

FORBES &gt; BUSINESS &gt; ENERGY

# Green Hydrogen Or Dirty Fuel? Treasury Department Rules On 45V Tax Credit Will Determine Industry's Future.

**Energy Innovation: Policy and Technology** Contributor ⓘ

*We are a nonpartisan climate policy think tank helping policymakers make informed energy policy choices and accelerate clean energy by supporting the...*

**Silvio Marcacci** Contributor ⓘ

*Communications Director*

Apr 17, 2023, 07:30am EDT



Listen to article 10 minutes



Congress including a production tax credit (PTC) for clean hydrogen in Section 45V of the Inflation Reduction Act, created a pathway to profitability for the United States' burgeoning hydrogen industry.

But whether 45V spurs a green hydrogen boom that cuts emissions or doubles down on fossil-fueled hydrogen production that increases pollution hinges on looming tax credit guidance

from the U.S. Treasury Department.

New [45V tax credit analysis](#) from Energy Innovation Policy & Technology LLC® shows that loose tax credit guidance from Treasury could create hundreds of millions of tons of greenhouse gas emissions per year by 2030, at an annual cost of \$30 billion in federal funding. Loose guidance would also set up the green hydrogen industry for failure long term, potentially closing the door on one of the most promising clean energy technologies.



Modern hydrogen energy storage system accompanied by large solar power plant and wind turbine park in ... [+] GETTY

However, if Treasury issues stringent tax credit guidance accurately accounting for emissions by following three smart design principles, the 45V tax credit could jumpstart a green hydrogen industry that is profitable from the start and can stand on its own once the tax credit expires. Stringent guidance would also cut emissions now and far into the future for hard to decarbonize economic sectors like heavy industry and long-haul aviation.

**Truly green hydrogen will require new renewable**

## energy resources

The U.S. cannot achieve its 2050 net-zero emissions targets without green hydrogen. Today, fossil fuel-derived hydrogen production accounts for about 1.5% of total U.S. climate pollution, mostly in fertilizer production and oil refining that are impossible to electrify.

---

MORE FOR YOU

**'Real Housewives' Couple Kim Zolciak And Kroy Biermann Divorcing, Owe \$1 Million In Unpaid Taxes**

**WWE Raw Results: Winners And Grades On May 8, 2023**

**Today's 'Quordle' Answers And Clues For Tuesday, May 9**

---

Section 45V of the Inflation Reduction Act contains a clean hydrogen production tax credit designed to scale up production of this fuel while reducing its embodied emissions. The 45V tax credit's value is tied to lifecycle hydrogen emissions through the point of production, with the highest credit level set at \$3 per kilogram of hydrogen.

---

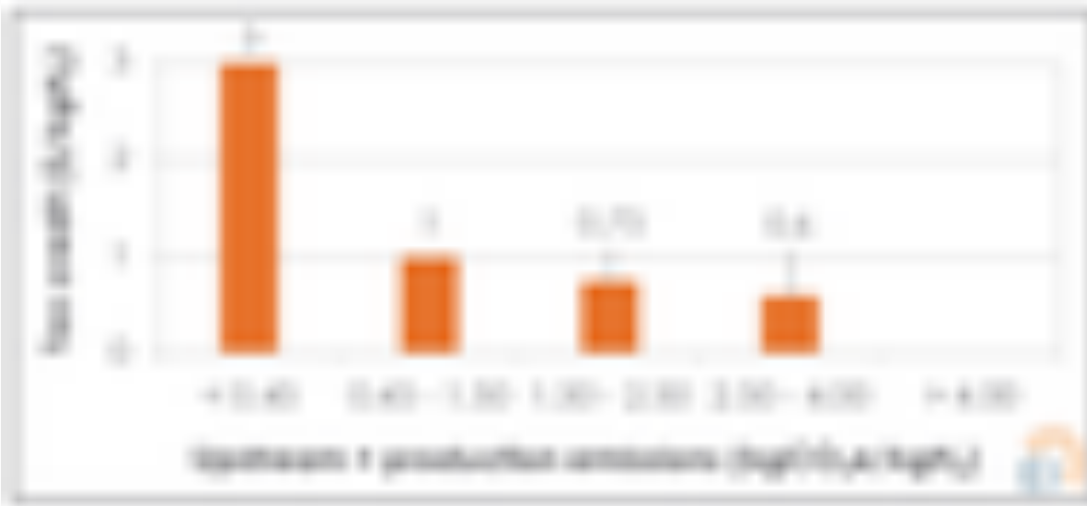
**Forbes Daily: Get our best stories, exclusive reporting and essential analysis of the day's news in your inbox every weekday.**

