Nuclear Hydrogen Initiative

## Response to Notice of Proposed Rulemaking REG–117631–23

These comments are submitted by the U.S.-based members of the **Nuclear Hydrogen Initiative (NHI)** to the notice of proposed rulemaking ("NOPR") issued by the Internal Revenue Service (IRS) on December 26, 2023 on the Section 45V Credit for Production of Clean Hydrogen. NHI is a global coalition of more than 60 companies and organizations – including hydrogen producers, hydrogen and nuclear supply chain companies, hydrogen end-users, academia and civil society - with the common mission to advance nuclear hydrogen as a critical climate solution within a shared vision of a decarbonized global energy system.[1] One of the goals of NHI is to develop and share policies that advance the rapid scaling of the production of clean hydrogen using both existing nuclear facilities as well as small modular and advanced reactors.

Our comments underscore the importance of ensuring that nuclear energy plays a meaningful role in hydrogen production. Not only does this clearly reflect Congressional intent in both IRA and IIJA clean hydrogen programs, but we believe that a large-scale clean hydrogen market will not exist without nuclear-produced hydrogen. Although we understand that the NOPR supports nuclear hydrogen in principle, the current eligibility requirements set out in the NOPR would from a commercial perspective significantly undercut the ability of nuclear energy to contribute to the clean hydrogen market. This is due to the timelines of deployment of new nuclear generation and limited capacity and capability of existing facilities to undergo significant uprates.

To address this issue, our comments propose several additional pathways for existing nuclear facilities to qualify for 45V. All of these pathways are in line with the three pillars of incrementality, distribution and hourly matching, and they are responsive to the comments sought by Treasury on flexibilities that the proposed rule can offer, while heeding to the stated goal of avoiding additional carbon emissions. Specifically, our comments offer:

1. Criteria for eligibility of facilities in jurisdictions with a high percentage of clean energy generation and policy-focused and/or legal constraints on the ability of fossil resources to ramp up due to resource shifting.

2. Pathways for facilities to meet the incrementality standard, such as an approach to avoided retirements that provides commercial certainty, extended eligibility for uprates or capacity increases, and treatment of license extensions similar to uprates.

3. Very limited relaxation of incrementality requirements for first-mover facilities.

[1] The full list of NHI participants is available at https://nuclear-hydrogen.org/#participants. One of NHI participants, the Clean Air Task Force (CATF) supports a 45V framework that provides for viability of clean hydrogen production from existing nuclear power plants that meet incrementality through certain alternative pathways and has reflected some of the proposals in this NHI letter in its own comments. However, CATF is filing its own comments and respectfully does not sign on to this comment letter.

## BACKGROUND

Hydrogen has often been called the "Swiss Army knife" of energy tools, given its ability to decarbonize a plethora of industries – especially those hard-to-abate sectors like transportation, heavy industry and buildings. Some modeling estimates demonstrate that hydrogen can help meet as much as 14% of the country's energy demand by 2050, which would require the production of 63 million metric tons of hydrogen by 2050.[2] However, doing so requires the removal of barriers to the scaling of the clean hydrogen market, cost being the principal one. This is why the Hydrogen Shot, the very first of the Administration's Energy Earthshots, launched June 7, 2021 seeks to reduce the cost of clean hydrogen by 80% to $1 per 1 kilogram in 1 decade.[3]

Nuclear energy is uniquely positioned to help achieve these targets. Not only is nuclear energy zero-carbon, but it is also firm and operates at the highest average capacity factor of any source of electricity (92%). This high-capacity factor allows for highly efficient and large-scale hydrogen production, meeting the goals of the IRA and also the DOE's Hydrogen Shot program. We firmly believe that, without large-scale efficient hydrogen production from nuclear energy, it will be extremely difficult to scale electrolyzer production and the DOE's Hydrogen Shot goals will not be met. Furthermore, it is a fact that nuclear power's high energy density results in a much smaller physical space requirements to generate a similar power output compared to renewable sources which can be a key aspect in considering building up a clean hydrogen market in the United States as competing land use and transmission line restrictions can be a limiting factor in locating new hydrogen generation facilities.

