

Three-pillar rule is essential to safely grow the U.S. clean hydrogen economy

45V tax credit could undermine climate goals without these essential elements

What is 45V and why does it matter for the climate?

The 45V tax code provision for The Clean Hydrogen Production Tax Credit was authorized by The [Inflation Reduction Act](#). It is part of the Biden administration's broader effort to support hydrogen and other technologies that will enable the U.S. to cut emissions from the hardest-to-abate sectors of the economy, including heavy industry and long-haul transportation.

Governments and industry are moving quickly to deploy hydrogen technologies, with billions of dollars being invested. Hydrogen, as an energy carrier, can store, move and deliver energy produced from other sources. Today, 99% of hydrogen used is produced from fossil fuels (known as gray hydrogen). But there are plans to deploy and scale 'clean hydrogen' produced from renewable energy (green hydrogen) or natural gas with carbon capture and storage (blue hydrogen).

While clean hydrogen holds great promise to help decarbonize our economy, [peer-reviewed research](#) indicates it is not a universal solution. Emissions related to hydrogen deployment can considerably undermine the climate benefits of decarbonization strategies that involve hydrogen – especially in the near term. Minimizing these risks through a strong 45V rule is essential to the effectiveness of hydrogen as a climate change mitigation strategy.

What does the 45V rule lay out for green hydrogen?

The draft 45V rule lays out a [proposed framework](#) to ensure electrolytic hydrogen produced from renewables (green hydrogen) does not inadvertently increase grid-wide emissions. Specifically, it proposed that grid-connected electrolyzers must procure electricity that is:

- **Time-matched** to the period during which the electrolyzer is operating, beginning on an annual basis until 2028, and then transitioning to an hourly basis. This ensures that renewables are actually available during the hours that the electrolyzer is running.
- **Deliverable** to the electrolyzer, by being located in the same grid region as described in the Department of Energy's 2023 National Transmission Needs Study. This ensures that the clean energy can be physically delivered to the electrolyzer and not blocked by constraints between electricity grids.
- **Incremental** to existing generation (new clean energy supplies). This ensures that electrolyzers are not diverting the existing supply of renewables and causing the grid to backfill with fossil fuels.

These "three pillars" are consistent with the lifecycle emissions accounting practices required by the law. Without each of these three requirements, there is a strong likelihood that hydrogen production would result in increased grid emissions and would exceed the maximum emissions intensity permitted to qualify for the credit.

The Biden administration is gathering comments on this framework and other elements of the proposed rule, and is expected to complete the 45V rule before the end of the year. Upholding the 3 pillars – and addressing [other key issues](#) around methane, carbon-negative offsets, and hydrogen emissions – is critical to ensure 45V delivers true climate benefits.

Who supports a strong 45V rule?

The environmental community and many forward-looking hydrogen companies have [publicly supported](#) Treasury's proposal to set strong climate standards for clean hydrogen. In December 2023, Air Products, Hy Stor Energy, Synergetic and EDP Renewables, among others, sent a [letter](#) to the Treasury expressing confidence in the three pillars' ability to deliver robust industry growth. Together, they have a collective scale of planning and interest exceeding a whopping 50 gigawatts of three-pillar compliant projects in the U.S. – able to supply more than 6 MMT of hydrogen per year.

The European Union has adopted legislation that includes the three pillars and offers powerful evidence that this approach will support substantial industry growth. Announced hydrogen projects since the EU adoption in 2023 has [already grown by 20%](#). In February 2024, results of the EU's hydrogen auction far exceeded expectations. The auction was only open to hydrogen projects that were three pillar compliant and that had secured hydrogen off-takers. While the [Hydrogen Bank](#) was only awarding funds to cover up to 400 MW of projects, investor appetite underpinned 8,500 MW in proposed projects.

The U.S. stands to see even greater success, including by taking advantage of the EU's 10 MMT import target and supplying three pillar-compliant hydrogen. [EPRI](#) notes the generosity of the 45V credit, which could cover up to 90% of hydrogen production costs in the most favorable cases (where high quality wind resources are available combined with lower electrolysis capital costs). Given these conditions, they estimate that the three pillars will support 20 MMT per year of clean hydrogen production by 2036 – double the Department of Energy's 2030 clean hydrogen production target.