Email address

**Sign Up**

You may opt out any time. By signing up for this newsletter, you agree to the [Terms and Conditions](#) and [Privacy Policy](#)

---



Inflation Reduction Act 45V Clean Hydrogen Production Tax Credit values ENERGY INNOVATION

Like most of the Inflation Reduction Act tax credits, Congress tasked Treasury with [setting 45V implementation guidance](#). The key issue at hand for 45V is how hydrogen producers account for their emissions to qualify for the tax credit. Loose guidance would allow increased emissions from hydrogen production by ignoring upstream impacts while stringent guidance would ensure that only nearly emission-free hydrogen can earn the top tax credit. Treasury accepted public comments in December 2022, and is required to publish final guidance by August 2023.

Producing emissions-free hydrogen requires electrolysis, which uses an electrolyzer to split water atoms into hydrogen and oxygen using electricity. This means the emissions intensity of electrolytic hydrogen depends entirely on upstream emissions from the electricity powering the electrolyzer.



Emissions intensities from fossil fuel-powered electrolysis. The most efficient commercially ... [+] ENERGY INNOVATION

Electrolysis consumes large amounts of electricity, so even small shares of fossil fuel power would push “clean” hydrogen over the .45 kilograms of carbon dioxide per kilogram of hydrogen threshold allowed under 45V. Meeting this threshold requires at least 97% carbon-free electricity and, in practice, requires new renewable energy sources to power electrolysis.

### **Three smart design principles can spur industry growth with near-zero emissions**

Treasury can balance this difficult task of fueling green hydrogen industry growth while accurately accounting for lifecycle emissions from hydrogen production via three smart design principles:

- **Additionality** requiring electrolyzers to draw power from new sources of renewable energy induced as a direct result of the electrolyzer coming online.

- **Deliverability** requiring electrolyzers to use local, physically deliverable renewable energy generation that accounts for grid congestion and transmission line losses.
- **Time-matching** requiring electrolyzers to run at the same time as renewable energy generation and to meet an annual average emissions test to determine the appropriate annual credit value.



Illustrative depiction of importance of additionality. In the “No New Clean Energy” case, a new ... [+] ENERGY INNOVATION

Implementing these smart design principles would avoid massive emissions increases of up to five times conventional fossil fuel-derived production as the hydrogen industry scales up. It would also avoid a “credit cliff” where electrolyzers require ongoing 45V renewal to remain profitable.

Simply deploying electrolyzers is insufficient to sustainably scale a green hydrogen industry. Building a long-term, emissions-free hydrogen supply requires electrolyzers to make money by harnessing cheap wind and solar today and into the future.

## **Stringent 45V Tax Credit Guidance Fuels Long-Term**

## Green Hydrogen Viability

Stringent 45V tax credit guidance would help ensure long-term viability of the green hydrogen industry, even after it expires. Smart guidance would provide business certainty, build public trust and support for hydrogen, and encourage development of flexible projects that can survive without tax credits.