Existing nuclear power plants are already entering the hydrogen production market, with three separate nuclear hydrogen demonstrations funded by the DOE, with one (production of hydrogen at Constellation Energy's Nine Mile Point nuclear power plant) already in operation. Figure 1 demonstrates the location of these projects and provides some information about them. These DOE-funded projects are intended to demonstrate the capability of nuclear energy to power hydrogen production and the various ways that such production could occur. This includes both low temperature and high temperature electrolysis. All three projects are precursors to large-scale nuclear hydrogen production; however, for that large-scale production to occur, the 45V credit is essential in closing the clean hydrogen production cost delta.

[2] *See* "Roadmap of a U.S. Hydrogen Economy": https://h2fcp.org/sites/default/files/Road+Map+to+a+US+Hydrogen+Economy+Full+Report.pdf.
[3] https://www.energy.gov/eere/fuelcells/hydrogen-shot

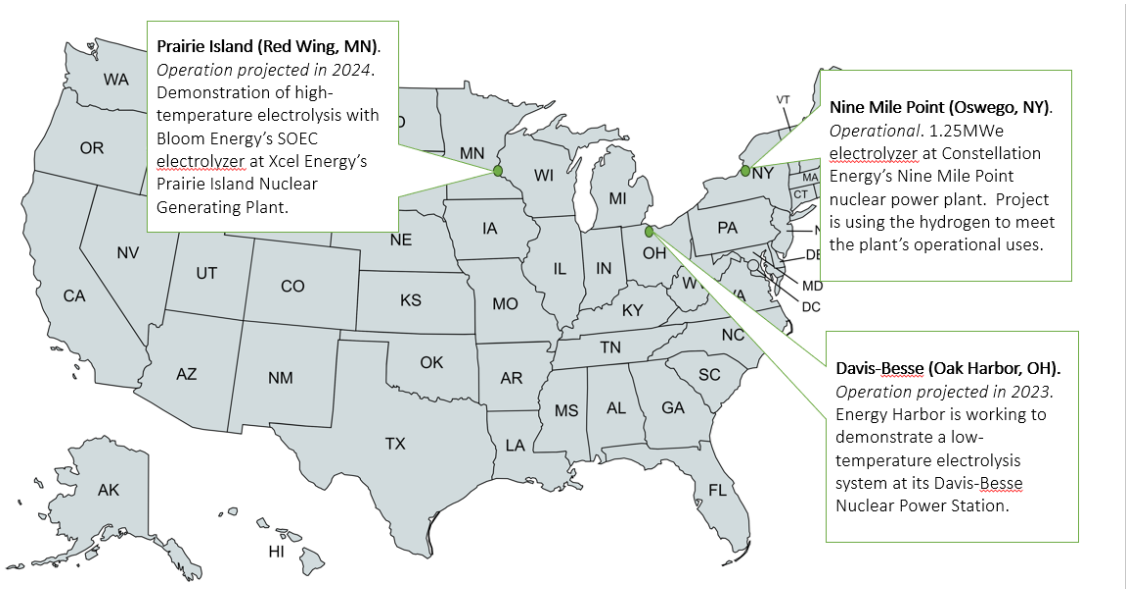


**Figure 1:** DOE funded projects to demonstrate hydrogen production at existing nuclear energy generating facilities.

The IRA clearly recognizes the role of existing nuclear energy production facilities in hydrogen production by: (1) tying the amount of the production tax credit to the lifecycle greenhouse gas emissions rate of hydrogen production based on the GREET model, which already calculates an emissions rate for nuclear-based hydrogen that is eligible for the highest (100%) rate and (2) linking Section 45V with the Section 45U production tax credit for nuclear facilities placed in service prior to enactment of the IRA.[4][5]

Similarly, clean hydrogen programs under the IIJA explicitly recognize the important role of nuclear hydrogen in the clean hydrogen economy. The $8B H2 Hubs program authorized by the IIJA provides that at least one of the four (or more) hydrogen hubs will rely on the production of hydrogen from nuclear energy. The DOE Funding Opportunity Announcement (FOA) for the H2 Hubs further requires that each H2 Hub produce "impactful, commercial-scale quantities of clean hydrogen at a rate of at least 50-100 metric tons (MT) per day" – a rate that is satisfied through the production of hydrogen using firm nuclear energy at high capacity factors.