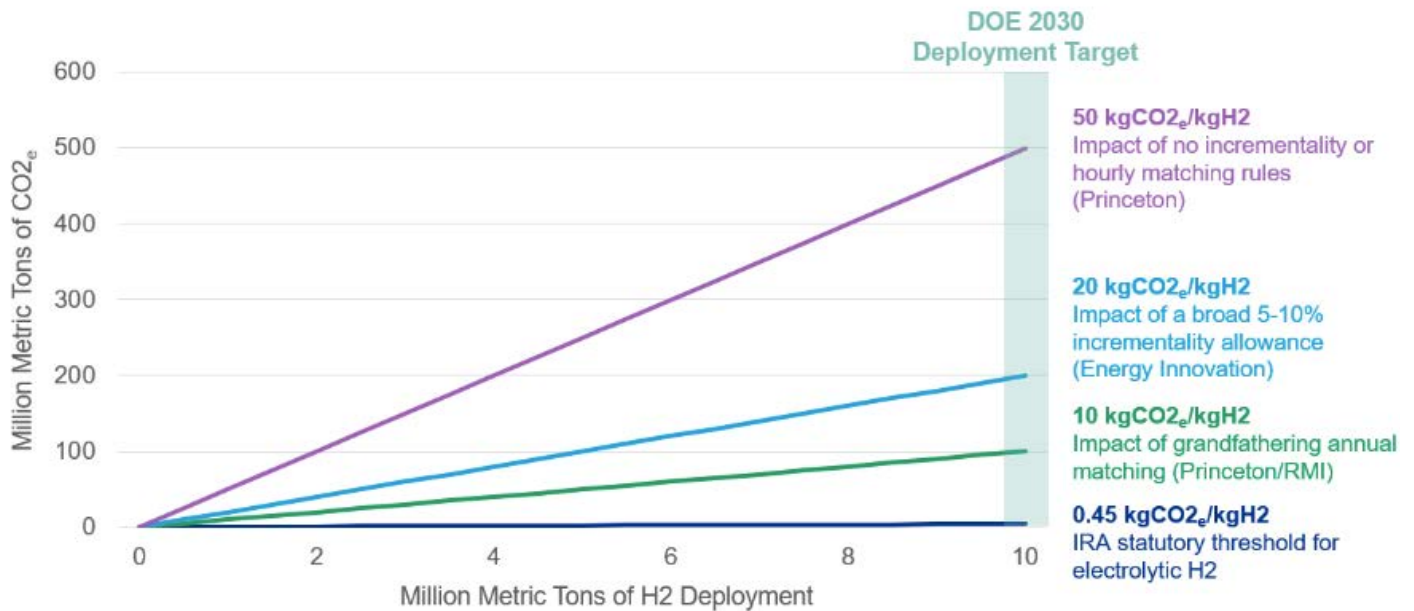
What are the risks of a weakened 45V rule?

Without the three pillars, electrolytic hydrogen deployment could substantially increase greenhouse gas emissions. That would undermine the central climate goals of the IRA. This is demonstrated by numerous studies, including [Princeton Zero Lab](#), [Electric Research Power Institute](#), [MIT Energy Initiative](#), [Evolved Energy Research](#), [Rhodium Group](#), [Environmental Defense Fund](#) and [Energy Innovation](#).

Without incrementality and hourly matching rules, hydrogen projects could have up to five times the emissions of today's dirty gas-based hydrogen. This could drive emissions increases of up to 650 million tons of CO₂ equivalent through 2032. This is equal to more than 40% of today's U.S. power sector emissions, or similar to putting more than 140 million new cars on the road.

Some in industry are lobbying for changes to the draft rule. But a weaker rule will result in unintended consequences that would undermine the very goal of the IRA tax credit.

Annual Emissions Impact of 45V H2 Deployment Under Different H2 Carbon Intensity Outcomes



Upholding a strong 3 pillar framework will ensure that 45V delivers it's intent – reducing GHG emissions, while sparking a durable and globally competitive hydrogen industry

TIME MATCHING

Treasury has proposed that hourly matching be required for all electrolyzer projects, but has provided a transition period through 2028 to enable tracking systems to be scaled nationwide. Some industry members have called for loosening this requirement even further through grandfathering (i.e., allowing annual matching for the remainder of their 45V eligibility) for facilities that begin construction by 2028. [RMI](#) and [Princeton Zero Lab](#) estimate that such a decision could lock in 700 million tons of CO₂ emissions over the lifetime of the credit, or more than 45% of annual power sector emissions.

DELIVERABILITY

Treasury has proposed deliverability boundaries that equate to those in DOE's Transmission Needs study. However, attempts to expand the boundaries or remove them altogether would increase system-wide emissions. For example, the [Princeton Zero Lab](#) finds that because of transmission constraints within the US Western Interconnection electricity system, allowing non-local procurement (for example, an electrolyzer in Wyoming procuring solar from California) would lead to the hydrogen producer consuming local fossil generation – with emissions 4 times higher than the IRA's definition of “clean hydrogen.”

INCREMENTALITY

An option under consideration would allow an electrolyzer to rely to some degree on existing generation that pulls from the most carbon-intensive grids. Energy Innovation finds that a 5-10% allowance in the California ISO could yield a climate footprint that is 4-5 times higher (17-22 kgCO_{2e}/kgH₂) than the IRA's 'clean hydrogen' threshold. And [Rhodium Group](#) finds that a 5% allowance could drive up to 1.5 billion metric tons of cumulative emissions through 2035 – the equivalent of putting 325 million new cars on the road.