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Internal Revenue Service
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Room 5203
P.O. Box 7604, Ben Franklin Station
Washington, D.C. 20044

Ms. Aviv Aron-Done
Assistant Secretary for Tax Policy
US Department of the Treasury
1500 Pennsylvania Avenue, N.W.
Washington, D.C. 20220

Mr. William Paul, Esq.
Acting Chief Counsel
Internal Revenue Service
1111 Constitution Avenue, N.W.
Washington, D.C. 20224

Re: REG-117631–23 (Notice of Proposed Rulemaking for Section 45V Clean Hydrogen Production Credit)

Dear Ms. Aron-Done and Mr. Paul:

Thank you for the opportunity to provide input to the Department of the Treasury and the Internal Revenue Service (IRS) regarding implementation of the Section 45V Clean Hydrogen Production Credit.

Breakthrough Energy is a network of philanthropic programs, investment vehicles, and policy efforts founded by Bill Gates with the goal of accelerating the clean energy transition and reaching net-zero emissions by 2050. Our initiatives include the two-billion-dollar Breakthrough Energy Ventures fund, which helps build groundbreaking companies that can significantly reduce emissions across the economy, and the Breakthrough Energy Catalyst program investing in demonstration projects to get new clean energy technologies to scale.

If produced via low-carbon methods, hydrogen's versatility positions it as an essential tool to decarbonize hard-to-electrify sectors of the economy including heavy transport, industrial manufacturing, and agriculture. The creation of a technology-neutral hydrogen tax credit via the Inflation Reduction Act of 2022 (IRA) will help reduce the green premium of this important energy carrier, spur deployment, and position the United States as a global leader of this emerging industry. In order to ensure Section 45V is implemented consistent with Congressional intent, Breakthrough Energy urges the Treasury and IRS to make certain that final regulations (1) provide parity and equal credit access to all clean hydrogen production methods, including nascent production pathways, and (2) ensure the credit is available only to producers who are able to demonstrate their fuel meets the clear and intentionally ambitious carbon emission standards set by Congress.

Below please find our comments pertaining to the recently published Notice of Proposed Rulemaking (NPRM) for Section 45V (REG-117631-23).

Comments

<u>Provisional Emissions Rate – §1.45V(c)(2)(c)</u>

While many ways of producing clean hydrogen exist today, continued technology innovation will likely result in the development of additional commercially viable production processes throughout the duration of Section 45V. Consequently, **Breakthrough Energy strongly encourages the Treasury, IRS, and Department of Energy (DOE) to work together to include new hydrogen production pathways in 45VH2_GREET as quickly as possible, including methane pyrolysis and geologic hydrogen**, to not delay the deployment of technologies at or nearing commercial readiness.

1. ***The Department of Energy's (DOE) review of Provisional Emissions Rate (PER) applications should be completed within six months of the taxpayer's submission.***
   A prolonged delay in determining a carbon intensity (CI) score creates uncertainty for taxpayers and may hinder projects from finalizing investment decisions. It also places emerging technologies at a disadvantage relative to other mature hydrogen production methods. Treasury should direct the DOE to assess PER applications and determine a CI score within six months. In the event that DOE does not complete the process, taxpayers should be provided the option to determine their CI score via an approved lifecycle analysis (LCA) methodology. This LCA determination should be allowed for the duration of the credit for that facility.

2. ***Taxpayers should be granted a safe harbor in the event their PER score is lower than the CI score that a subsequent 45VH2_GREET update yields.***
   Ideally no discrepancy should exist between a taxpayer's PER score and future GREET-determined CI score. However, scientific developments and methodological improvements may result in slightly different scores. Breakthrough Energy recommends that the Treasury and IRS grant a safe harbor to a facility in the event a future update to 45VH2_GREET results in a higher CI score, so long as the taxpayer makes a good faith effort to report accurate information in its initial PER application.

3. ***A technology-inclusive approach to determining carbon intensity score should be embedded in LCA requirements.***
   Many established methods of producing low-carbon hydrogen today (such as electrolysis and methane pyrolysis) have defined system boundaries, consistent inputs and outputs, and modular equipment that make LCA assessment relatively straightforward and consistent. However, the same is not true of more novel methods of production. For example, geologic hydrogen (also known as natural hydrogen) involves removing naturally occurring deposits of hydrogen from the earth's subsurface. Given the varied nature of geologic conditions of reservoirs, the carbon intensity of hydrogen acquired this way may vary slightly. Breakthrough Energy recommends that the Treasury and IRS specify that geologic hydrogen producers must file a PER application for each facility, and that "facility" is defined as one (or more) wells and the processing equipment that exist within the same reservoir. Additionally, to minimize administrative burden, we recommend that taxpayers not be required to re-test CI unless significant changes in operations and equipment occur that might alter the carbon intensity of producing hydrogen at that facility.