The IRA 45V PTC and the IIJA H2 Hubs program are clearly linked, with the first seeking to reduce the operating costs of hydrogen production, while the second seeks to reduce the capital costs of clean

[4] Section 45U(c)(2) allows existing nuclear facilities receiving credits under Section 45U to also receive credits under Section 45V if they use the electricity they generate to produce clean hydrogen.

[5] Note further that the IRA does not include an "additionality" requirement; rather, the language in the IRA is very clear that there are only four requirements for hydrogen to meet the definition of "qualified clean hydrogen": (a) production through a process with lifecycle emissions less than 4 kilograms of CO2e per kg of hydrogen, (b) production or possession in the United States, (c) in the ordinary course of trade or business of the taxpayer, and (d) verification of the production, sale and use by an independent party.

hydrogen investments. Three (3) of the seven (7) H2Hubs selected by the DOE currently include nuclear energy. One of these projects is Constellation's ~$900M proposed hydrogen production facility at its LaSalle Clean Energy Center in Illinois, which is included in the MachH2 hub selected for up to $1B of funding by the DOE. If constructed, this would be the world's largest nuclear-powered clean hydrogen facility targeted to produce an estimated 33,450 tons of clean hydrogen each year.[6]

**THE ISSUE**

The current eligibility requirements set out in the NOPR would significantly undercut the ability of nuclear energy to meaningfully contribute to the clean hydrogen market, which clearly negates the intent of both the IRA and IIJA clean hydrogen programs. The NOPR provides the use of "energy attribute certificates" (EACs) to prove eligibility for the credit under section 45V of the Internal Revenue Code (IRC). The use of EACs is further predicated on the "incrementality" of the generation source. "Incrementality" can be met by either (a) bringing online a new generation facility with commercial operation date no more than 36 months before the hydrogen production facility for which the EAC is retired was placed in service, or (b) implementing an "uprate" at the generation facility no more than 36 months before the hydrogen production facility with respect to which the EAC is retired was placed in service. Nuclear energy will have difficulty meeting either part of this test for the following reasons:

**Timelines.**

While the IRA provides that a "qualified clean hydrogen production facility" must start construction before January 1, 2033. The milestones set out in the IIJA H2 Hubs program are even more aggressive: these provide for operation of hydrogen production facilities from 5-8.5 years from the date of award (or earlier) – i.e., between 2028 and 2032.

There are currently only a handful of new nuclear energy production facilities under development: the X-energy SMR projects in Texas and Washington State, each 320 Mwe, and the TerraPower 345Mwe SMR project in Kemmerer, Wyoming. These are exciting first-of-a-kind demonstrations of SMR / advanced reactor technologies, which NHI believes have great potential for hydrogen production. However, these first projects are not slated to be operational until at least 2030 and are not targeted for hydrogen production.

Although NHI and many of its participants are working to accelerate the commercial operation of SMRs / advanced reactors, realistically, few SMR / advanced reactor projects would be able to qualify for 45V and none would be able to meet the accelerated milestones set out by the H2Hubs program. Both these programs thus clearly focus on hydrogen production from existing nuclear facilities. In fact, in its policy recommendations, NHI urged *additional incentives* to catalyze hydrogen production from SMRs / advanced reactors.

[6] *See* https://www.constellationenergy.com/newsroom/2023/Constellation-To-Play-Key-Role-in-1-Billion-Clean-Hydrogen-Hub-Awarded-by-US-Department-of-Energy.html

We also note that it's also important that the 45V PTC eligibility criteria recognize the long operational life of a nuclear power plant. The NOPR emphasizes construction starts and capital cost investments, which are metrics that recognize attributes of wind and solar facilities, which have minimal operation and maintenance (O&M) costs but also short operating lives. Nuclear generating facilities, on the other hand, require continual O&M investments. These continual investments allow a nuclear facility to operate around five (5) times longer than wind and solar facilities. By focusing fulfilment of the incrementality criterion solely on the upfront capital date, the NOPR is incentivizing project that have short operational lives and low O&M requirements. These attributes, however, are not at all relevant to the goal that the incrementality criterion seeks to achieve -- reducing emissions.

