/Dec%2012%20-%20RE100%20technical%20criteria%20%2B%20appendices.pdf

[21] *See* U.S. Environmental Protection Agency. Green Power Markets. Available at: https://www.epa.gov/green-power-markets/what-green-power

[22] LIHI certification is also recognized and required in the ASHRAE Standard 189.I-2017 for the Design of High-Performance Green Buildings, see https://www.ashrae.org/file%20library/technical%20resources/standards%20and%20guidelines/standards%20addenda/189_1_2017_j_20200302.pdf; it is also required in the International Green Construction Code, see https://codes.iccsafe.org/content/IGCC2021P2/chapter-7-energy-efficiency

[23] *See* U.S. Environmental Protection Agency. Green Power Markets. Available at: https://www.epa.gov/green-power-markets/what-green-power

[24] *See* for example, Skidmore, P. and Wheaton, J., 2022. Riverscapes as natural infrastructure: Meeting challenges of climate adaptation and ecosystem restoration. *Anthropocene*, *38*, p.100334.

Requiring LIHI Certification specifically will help maintain consistent requirements for hydropower projects throughout the nation regardless of their size or regulatory status, and to ensure that only projects with socio-environmentally sound operations are included in this key climate initiative.

2. **To the extent existing hydropower projects are eligible to be exempted from meeting the incrementality requirements for 'qualified clean hydrogen' production, Treasury should require such projects to obtain low impact certification using science-based criteria[25] and ensure that their use does not increase grid-level GHG emissions.**

The Treasury's Proposed Regulations contemplate using existing electricity generating facilities for clean hydrogen production and seek comments on 3 proposed approaches for determining whether an existing facility would be eligible to be exempted from the incrementality requirement.[26] However, all 3 proposed approaches have serious pitfalls in the context of hydropower facilities. This section first discusses the limitations of the Treasury's 3 proposed approaches as they apply to hydropower facilities and subsequently outlines the guardrails needed for existing hydropower projects to qualify as eligible for clean hydrogen production.

A. <u>The Treasury's 3 proposed approaches for determining the circumstances under which existing facilities would be eligible to be exempted from the incrementality requirement have serious pitfalls and risk supporting socio-ecologically detrimental hydropower projects.</u>

The first approach based on avoided retirement would apply to existing hydropower facilities that need to undertake the relicensing process;[27] however, this approach could economically prop up projects that no longer make sense for the health of a river system or contribute meaningfully to the grid with generation or other attributes. Under the current regulatory structure, many non-federal hydropower projects need a FERC license to operate and have to undergo a relicensing process at the end of their 30-50 year license term.[28] Lack of economic viability of a project is one reason for retirement during relicensing.[29] Yet in the context of hydropower operations writ large, economic viability alone cannot, and should not, determine whether a project is relicensed.[30] Furthermore, *avoiding* retirement may not

[25] *See* for example, Low Impact Hydropower Institute. Criteria & Standards. Available at: https://lowimpacthydro.org/criteria-standards/

[26] Internal Revenue Service, U.S. Treasury, Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, Notice of Proposed Rulemaking and Notice of Public Hearing, December 26, 2023, p. 89228. Available at: https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf

[27] *See* Internal Revenue Service U.S. Treasury, Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, Notice of Proposed Rulemaking and Notice of Public Hearing, December 26, 2023, p. 89230. Available at: https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf

[28] FERC 2020. Hydropower Licensing— Get Involved, A Guide for the Public. p. 4. Available at: https://www.ferc.gov/sites/default/files/2020-04/hydro-guide.pdf

[29] Schmidt, K. 2023, Practitioner's Guide to Hydropower Dam Removal. American Rivers and Hydropower Reform Coalition, pp. 4-5. Available at: www.americanrivers.org/HydroDamRemovalGuide

[30] *Ibid.*, pp. 11-17.

necessarily be a *desirable* outcome. In the relicensing process, projects that have considerable safety risks or ecological impacts may instead produce greater socio-ecological benefits if they are decommissioned.[31] Consequently, the avoided retirement approach should be used with caution and only on a case-by-case basis[32] for hydropower projects that meet additional guardrails discussed in sub-section 2.B. below. Additionally, even in the limited circumstances that the Treasury chooses to use this approach, it should avoid influencing the licensing outcomes for projects that demonstrate safety risks or significant socio-ecological impacts.

