



Testimony of Earthjustice
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Concerning Hydrogen Hubs and Climate Change
Before the Pennsylvania House Environmental Resources & Energy Committee

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Chairman Vitali, Chairman Causer, and honorable members of the House Environmental Resources and Energy Committee, thank you for inviting me to join you today. My name is Lauren Piette and I am an attorney with Earthjustice, a nonprofit environmental law organization that is committed to advancing a clean energy future in Pennsylvania and throughout the country.¹ We have an office in Philadelphia, where we are working to protect Pennsylvania's environment and people.

Earthjustice believes that hydrogen has an important role to play in cleaning up hard-to-decarbonize industries if it is produced cleanly and in a way that does not add burdens in already over-burdened communities. Much of my work over the last year has focused on the Hydrogen Hub program and how it can help us mitigate climate change while providing environmental, health, and economic benefits. Through this work, it has become clear that the Hydrogen Hubs can either help decarbonize our economy, as intended, or they can exacerbate our climate crisis. Which of these possibilities becomes reality depends in large part on how the Hubs produce hydrogen and whether that process is clean.

Hydrogen that is made from fossil fuels is never a climate solution because the process emits substantial climate-warming pollution, even when it includes carbon capture technology.² Hydrogen that is made from water, called electrolytic hydrogen, *can* be a climate solution. Both of the Pennsylvania Hubs, ARCH2 and MACH2, include electrolytic hydrogen projects.³

However, electrolytic hydrogen is only clean if it meets specific criteria. That is because electrolytic hydrogen production is extremely energy intensive. If power-hungry electrolyzers eat up our existing zero-carbon resources, then they will create a massive gap on our electric grid very likely to be backfilled by fossil fuel power plants. As a result, hydrogen made from water would become significantly more carbon-intensive than hydrogen made from fossil fuels.⁴ *This*

¹ <https://earthjustice.org/>.

² See, e.g., Institute for Energy Economics and Financial Analysis, Blue Hydrogen: Not Clean, Not Low Carbon, Not a Solution (Sept. 2023), https://ieefa.org/sites/default/files/2024-01/Blue%20Hydrogen%20Not%20Clean%20Not%20Low%20Carbon_September%202023_0.pdf.

³ See, e.g., U.S. Department of Energy, Appalachian Regional H2Hub Community Briefing (Oct. 24, 2023), https://www.energy.gov/sites/default/files/2023-10/H2Hubs_Appalachian_Community_Briefing.pdf; U.S. Department of Energy, Mid-Atlantic Regional H2Hub Community Briefing (Oct. 25, 2023).

⁴ Researchers at Princeton modeled emissions from grid-based electrolytic hydrogen production in southern California with and without the three pillars. See W. Ricks *et al.*, Minimizing Emissions from Grid-Based Hydrogen Production in the United States, 18 *Env't Rsch. Letters* 1 (2023),

bears repeating: if electrolytic hydrogen producers are allowed to siphon our existing zero-carbon resources, then their hydrogen would have significantly larger warming impacts than hydrogen made from fossil fuels.

To avoid this result, electrolytic hydrogen production must comply with three specific criteria, often called the “three pillars.” Those are:

1. Additionality (or incrementality);
2. Hourly matching; and
3. Deliverability.

The first pillar, additionality, requires producers to power their electrolyzers with new or uprated⁵ zero-carbon resources. This ensures that producers do not divert existing zero-carbon resources from other customers already using that electricity. Otherwise, those existing customers will be forced to get their electricity elsewhere—and given the makeup of today’s electric grid, “elsewhere” will very likely be a fossil fuel power plant.

The second pillar, hourly matching, requires producers to run their electrolyzers *only* during the same hours that the additional zero-carbon resources are producing electricity. This also ensures that zero-carbon resources diverted for hydrogen production are not replaced by carbon-intensive sources. The third pillar, deliverability, requires the additional zero-carbon resources to be located where the electricity they produce can actually reach the electrolyzer. These second and third pillars account for the fact that the emissions impact of running an