**Uprates**.

Uprates are clearly an addition of new generating capacity that meets any version of an incrementality standard potentially adopted by Treasury. However, most nuclear power plants in the United States have already completed some form of an uprate. In fact, 176 uprate applications have been approved by the Nuclear Regulatory Commission (NRC) to date, totaling more than 8 GW of additional electricity production. Many of these facilities technically are not capable of implementing additional uprates. For those that are, Treasury should confirm that uprated capacity satisfies any incrementality standard adopted.

This does not mean that only uprated capacity should qualify for the full 45V tax credit. Uprates are expensive endeavors costing tens to hundreds of millions of dollars depending on the target uprate. An owner/operator of a nuclear reactor already must invest hundreds of millions of dollars in capital into a hydrogen production facility. This is the case even for projects selected as part of the H2Hubs program (given the 50% or greater non-federal cost share requirement). These nuclear hydrogen producers are already taking a substantial risk in making this investment to enter a clean hydrogen market that is still rife with uncertainties. In fact, the White House has acknowledged demand-side failures and the need for federal support for remedy them,[7] while the DOE announced just last month the selection of a consortium to "design and implement demand-side support mechanisms"—an effort to which $1B of the $8B H2Hubs will be dedicated.[8] Requiring nuclear reactor owner/operators to invest additional capital into an uprate in such an uncertain market *solely* to qualify for the 45V credit is unreasonable.

[7] *See* https://www.whitehouse.gov/cea/written-materials/2023/07/05/the-economics-of-demand-side-support-for-the-department-of-energys-clean-hydrogen-hubs

[8] *See* https://www.energy.gov/oced/articles/doe-selects-consortium-bridge-early-demand-clean-hydrogen-providing-market-certainty

## THE PROPOSED SOLUTIONS

Given these constraints and the importance of ensuring that nuclear energy can play a significant role in enabling and participating in the clean hydrogen market, as envisioned by Congress, we propose the following additional eligibility criteria for clean energy facilities for the 45V credit. We believe that these criteria would also satisfy the "incrementality" framework proposed by Treasury and the IRS. Some of these proposals would apply to clean energy facilities across the board, while others are specific to nuclear-produced hydrogen because of the unique nature of nuclear technology.

### 1. Facilities in Jurisdictions with Clean Grids / Renewable Portfolio Standards

One of the rationales for the "incrementality" criterion is the concern that allowing the use of existing clean electricity for hydrogen production would result in other customers using electricity produced by other generators, which could be unabated fossil plants. However, several states have renewable / clean energy portfolio standards that provide for firm commitments to bring additional clean energy capacity onto the grid. Some states have also implemented cap-and-trade programs. We believe that a clean energy facility should be eligible for the 45V credit without needing to meet the incrementality criterion if it is located in a state that: (1)(a) during the year prior to the year that the taxpayer seeks the credit, maintains a ratio of more than 60% of in-state carbon-free electricity generated to total in-state electricity consumed and (b) maintains a renewable or clean energy standard that requires the state to implement more than 70% clean electricity in its electricity mix by 2035 and the state has demonstrated reasonable progress towards that goal during the last three (3) years OR (2) maintains a cap-and-trade or cap-and-invest program with reduction of emissions of at least 40% over 1990 levels by 2035 OR (3) maintains a ratio of more than 90% in-state carbon-free electricity generated to total in-state electricity consumed. Each one of these sets of metrics demonstrate that the jurisdiction limits the ability of fossil resources to ramp up as a result of resource shifting.

The table below shows these metrics for New York, California, and Illinois. Using the formula above, clean energy facilities in New York would qualify by 2030 because of the State's carbon-free electricity commitments (provided that New York shows reasonable progress in meeting these metrics), California would qualify because of its cap-and-trade program, and Illinois would qualify based on meeting the 90% carbon-free generation standard today.

