

The Breakthrough Institute - Response to Proposed Rulemaking REG—117631—23

The Breakthrough Institute submits this comment in response to the notice of proposed rulemaking announced by the IRS related to the Inflation Reduction Act's clean hydrogen production credit under Section 45V.¹ This comment primarily seeks to improve the rulemaking in the following respects:

1. Discussing further circumstances under which making hydrogen by using electricity from generators already in service is unlikely to cause significant induced grid emissions, and therefore could satisfy the incrementality requirement.
2. Articulating criteria for assessing cases in which hydrogen production could help prevent the retirement of existing low-emissions electricity generating facilities.
3. Highlighting the heat energy co-production capabilities of certain low-emissions thermal power generation technologies like nuclear power plants, solar thermal power plants, geothermal power plants, and fossil power plants with carbon capture, which the Treasury Department and the IRS ought to consider as eligible incremental energy inputs if such generating facilities supply thermal energy to hydrogen production facilities.

The Breakthrough Institute is an independent 501(c)(3) global research center that identifies and promotes technological solutions to environmental and human development challenges.² In addition to broadly advocating for deployment of all low-emissions energy technologies, Breakthrough supports the continued maximal use of domestic nuclear generation as a valuable and affordable clean energy resource. Breakthrough also advocates appropriate regulation and licensing of advanced nuclear reactors to enable the commercialization of innovative and economically viable emerging nuclear technologies, which represent important pathways to climate mitigation and deep decarbonization. The Breakthrough Institute does not receive funding from industry.

Recommendations

¹ Internal Revenue Service. "Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election To Treat Clean Hydrogen Production Facilities as Energy Property." Federal Register Vol. 88, No. 246, (December 26, 2023):89220. <https://www.federalregister.gov/d/2023-28359>

² The Breakthrough Institute. <https://thebreakthrough.org/>.

The primary motivation behind the incrementality criteria for the Section 45V credit is to avoid the diversion of large amounts of existing clean electricity generation for hydrogen production, resulting in fossil electricity generation increasing to meet the new level of power demand, often called marginal energy resources. To qualify for “energy attribute credits” (EACs) that demonstrate 45V eligibility, the Treasury Department and the IRS’s proposed framework requires that an electricity generation facility must have either commenced operation 36 months or less prior to the commissioning of the hydrogen production facility, or that the generation facility must have upgraded its equipment to boost its generation output, in which case the additional output would qualify as incremental.

These proposed criteria, however, do not consider additional cases in which an existing generation facility could supply a hydrogen production facility while generating few to no induced grid emissions. We suggest that the final Treasury Department and IRS framework could take into account the following:

Evidence of minimal or zero induced grid emissions:

Refers to Section on “Zero or Minimal Induced Grid Emissions Through Modeling or Other Evidence”

We support opportunities for an existing electricity generation facility, hydrogen producer, or both to provide evidence demonstrating zero to minimal induced grid emissions if the existing generation facility were to supply a new hydrogen production facility. Such evidence could incorporate 1) modeling, 2) analysis of historical generation and market data demonstrating that marginal generators serving new load are predominantly or entirely low-emissions, 3) an inventory of existing generation assets and/or new generation resource procurements, and/or 4) references to policies or practices such as state or regional clean energy standards.

Regions or states with clean grids and commitments to avoid new induced grid emissions:

Refers to section on “Zero or Minimal Induced Grid Emissions Through Modeling or Other Evidence”

We propose that in regions, or in states within a region or part of a region, that already produce 60% or more of their annual electricity generation from low-emissions sources and are subject to clean or renewable energy standards that require the region/state to achieve 80% or more clean electricity by 2035, clean electricity production facilities should satisfy incrementality criteria. In such regions/states, new marginal generation is highly likely to be low-emissions, and that the early technological learning benefits of deploying clean hydrogen production facilities in such low-emissions grid regions outweigh any remaining induced emissions. While such hydrogen facility deployments may induce some short-term marginal emissions, we point out that the

current proposed rulemaking considers carbon dioxide equivalents defined on a 100-year global warming potential basis, and thus explicitly assesses the environmental impacts of greenhouse gas emissions on long rather than short timescales. As such, an excessive focus on short-term marginal emissions is inconsistent and may not sufficiently account for long-term emissions mitigation potential.

Facilities that implement upgrades or operational improvements that increase generation output, outside of uprates:

Refers to sections on “Incrementality” and proposed § 1.45V–4(d)(3)(i)(B)

Apart from traditional uprates enabled through capital development, existing electricity generation facilities may be able to increase generation output through further operational optimization, or through equipment and infrastructure improvements that would not be considered as a traditional uprate. The added generation enabled by such efficiency gains ought to qualify as incremental. This includes modifications that raise the capacity factor of zero-carbon generators.

Onsite consumption of hydrogen:

Some types of low-emissions power plants consume small quantities of hydrogen for regular operational needs, such as for heat transfer and cooling purposes.³ Such hydrogen is presently supplied from fossil feedstock pathways that do not incorporate significant emissions mitigation approaches. New onsite hydrogen production capacity that displaces onsite hydrogen supply needs that would otherwise be met from emissions-intensive hydrogen sources ought to qualify for the credit.