[9326/acacb5](#). They found that removing any one of the three pillars dramatically increased the carbon intensity of electrolytic hydrogen production. Without additionality, the carbon intensity of electrolytic hydrogen production equaled 20kg CO₂e/kg H₂—twice that of grey hydrogen—even if hourly matching was required. Likewise, without hourly matching, the emissions intensity of electrolytic hydrogen often reached double the intensity of grey hydrogen, and in one instance, reached nearly four times the intensity of grey hydrogen. They also found that requiring weekly or annual matching instead of hourly matching is “universally ineffective at reducing consequential emissions from grid-based hydrogen production.” Finally, without deliverability, they found that zero-carbon resources “cannot be relied on to eliminate emissions from hydrogen production” due to transmission constraints. See also Energy Innovation, Smart Design Of 45V Hydrogen Production Tax Credit Will Reduce Emissions and Grow the Industry (Apr. 11, 2023), <https://energyinnovation.org/publication/smart-design-of-45v-hydrogen-production-tax-credit-will-reduce-emissions-and-grow-the-industry/> (finding that without additionality, carbon emissions from electrolytic hydrogen production can increase as much as five times compared to grey hydrogen); Rhodium Grp., Scaling Green Hydrogen in a post-IRA World (Mar. 16, 2023), <https://rhg.com/research/scaling-clean-hydrogen-ira/> (finding that removing the additionality pillar alone could cause an increase in annual carbon emissions of 73 million metric tons in 2030); B. King *et al.*, How Clean Will US Hydrogen Get? Unpacking Treasury’s Proposed 45V Tax Credit Guidance, Rhodium Grp. (Jan. 4, 2024), <https://rhg.com/research/clean-hydrogen-45v-tax-guidance/> (finding that allowing loopholes to the three pillars could increase carbon emissions by between 23 million metric tons to 1.5 billion metric tons cumulatively through 2035); Env’t Res. Mgmt., Assessment of Grid Connected Hydrogen Production Impacts, at 9 (Feb. 2024), https://www.erm.com/globalassets/documents/publications/assessment-of-grid/assessment-of-grid-connected-h2-electrolysis-impact_part-i_lit-review_final.pdf (providing a literature review of approximately 30 reports on electrolytic hydrogen production and concluding “the consensus in the analysis is clear that GHG emissions will increase considerably” without the additionality pillar).

⁵ “Uprate” means “an increase in an electricity generating facility’s rated nameplate capacity.” 88 Fed. Reg. 89,230 (U.S. Department of Treasury, Notice of Proposed Rulemaking, Section 45V Credit for Production of Clean Hydrogen) (Dec. 26, 2023), <https://www.govinfo.gov/content/pkg/FR-2023-12-26/pdf/2023-28359.pdf>.

electrolyzer depends on time and location. Fossil fuel power plants provide more electricity to certain parts of our grid, and during certain hours of the day, than others. Hourly matching and deliverability ensure that electrolyzers only run when and where zero-carbon resources are actually providing electricity to the grid.

All three of these pillars must be met for electrolytic hydrogen production to help, rather than hurt, our efforts to create a cleaner, healthier, and thriving environment and economy. Without them, the emissions impact of producing hydrogen from water would be staggering. One analysis found that requiring hydrogen producers to comply with the three pillars could avoid over 640 million metric tons of CO₂ through 2032 compared to a scenario where the three pillars are not required.⁶ This is consistent with research from the Electric Power Research Institute,⁷ which found that requiring anything less than compliance with the three pillars will cause a net increase in CO₂ emissions.⁸

This Committee has heard testimony on the importance of the three pillars before, including at its November 2023 hearing on the Hydrogen Hubs. Since that hearing, the U.S. Department of Treasury has proposed regulations that would require electrolytic hydrogen producers to comply with the three pillars in order to qualify for the federal clean hydrogen production tax credits. Treasury proposes to adopt the three pillars because, in its own words, “there is a significant risk that hydrogen production would significantly increase induced grid GHG emissions beyond the allowable levels” if producers do not comply with the three pillars.⁹

On top of increased carbon emissions, electrolytic hydrogen production that fails to comply with the three pillars would hurt our communities in other ways. It could significantly raise power prices,¹⁰ just like crypto-mining, and increase health-harming pollution from fossil fuel power plants in the same frontline communities that have been breathing in their polluted air for decades. Frontline communities have long suffered as a result of policies that put their health and welfare behind market creation and company profits. The communities I work with have been clear that they want both health *and* economic benefits, and they want policies that deliver on both.

⁶ B. Haley & J. Hargreaves, 45V Hydrogen Production Tax Credits: Three-Pillars Accounting Impact Analysis, Evolved Energy Rsch., 4-27 (June 23, 2023), <https://www.evolved.energy/post/45v-three-pillars-impact-analysis>.

⁷ EPRI research is funded in part by utilities and other energy companies.

⁸ EPRI & GTI Energy, Impacts of IRA’s 45V Clean Hydrogen Production Tax Credit, 19 (Nov. 3, 2023), <https://www.epri.com/research/products/000000003002028407>.

⁹ 88 Fed. Reg. 89,229.