Next, the curtailment approach,[33] while reasonable at a theoretical level, may also have problematic consequences when applied to hydropower facilities. Each hydropower facility has a unique set of governing rules and operational constraints.[34] In the context of hydropower, the Treasury notes that "[h]ydropower plants sometimes ''spill'' water, a form of curtailment."[35] If the "spill" occurs to support ecological flows, then using the resulting generation for green hydrogen production may be reasonable, so long as it occurs during a period of true resource curtailment where there is no rise in induced grid-level GHG emissions. Yet, it is also worth noting that hydropower projects may simply store water during curtailment hours and generate electricity when it is most needed or when the wholesale electricity prices are high.[36] In this scenario, any changes in water flow patterns could result in ecological impacts to river systems. An across-the-board, quantity-based curtailment approach that is agnostic to the *timing* of the curtailment should not be used for hydropower facilities.

Last, the approach of modelling induced emissions based on grid characteristics or state policies[37] in regions with a high concentration of hydropower, may similarly ignore the ecological and social impacts of these projects and potentially increase induced emissions when the state clean energy goal target dates go beyond the timeline of the Section 45 V tax credit. For example, Washington state has a goal of achieving 100% carbon neutral electricity by 2030 —where the use of natural gas is allowed if paired with offsets—and 100% clean electricity by

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[31] *See* generally, Schmidt, K. 2023. Practitioner's Guide to Hydropower Dam Removal. American Rivers and Hydropower Reform Coalition. Available at: www.americanrivers.org/HydroDamRemovalGuide

[32] Beyond the socio-environmental impacts and safety risks, it is worth noting that even for successfully relicensed projects, a blanket approval of all such facilities for hydrogen production alone rather than continuing to serve load on the grid has the potential of increasing GHG emissions by 23-165 million metric ton through 2035 based on a 2024 estimate by the Rhodium Group. Available at: https://rhg.com/research/clean-hydrogen-45v-tax-guidance/

[33] *See* Internal Revenue Service U.S. Treasury, Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, Notice of Proposed Rulemaking and Notice of Public Hearing, December 26, 2023, p. 89231. Available at: https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf

[34] *See* for example, Karambelkar, S. 2018. Hydropower Operations in the Colorado River Basin: Institutional Analysis of Opportunities and Constraints. Available at: https://www.osti.gov/servlets/purl/1638690 (discussing the distinct governing rules and operational constraints for two successive hydropower projects within a single river system).

[35] *See* Internal Revenue Service U.S. Treasury, Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, Notice of Proposed Rulemaking and Notice of Public Hearing, December 26, 2023, p. 89232. Available at: https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf

[36] *See* for example. the average power release trend at Hoover Dam. Available at: https://www.usbr.gov/lc/region/g4000/riverops/HOVR_QD_LastSevenDays_Hourly.html

[37] *See* Internal Revenue Service U.S. Treasury, Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, Notice of Proposed Rulemaking and Notice of Public Hearing, December 26, 2023, p. 89231. Available at: https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf

2045.[38] While hydropower supplies about half of the total electricity demand of utility customers in the state,[39] any shortfall in hydropower availability is met with an increase in fossil fuel generation resulting in greater GHG emissions.[40] Washington state's electricity demand is expected to grow rapidly over the coming decades.[41] Absent corresponding availability of renewable generation, the diversion of existing hydropower for green hydrogen production in the near term could risk increasing grid-level GHG emissions, especially since the use of natural gas paired with offsets is allowed until 2030. Consequently, current grid characteristics or state policies alone can neither serve as a yardstick for assessing induced emissions, nor guarantee that the existing hydropower diverted for hydrogen production would have socio-environmentally responsible operations.

B. The Treasury should allow the use of existing hydropower facilities for clean hydrogen production in limited circumstances where their use does not increase induced grid-level GHG emissions and only if those facilities obtain low impact certification using science-based criteria.