| State | 2022 Electricity Consumption (GWh)[9] | 2022 Clean Electricity Generation (GWh)[10] | Percentage of Carbon-Free Output to Electric Consumption | Renewable / Clean Energy Standard[11] | Cap-and-Trade Program |
|---|---|---|---|---|---|
| New York | 143,210.5 | 61,019.6 | 42.6% | 70% renewable electricity by 2030 \| 100% carbon-free electricity by 2040 | Regional Greenhouse Gas Initiative (RGGI) |
| California | 251,869.1 | 102,736.5 | 40.8% | 60% by 2030 \| 90% by 2035 \| 95% by 2040 \| 100% by 2045 | California Cap-and-Trade Program[12] |
| Illinois | 135,871.6 | 124,027.0 | 91.3% | 40% by 2030 \| 50% by 2040 (does not include nuclear) | N/A |

This approach has parallels to that implemented by the European Union (EU) with respect to its renewable hydrogen mandates for industry. On September 12, 2023, the EU passed the Renewable Energy Directive (RED III), implementing a requirement for industries such as ammonia and chemicals production, oil refining and green steel to use at least 42% renewable hydrogen (of all hydrogen used) by 2030 and 60% by 2035. RED III, however, allows for member states to discount the share of renewable hydrogen by 20% in 2030 if the member state (a) is on track to meet their national contribution to the EU's overall target for 42.5% renewables in final energy consumption by 2030 and (b) has a low share of fossil fuel-produced hydrogen (23% or below in 2030 and 20% or below in 2035).[13]

**2. Pathways to Meet Incrementality**

As noted above, the NOPR provided only two ways for a hydrogen producer to meet the "incrementality" requirement – construct a new clean energy facility or undertake an uprate within 36 months of the hydrogen facility coming online. We believe that Treasury should consider broader mechanisms that would allow nuclear hydrogen producers to meet the incrementality requirement.

**2.1 Avoided Retirements**

The NOPR seeks comments on the eligibility of a facility for 45V that would be tied to avoiding the retirement of that facility. We believe that the "avoided retirement" test should allow for several

[9] Source: U.S. Energy Information Administration, EIA-861 Annual Electric Industry Report: Annual Sales to Ultimate Customers by State and Sector, https://www.eia.gov/electricity/data/state/xls/861/HS861%202010-.xlsx

[10] Source: U.S. Energy Information Administration, EIA-923 Power Plant Operations Report: Net Generation by State by Type of Producer by Energy Source, https://www.eia.gov/electricity/data/state/annual_generation_state.xls

[11] *Source:* ClimateXChange State Climate Policy tracker: https://climate-xchange.org/dashboard/map/

[12] *See* https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program

[13] *See* RED III Article 22b (Conditions for reduction of the target for the use of renewable fuels of non-biological origin in the industry sector), at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023L2413&qid=1699364355105.

pathways. We are proposing simplified tests, rather than the multi-factor considerations discussed in the NOPR because we believe that there are already metrics in existence that would demonstrate that a zero-carbon generation facility is under financial strain and is opting to produce hydrogen at least in part to stabilize its financial outlook.

We note that, if applied on a per-facility basis, the "avoided retirement" test must be applied in a way that allows for snapshot in time to be relied upon prospectively. Otherwise, the uncertainty of the cost to deliver electricity (since the generator cannot perfectly predict future economic conditions) makes it is impossible for a generator to enter into offtake contracts with hydrogen producers.

We thus propose that facilities that meet the criteria below should satisfy the "incrementality" criterion under the avoided retirement logic:

a. Any nuclear facility that was eligible for the 45U Zero-Emission Nuclear Power Production Credit or located in a jurisdiction where electricity prices were lower than $43.75/MWh, escalating with inflation, for at least three (3) of the past six (6) years. The 45U credit aims to prevent premature closure of existing nuclear facilities by providing, beyond a certain threshold, a credit that is gradually reduced as power prices rise above a $25 per megawatt hour (MWh) index. The credit is thus based on market conditions and is focused on merchant facilities that are at risk due to market volatility. However, tying eligibility for 45V to 45U on a year-to-year basis creates too much uncertainty for nuclear hydrogen producers given the significant up-front investment required for a hydrogen facility. Providing a snapshot of market volatility for six (6) years prior to hydrogen facility operation – either through the 45U test or through a more simple <$43.75/MWh electricity price metric (escalated with inflation) -- gives potential nuclear hydrogen producers a mix of data and projections that allows for some certainty in (1) deciding whether to make an investment into developing and constructing a hydrogen facility and (2) entering into offtake agreements. This test would be applied as of the date a supply agreement for electricity used to power hydrogen production is executed, and deliveries under that supply agreement would be incremental for the full term of the agreement and any extension thereof, up to the contract quantity. This approach is consist with the EU formulation for additionality.