The U.S. Department of Energy forecasts green hydrogen production will eventually need to cost as little as \$0.40 per kilogram to serve all useful applications, but even with a free electrolyzer, achieving this benchmark without subsidies requires buying electricity only when it's priced below \$10 per megawatt-hour. Once the 45V tax credit sunsets, this will only be possible with electrolyzers that can flexibly ramp up and down to use electricity during the cheapest hours, along with access to low-cost transport and storage infrastructure to stabilize customer supplies.

Hydrogen production must meet several conditions to ensure projects can survive and grow after 45V's expiration:

- Electrolyzers must be concentrated in regions with high renewable energy potential, especially wind.
- Green hydrogen must primarily supply high-value customers like industry that will remain competitive well into the future.
- Electrolyzers must be flexible and connected to the grid to

help balance a high variable renewable energy system and capture that system's benefits.

- Green hydrogen storage and transportation infrastructure must be deployed at scale.

Loose 45V tax credit rules from Treasury could fail all four of these conditions. This scenario risks a wave of lost jobs and stranded investments once 45V expires or repeated attempts to indefinitely extend the tax credit. Either threatens high costs to taxpayers and prolonged emissions growth at the exact time the U.S. must be fully shifting to a net-zero policy pathway.

Stringent 45V tax credit rules from Treasury would have the opposite effect. Early electrolyzer development would be concentrated in regions where renewables are easy to build, where wind energy is abundant, and where heavy industry is already clustered – Texas, the Interior West, and the Great Plains. Smart guidance would also encourage flexible electrolyzers that can sop up wind and solar output when it's available and ramp down when grid demand is highest, while hydrogen storage would allow for delivering a consistent supply to off-takers.





U.S. locations with wind and solar resources averaging less than \$25/MWh. Dots represent locations ... [+] ENERGY INNOVATION

As deployment over the next decade drives down electrolyzer and clean energy capital costs, and dedicated hydrogen pipelines come online, projects would expand across the country in a virtuous cycle spurring additional green hydrogen supplies and cutting emissions even further.

### **Green hydrogen is profitable from the start even with stringent 45V tax credit guidance**

While stringent 45V tax credit guidance from Treasury will ensure long-term viability for the green hydrogen industry, it's as important to note that green hydrogen production is profitable from the start, even with stringent accounting rules. Energy Innovation® analysis shows new projects can sell electrolytic hydrogen at or below \$1 per kilogram today, easily outcompeting hydrogen produced using fossil fuels, in huge swaths of the country.

Projects can be configured multiple ways, and co-located electrolyzer and renewable energy projects—which are easier to understand and unquestionably compliant with 45V emissions rates—are profitable in parts of the U.S. with strong renewable resources.



Illustrative clean electrolytic hydrogen project configurations. Yellow arrows represent clean power ... [+] ENERGY INNOVATION

The three principles outlined above allow these components to be separated geographically, which can further improve project economics by using the best land for development and building electrolyzers near hydrogen customers. Several renewable energy and electrolyzer developers [confirmed this finding](#), stating “hydrogen projects that satisfy the three [principles] can be extremely competitive from the outset.”

### **Green hydrogen can be a win-win for the climate and economy—if done right**

The 45V production tax credit can be a win-win for our climate and economy. Smart policy design can stand up an entirely new green hydrogen industry that is profitable from the start, creates new jobs and GDP growth, cuts emissions from some of the hardest-to-decarbonize sectors, and can stand on its own without

tax credit extensions once 45V expires.

But loose tax credit guidance would subsidize even greater emissions and leave green hydrogen production reliant upon federal funds to survive. [Advocates for loose Treasury guidance](#) would profit enormously from no guardrails while greatly increasing fossil fuel power generation.

The U.S. doesn't need policy that increases short-term emissions to cut long-term emissions—the right green hydrogen tax credit design will cut emissions today and into the future.



**Energy Innovation: Policy and Technology**

**Follow**



**Silvio Marcacci**

[Editorial Standards](#)

[Print](#)

[Reprints & Permissions](#)

ADVERTISEMENT