Hydrogen leakage from the hydrogen production facility

We point out that the 45VH2–GREET model approach for determining emission rates for purposes of the Section 45V credit may not sufficiently account for fugitive hydrogen leakage from the production facility, for example leaks from pumps, seals, and process storage tanks. Additionally, the well-to-gate emissions scope may not sufficiently account for fugitive hydrogen emissions from the hydrogen production facility at the point of delivery or sale, such as leaks from transfer equipment used to supply hydrogen to a customer’s shipping tanks or to pipeline

³ Energy.gov. “H2IQ Hour: Highlighting H2@Scale Demonstration Projects: Text Version.” Accessed February 22, 2024. <https://www.energy.gov/eere/fuelcells/h2iq-hour-highlighting-h2scale-demonstration-projects-text-version>.

infrastructure. We highlight these as important considerations for inclusion when defining and assessing whether produced hydrogen meets the threshold for qualification as clean hydrogen, as facility leakage may substantially impact the real-world greenhouse gas intensity of hydrogen production.

Eligibility pathway for pilot projects with outstanding potential to drive clean hydrogen sector development:

The intent of Congress in creating these tax credits was clearly not to assure a long-term supply of bulk quantities of hydrogen, but to induce the private sector to establish pilot-scale projects that would demonstrate pathways to that long-term goal. Thus the implementing regulations should encourage a variety of technological approaches. We support the creation of a mechanism for a highly limited number of exceptionally innovative clean hydrogen demonstration projects that use electricity from existing electricity generation facilities to qualify as eligible for 45V. We propose that the Treasury Department and IRS provide alternative circumstances under which a taxpayer may make a submission to a partnering Federal agency such as the Department of Energy, containing specific information articulating disproportionate technology advancement potential from successful deployment and demonstration of an emerging hydrogen production technology. Such technology ought to differ substantially from existing equipment that is already operating at commercial scale or as part of existing demonstration projects. Assuming rigorous review, we believe that 45V support for innovative and disruptive hydrogen sector technologies, such as today's laboratory-stage next-generation electrolytic cell concepts, has the potential to deliver long-term emissions reductions that may well warrant qualifying key demonstration projects as incremental in the near-term.

Avoided retirements:

Refers to section on "Avoided Retirements Approach"

We support recognition of avoided retirement. EACs from an existing low-emissions electricity generating facility that would otherwise have retired is incremental if an arrangement to supply heat or electricity to a hydrogen production facility is an important factor for preventing that facility's retirement. We propose that the following kinds of facilities ought to qualify as incremental:

- Nuclear power plants that have successfully applied for the Civil Nuclear Credit Program (CNCPP).⁴ Such facilities have demonstrated that they face risk of closure due to adverse economic circumstances. A nuclear power plant eligible for the CNCPP that builds a hydrogen production facility or enters into a contract or agreement to provide power to a hydrogen production facility is clearly doing so to improve the economic outlook for a valuable clean electricity asset that otherwise confronts a high risk of retirement.
- Nuclear power plants that have regularly received the 45U tax credit⁵ for nuclear electricity generation have also demonstrated that they face economic stress from electricity market volatility and require public policy support to remain in operation—circumstances that partnership with a hydrogen production facility might meaningfully ameliorate.
- Similarly, electricity generating facilities deemed eligible for state-level policy support mechanisms to prevent retirement of existing low-emissions generation capacity ought to qualify as incremental generation.
- License renewals for existing electricity generating facilities often involve equipment maintenance, facility upgrade, and other costs that significantly influence an operator's decision whether or not to seek lifetime extension. A taxpayer ought to have an opportunity to provide evidence that new hydrogen production constitutes a factor in its decision to pursue relicensing of an existing generation asset, qualifying the facility as eligible incremental generation capacity that would otherwise retire.

Heat co-generation in support of hydrogen production:

Many low-emissions thermal power plant technologies may produce waste heat in addition to electricity. Examples of such technologies include—but may not be limited to—nuclear power plants, concentrating solar power plants, geothermal power plants, fusion power plants, or fossil power plants with carbon capture. This waste heat can support operations at a hydrogen production facility, whereas other low-emissions electricity sources like hydropower, solar, and wind do not inherently produce useful heat and would have to convert some electrical output into heat energy in order to do so. Such thermal energy inputs ought to be taken into account in incrementality criteria for Section 45V credit eligibility. We propose the following:

⁴ Energy.gov. "Civil Nuclear Credit Program." Accessed February 22, 2024. <https://www.energy.gov/gdo/civil-nuclear-credit-program>.

⁵ Energy Communities. "Zero-Emission Nuclear Power Production Credit - 26 U.S. Code § 45U." Accessed February 22, 2024. <https://energycommunities.gov/funding-opportunity/zero-emission-nuclear-power-production-credit-26-u-s-code-45u/>.

- Pre-heating of water introduced into an electrolytic cell can dramatically reduce electricity consumption for electrolytic hydrogen. If a facility produces heat to support pre-heating of the water input to the hydrogen production facility, the equivalent electricity input required to produce that input heat should count as incremental and the taxpayer should receive EACs corresponding to that amount of electricity.
- Co-located heat co-generation to support high-temperature electrolysis via solid oxide electrolysis cells (SOEC) is a promising emerging technical approach to clean hydrogen production that is unique to thermal power plants. Low-emissions thermal electricity generating facilities that build or partner with a SOEC-based hydrogen production facility that receives thermal energy inputs from the generating facility ought to qualify as incremental.

We thank the Treasury Department and the Internal Revenue Service for the opportunity to comment on this proposed rulemaking. We look forward to future conversations regarding these policies.

Sincerely,

Dr. Seaver Wang
Co-Director, Climate and Energy
The Breakthrough Institute

Dr. Adam Stein
Director of Nuclear Energy Innovation
The Breakthrough Institute