   Any nuclear facility eligible for a state program enacted to prevent closures of nuclear power plants. Examples of such programs include two pieces of legislation in Illinois - the Future Energy Jobs Bill enacted in December 2016 that provided for the procurement of zero-emission credits (ZECs) from zero emission facilities and the 2021 Climate and Equitable Jobs Act which implemented a carbon mitigation credit (CMC) program. A clean energy facility should automatically meet the "avoided retirements" test if it has previously been qualified as eligible to receive support under a state program designed to prevent nuclear power plant closures. Retirement of that facility has been avoided and its output is incremental for the duration of its operating license.

In addition to the pathways set out above, we believe that any nuclear facility eligible for the Civil Nuclear Credit Program (CNCP) should automatically meet the "avoided retirements" test if the DOE has

issued a Conditional Award Decisions that covers that facility. The CNCP is a $6 billion program authorized by the CNCP to help preserve the existing U.S. reactor fleet.[14] However, only one nuclear facility (Diablo Canyon) has been awarded CNCP funds, with no further applications or awards expected; the rest of the funds ($4.5B) are expected to be absorbed into programs supporting the domestic production of nuclear fuel. Given that only one nuclear unit would qualify for a CNCP-based exception, while this test should be an acceptable way for a facility to qualify, it should not be applied as a sole or principal pathway to meet the avoided retirements criterion.

### 2.2 Extended Eligibility for Uprates and Capacity Increases

As noted above, we fully agree that any clean energy facility that implements an uprate should be eligible for 45V. However, we believe that the capacity created by an uprate should not be subject to the thirty-six (36)-month timeline proposed in the NOPR. Any nuclear facility for which a taxpayer submitted an application for an uprate to the Nuclear Regulatory Commission (NRC) by the date of enactment of this rule (and the uprate application is subsequently approved) should be deemed an "uprate" under the rule. Clearly, a taxpayer that pursues an uprate after the rules for 45V are established and subsequently constructs and operates a hydrogen facility is pursuing the uprate at least in part to make incremental capacity available for hydrogen production on an on-going basis. The link between the uprate the hydrogen production is thus naturally established. The thirty-six (36) month timeline proposed in the rule is arbitrary and does not serve a specific purpose.[15]

Further, the uprate criterion should also include capacity increases. U.S. nuclear power plants have the highest capacity factors in the world – above 92%. However, U.S. nuclear operators are always striving to improve their operations. If a nuclear power plant increases its capacity, that additional capacity should be considered incremental, comparable to uprates.

### 2.3 License Extensions

We believe that life extensions of existing nuclear reactors should be treated similarly to uprates. Any nuclear facility for which a taxpayer applied to the NRC for license renewal, including subsequent license renewal (and for which the license renewal application is subsequently approved) should be deemed to automatically satisfy the incrementality criterion for the facility's new license period. The logic here is the same as for uprates -- a taxpayer that completes a license renewal after the rules for 45V are established and subsequently constructs and operates a hydrogen facility is pursuing that license

[14] Facilities eligible for CNCP must meet demonstrate that they are projected to close for economic reasons and that closure will lead to a rise in air pollutants. To meet this requirement, applicants for CNCP must provide supporting information, such as public filings, that announce the intention of the nuclear reactor, an assessment of the availability (or unavailability) of federal or state support programs, and other factors that indicate the likelihood of closure due to economic factors during the award period. Applicants must further demonstrate that they compete in a competitive electricity market during the award period.

[15] We recognize that the rule also provides for a 36-month period for incremental facilities more generally. For the same reasons set out above, we would support extending this period in a similar way.

renewal at least in part to pursue hydrogen production from that facility. The proposed thirty-six (36) month timeline therefore should not apply.