¹⁰ Energy Innovation, Consumer Cost Impacts of 45V Rules, 1 (Nov. 2023), <https://energyinnovation.org/wp-content/uploads/2023/11/Consumer-Cost-Impacts-of-45V-Rules-1.pdf> (“It’s reasonable to expect double digit percentage increases in electricity prices without an additional requirement for electrolyzers.”); *id.* at 3 (explaining that consumer power prices would also increase without hourly matching or deliverability) (original emphasis omitted); W. Ricks et al., Minimizing Emissions from grid-based hydrogen production in the United States, 18 Env’t Rsch. Letters 1, Research Addendum: Consumer Electricity Price Impacts of the 45V Hydrogen Production Tax Credit (Oct. 25, 2023), <https://zenodo.org/records/10041735> (finding that without the three pillars, average wholesale electricity prices would be 8% higher in southern California, and 10% higher in Wyoming and Colorado).

Despite strong support for the three pillars among communities, government agencies, researchers, and hydrogen producers themselves,¹¹ some project developers in the Hubs are advocating to erode the three pillars by introducing massive loopholes. One such loophole would create a 5-10% carveout for hourly generation from existing zero-carbon resources. In other words, they want 5-10% of hourly generation to count as additional even though it is coming from existing resources with existing customers¹²—which would allow producers to claim their hydrogen is clean even when it is actually more carbon intensive than hydrogen made from fossil fuels. This loophole would have serious emissions impacts. One analysis found that even a 5% carveout could increase carbon emissions by nearly 1.5 billion metric tons cumulatively through 2035 if existing resources are diverted during the times when our grid is the dirtiest.¹³ That is equal to the amount of annual carbon emissions from 386 coal plants.¹⁴

Another potential loophole would exempt existing zero-carbon resources that would purportedly retire unless used to power electrolytic hydrogen production. This is particularly relevant for nuclear reactors, which are set to play a big role in Hubs such as MACH2. Like the 5-10% carveout, an avoided retirement loophole could have serious climate consequences. Carbon emissions could increase by 33-360 million metric tons if all nuclear reactors in the country whose licenses expire before 2036 shift to powering hydrogen production.¹⁵ To put that in perspective, that is the same emissions increase we would see from burning between about 40 billion and 400 billion pounds of coal.¹⁶

While in theory the exemption may not increase emissions from plants that are truly on the precipice of retirement, reality is very different. Retirement decisions are complex. Yet, an avoided retirement loophole would provide cover for companies to claim their retirement decisions are based solely on whether or not they can be credited for powering hydrogen production. Owners of nuclear reactors would have a strong incentive to claim they are facing retirement in order to reap lucrative tax credits from powering hydrogen production. To mitigate this risk, any avoided retirement exemption must be coupled with a rigorous, fact-intensive, and case-by-case investigation that accurately determines whether a reactor is truly facing retirement. This could be modeled on the U.S. Department of Energy’s multi-factor test for the Civil Nuclear Credit Program.

¹¹ See, e.g., *supra* n. 3; consumer advocates 45V letter to Treasury and the White House, (Oct. 26, 2023), <https://www.citizen.org/wp-content/uploads/Consumer-Advocates-45V-Letter.pdf>; environmental justice groups letter (Nov. 15, 2023), <https://subscriber.politicopro.com/f/?id=0000018b-d509-deac-a19b-f58907a60000>; Taxpayers for Common Sense comments to Treasury (Feb. 26, 2024), <https://www.taxpayer.net/energy-natural-resources/tcs-comments-on-clean-hydrogen-tax-credits/>; U.S. Treasury Department Framework Will Grow Clean Hydrogen Industry (Dec. 22, 2023) (“This experience gives us confidence that proposed 45V guidance requiring the three pillars — including additionality from day 1, strong deliverability standards, and a phase-in of hourly matching by 2028 (without grandfathering) — will support scaled industry growth and enable the creation of a successful U.S. and global clean electrolytic hydrogen market.”) (quoting a letter from hydrogen producers), <https://content.govdelivery.com/accounts/USTREAS/bulletins/381482f>.

¹² See, e.g., 88 Fed. Reg. at 89,231.

¹³ B. King *et al.*, How Clean Will US Hydrogen Get? Unpacking Treasury’s Proposed 45V Tax Credit Guidance, Rhodium Grp. (Jan. 4, 2024), <https://rhg.com/research/clean-hydrogen-45v-tax-guidance/>.

¹⁴ <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results>.

¹⁵ *Supra* n. 13.

¹⁶ <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator#results>.

The Hydrogen Hub program represents one of the largest allocations of federal funding for energy projects in our history. It has the potential to position our country and each of the Hub states as leaders in the clean hydrogen industry. Hub states like Pennsylvania are at the forefront of this emerging industry and have both the power and responsibility to establish the industry in a way that mitigates, rather than exacerbates, our climate crisis and benefits communities. That is only possible if Hub states require electrolytic hydrogen producers to comply with the three pillars. Any other outcome, including one that introduces major loopholes to the three pillars, would cause significant emissions spikes that our climate and communities cannot afford.

Thank you very much for the opportunity to testify. I would be happy to answer any questions from the Committee.