Given that diverting existing hydropower generation for hydrogen production could risk increasing grid-level GHG emissions, the Treasury should use caution in allowing existing hydropower facilities to power hydrogen production to only those circumstances where a facility's use does not result in induced GHG emissions. In addition, the Treasury should require any such existing hydropower facilities to obtain low impact certification using science-based criteria, such as LIHI Certification, to qualify as eligible for clean hydrogen production. As discussed in Section 1 above, requiring LIHI Certification can create a standard baseline for assessing and addressing the socio-environmental impacts of hydropower facilities across the nation. More saliently, for existing hydropower projects that do not need a FERC license as well as for those that have decades to go before their next relicensing, LIHI Certification is the *only* available science-based process in the nation that can help ensure that a project minimizes environmental harms in the process of supporting hydrogen production, such as through changes in river flow. Lastly, as a general matter, the Treasury should ensure that there is no double-counting of environmental attribute certificates and that existing hydropower facilities meet the eligibility requirements outlined in the respective state Renewable Portfolio Standards (RPS) to qualify as eligible for clean hydrogen production.

3. The Treasury should update the 45VH2- Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model as more data on reservoir GHG emissions becomes available.

[38] https://www.commerce.wa.gov/growing-the-economy/energy/ceta/
[39] *See* the data for 2022 here, https://www.commerce.wa.gov/growing-the-economy/energy/fuel-mix-disclosure/
[40] https://ecology.wa.gov/air-climate/reducing-greenhouse-gas-emissions/tracking-greenhouse-gases/ghg-inventories
[41] Washington 2021 State Energy Strategy. F. 100% Clean Electricity to Meet the Needs of a Decarbonized Economy, p. 116. Available at: https://www.commerce.wa.gov/wp-content/uploads/2021/01/WA_2021SES_Chapter-F-Electricity.pdf

Accurate GHG emission estimation of a hydrogen production process is paramount to guarantee that the billions of dollars of Section 45V public funding flow to electrolytic hydrogen production projects with low or no direct or significant indirect GHG emissions. Under the Proposed Regulations, the Treasury uses the 45VH2-GREET model to calculate the GHG emissions rate of a hydrogen production facility, which, in turn, determines the applicable amount of Section 45V tax credit that producers can receive.[42] The current version of the 45VH2-GREET model estimates the emission factor for electricity generated from hydropower as 0 $kgCO_2e/kWhe$;[43] this would make three-pillars compliant hydropower-based electrolytic hydrogen production eligible for the highest tier of the tax credit. However, the underlying emission factor for hydropower-based electrolytic hydrogen production may not be accurate for all hydropower facilities and, unless updated, could risk supporting projects that add, rather than reduce, GHG emissions.

While GHG emission estimates associated with individual hydropower facilities vary based on a variety of factors,[44] current scientific studies converge to note that like all bodies of water, hydropower reservoirs emit GHG emissions.[45] There are four major pathways for the emission of greenhouse gases from constructed reservoirs, including through the operation of hydropower turbines that can release methane emissions via degassing.[46] In the United States, there are research efforts underway to measure reservoir GHG emissions, such as the U.S. EPA's Survey of Reservoir Greenhouse Gas Emissions (SuRGE) Project and Oak Ridge National Laboratory's studies to understand GHG emissions from reservoirs.[47] These efforts will aid in providing additional data to understand and assess hydropower reservoir GHG emissions.

As new data become available, the Treasury should update the emission factor estimate for electricity generated from hydropower in the 45VH2-GREET model.[48] Given the scope and

[42] *See* Internal Revenue Service U.S. Treasury, Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, Notice of Proposed Rulemaking and Notice of Public Hearing, December 26, 2023, pp. 89220-89221. Available at: https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf

[43] U.S. Department of Energy. 2023. Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2-GREET 2023. p. 16. Available at: https://www.energy.gov/eere/greet

[44] These include, but are not limited to, the type of hydropower facility (e.g., run-of-river, pumped storage, storage/peaking), and the age, location, and water quality of reservoirs. See Song, C., Gardner, K.H., Klein, S.J., Souza, S.P. and Mo, W. 2018. Cradle-to-grave greenhouse gas emissions from dams in the United States of America. *Renewable and Sustainable Energy Reviews*, 90, pp.945-956; Deemer, B.R., Harrison, J.A., Li, S., Beaulieu, J.J., DelSontro, T., Barros, N., Bezerra-Neto, J.F., Powers, S.M., Dos Santos, M.A. and Vonk, J.A., 2016. Greenhouse gas emissions from reservoir water surfaces: a new global synthesis. *BioScience*. 66(11), pp.949-964; Harrison, J.A., Prairie, Y.T., Mercier-Blais, S. and Soued, C. 2021. Year-2020 global distribution and pathways of reservoir methane and carbon dioxide emissions according to the greenhouse gas from reservoirs (G-res) model. *Global Biogeochemical Cycles*, *35*(6), p.e2020GB006888.