**Limited Relaxation of Incrementality Requirements for First-Movers**

As noted above, nuclear energy is uniquely positioned to help achieve U.S. clean hydrogen production targets, and existing nuclear energy plants are uniquely positioned to be early movers. Having just a few existing nuclear plants convert to hydrogen production in the first few years of the tax credit availability would begin the process of learning by doing and building out infrastructure. While concerns about potentially increased emissions in the early years of hydrogen production are important, the energy system modeling that has raised concerns about foregone emission reductions has not accounted for the enormous learning-by doing benefits afforded by early movers. These early movers enable much larger emission reductions later. We propose three mechanisms to allow these early movers to proceed:

a. Any existing nuclear facilities in a taxpayer's nuclear fleet should be deemed as eligible for 45V (subject to other requirements, such as distribution and hourly matching) as long as the total electricity used by these facilities to produce hydrogen does not exceed 10% of the capacity of the taxpayer's nuclear fleet and these facilities enter into offtake agreements. This formulation places a cap on the nuclear generation that can be allocated to hydrogen production, thus greatly reducing the potential of indirect emissions. Any generation that is deemed eligible for 45V through other means (e.g., the 45U test proposed in Section 2.1(c) above) would be subtracted from this number. This criterion also ties into and supports the "avoided retirements" approach discussed in Section 2.1. above. As Treasury has asserted in the NOPR, 5% of the nuclear fleet is currently at risk of retirement. The same EIA data cited by Treasury shows retirements increasing to 10% by 2033 and more than doubling to 22% by 2040.[16] Since only a subset of nuclear facilities are likely to pursue hydrogen production (due to the substantial investment required), the total number of nuclear-produced gigawatts dedicated to hydrogen production would be significantly below the gigawatts of nuclear generation at risk of retirement.

b. The first five (5) large-scale (i.e., above 50MWe) hydrogen production facilities that use electricity from nuclear power plants that are placed into operation by 2028 should be deemed as eligible for 45V (subject to other requirements, such as distribution and hourly matching). These facilities (and any capacity additions to those facilities) should be eligible for 45V as long as the credit remains available (i.e., 2032 or later if it is extended). This formulation follows, in part, the EU's delay of the implementation of incrementality / additionality requirements until 2028, but with a stricter limit. Treasury could propose the same formulation for renewable and natural gas + CCUS first-mover hydrogen production facilities, resulting in only 15 facilities that would be outside the incrementality framework but which would generate enormous first-mover benefits.

[16] U.S. Energy Info. Admin., Annual Energy Outlook 2023, Table 9 (Electric Generating Capacity, Reference Case), https://www.eia.gov/outlooks/aeo/data/browser/#/?id=9-AEO2023&cases=ref2023&sourcekey=0.

c. Facilities that pursue hydrogen production via high-temperature electrolysis. Several nuclear power plants in the United States, including Xcel Energy's Prairie Island nuclear power plant[17], are considering the production of hydrogen using the high-temperature electrolysis process using solid oxide electrolysis cells (SOEC). In several trials at Idaho National Laboratory, high-temperature electrolysis was demonstrated to be more than 45% more efficient than low-temperature electrolysis when combined with external heat.[18] This improvement in efficiency means that less electricity is required to produce hydrogen, which may also mean a reduction in the cost of clean hydrogen produced. Projects that implement high-temperature electrolysis projects are also pursuing technological innovation and techno-economic "learning-by-doing," which have further benefits to accelerating the clean hydrogen economy and reducing carbon emissions. For these reasons, facilities pursuing high-temperature electrolysis should be considered eligible for 45V regardless of whether the underlying generation is incremental.

## CONCLUSION

As noted above, we believe that these proposals support a key role for nuclear hydrogen in catalyzing a clean hydrogen market, while adhering to decarbonization goals. We appreciate the opportunity to comment on REG–117631–23 and welcome the opportunity to have additional discussions on these issues. Please do not hesitate to contact the undersigned with any questions.

Sincerely,

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[17] *See* https://www.bloomenergy.com/news/xcel-energy-and-bloom-energy-to-produce-zero-carbon-hydrogen-at-nuclear-facility/#:~:text=The%20high%20heat%20and%20steam,membrane%20(PEM)%20or%20alkaline.
[18] *See, e.g.,* https://www.bloomenergy.com/news/idaho-national-lab-and-bloom-energy-produce-hydrogen-at-record-setting-efficiencies/