[45] *Id.*

[46] Prairie, Y.T., Mercier-Blais, S., Harrison, J.A., Soued, C., del Giorgio, P., Harby, A., Alm, J., Chanudet, V. and Nahas, R., 2021. A new modelling framework to assess biogenic GHG emissions from reservoirs: The G-res tool. *Environmental Modelling & Software*, *143*, p.105117.

[47] Oak Ridge National Laboratory, 2023. Improving understanding of greenhouse gas emissions from reservoirs. Available at: https://www.ornl.gov/reservoiremissions; *See* U.E. EPA's Survey of Reservoir Greenhouse Gas Emissions (SuRGE) Project. Available at: https://www.epa.gov/air-research/research-emissions-us-reservoirs

[48] Project-specific characteristics may impact GHG emission estimates from individual hydropower projects. As the 45VH2-GREET model is revised further, it would be vital to develop GHG emission estimates for each individual hydropower project since a common emission factor may not universally apply to projects across the country. Consequently, future rounds of the

scale of federal clean hydrogen tax credit incentives, it is vital that Treasury continually update the 45VH2-GREET model to ensure that only hydropower projects with low emissions are used to produce hydrogen.

Additional Recommendation

4. **The Treasury should ensure responsible stewardship of water resources in the process of hydrogen production.**

All methods of hydrogen production require water.[49] Under the Treasury's Proposed Rules, some regions may be considered more favorable for qualified 'clean hydrogen production;' this is especially the case in areas where wind and solar resources are plentiful that guarantee the highest amount of Section 45V tax credit.[50] Yet, some of these same regions that are favorable for projects qualifying for the highest tier of the tax credit may be prone to water stress and droughts.[51]

Truly clean hydrogen production cannot, and should not, threaten scarce water resources that are necessary for social and ecological wellbeing. To the extent that qualified clean hydrogen facilities are located in regions with limited water availability, the Treasury should ensure that the siting and operation of such facilities does not exacerbate water scarcity or divert water away from higher priority water needs for drinking, agriculture, and healthy ecosystem functioning.

Conclusion

The Treasury's Proposed Regulations for implementing the federal clean hydrogen tax credit include important safeguards that must be strengthened further to ensure that this substantial investment of public funds for climate change mitigation protects, rather than threatens, this nation's river systems. In the context of electrolytic hydrogen production, the Treasury should require hydropower facilities to demonstrate socio-ecologically responsible operations through a low impact certification to qualify as an eligible resource for clean hydrogen production. The Treasury should also ensure that the use of hydropower-based electrolytic hydrogen production does not increase induced GHG emissions. Lastly, the Treasury

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45VH2-GREET model revision should allow the input of hydropower project-specific information to refine the GHG emission results for each individual project; any project-specific data included in the model must also be rigorously assessed and verified by Treasury.

[49] Argonne National Laboratory. Development of a Life Cycle Inventory of Water Consumption Associated with the Production of Transportation Fuels. October 2015. Available at: https://publications.anl.gov/anlpubs/2015/10/121551.pdf Pp. 29-35.

[50] *See* for example, Canary Media. New 'clean' hydrogen rules will favor some regions more than others. January 4, 2024. Available at: https://www.canarymedia.com/articles/hydrogen/new-clean-hydrogen-rules-will-favor-some-regions-more-than-others

[51] *See* for example, Canary Media. New 'clean' hydrogen rules will favor some regions more than others. January 4, 2024. Available at: https://www.canarymedia.com/articles/hydrogen/new-clean-hydrogen-rules-will-favor-some-regions-more-than-others

should apply scrutiny and caution to ensure that hydrogen production facilities located in water stressed regions do not exacerbate water scarcity.

Thank you very much for considering these comments. LIHI welcomes the opportunity to discuss these issues further with the Treasury.

Sincerely,

/s/Surabhi Karambelkar
Surabhi Karambelkar
Policy Director

/s/Shannon Ames
Shannon Ames
Executive Director