4. ***Completion of a FEED study is an inappropriate indicator of project maturity to request a PER.***
   Determining 45V eligibility for a clean hydrogen production facility will be a necessary pre-condition for many, if not all, participants taking a financial stake in a project in the process of reaching a Final

Investment Decision (FID). As part of this process, a PER is required to determine facility eligibility. Therefore, the stipulation that a Front-End Engineering Design (FEED) study must be finalized before a request for a PER can be made to the Department of Energy (DOE) could substantially delay projects. A more logical approach would be for the DOE to conduct the determination of a PER using a pre-FEED or feasibility study as a demonstration of project maturity.

Co-product Emissions Allocation in GREET Model §1.45V–4(b)

The Treasury and IRS are seeking public input on appropriate alternative co-product accounting methods within 45VH2_GREET. Breakthrough Energy requests that final guidance provide clarity for specific primary methane pyrolysis co-products, including synthetic graphite and carbon black. Specifically, Breakthrough Energy recommends incorporating displaced emissions of synthetic graphite and carbon black using the International Organization for Standardization 14044:2006.2 standard. Furthermore, we request that the Treasury and IRS, in consultation with the DOE, provide specific guidance on greenhouse gas credit values associated with these co-products when employing the system expansion method, similar to those for steam, nitrogen, and oxygen that are already included in the existing 45VH2-GREET 2023 model.

Renewable Natural Gas (RNG) and Fugitive Sources of Methane – Part IX of the Preamble for §1.45V

In general, Breakthrough Energy does not consider offset regimes that allow pollution reductions in one sector to be offset against pollution generated in another to be consistent with the intent of Section 45V, unless these offsets can be verified as permanent carbon removals. Offset regimes should be limited to the reduction of a facility's real emissions, which include mitigation of induced emissions. For instance, the stipulated requirements (incrementality, temporal matching, deliverability) for Environmental Attribute Credits (EACs) to offset electricity consumption associated with electrolytic hydrogen production ensure a direct reduction in emissions associated with a facility's production process – and therefore limit induced emissions from the power sector.

To the extent that negative-carbon-intensity fuels such as RNG are allowed, Breakthrough Energy recommends that they not be permitted to offset a facility's real emissions below zero (net-negative.) Such a practice would effectively allow taxpayers to artificially reduce emissions that actually occurred.

In addition, when establishing baseline assumptions about RNG and methane that determine a facility's emissions rate, the Treasury and IRS should assume the RNG or methane would otherwise be mitigated using best available technology. This assumption is crucial as determinations about where fuel came from and what might have otherwise happened to it can significantly impact emissions associated with its use. For fugitive sources of methane, we recommend adoption of a baseline comparison of capturing and flaring since that method is broadly considered the best available technology to minimize methane emissions. This approach is consistent with measures proposed by the Environmental Protection Agency in New Source Performance Standards for the oil and gas industry (FRL-8510-01-OAR), which presents capturing and flaring as a preferred control measure over venting. Venting of fugitive methane is not an appropriate baseline, as the best endorsed alternative to using methane for hydrogen production should not be to release it directly into the atmosphere. Adopting venting as the baseline assumption might inadvertently incentivize operators to choose more carbon-intensive practices, which would cut against Section 45V's goal of supporting cleaner hydrogen production.

Moreover, once RNG and fugitive methane enter a pipeline for transportation and use, they are indistinguishable from fossil methane. This fungibility means that robust tracking and verification of environmental attributes (EACs) is crucial to ensure accurate and verifiable carbon accounting of these fuels. Breakthrough Energy recommends that the Treasury and IRS set tracking requirements comparable with those proposed for EACs from the power sector. Such a system should include tight geographic bounds for fuel deliverability, and rigorous accounting of methane leakage.

Emissions Allocations -- §1.45V–1(b)

Annual averaging of CI could subject projects to significant compliance uncertainty and project financing risk. Breakthrough Energy recommends that the final rules reduce the risk that temporally isolated circumstances beyond the control of hydrogen producers lead to a lower applicable percentage under Section 45V(b)(2), disproportionately impacting annual project revenues – and therefore negatively impacting overall project economics. For example, a drop in contracted renewable energy production in a subset of hours could lead to losses of credit eligibility in all hours of the year. Below we discuss the challenges with the existing approach and offer two alternatives.

Challenges of Proposed Emissions Allocations Approach

Most electrolysis facilities will need to lock in a net revenue stream by signing long-term offtake contracts with hydrogen customers, and long-term power purchase agreements (PPAs) with renewable generators, so that they can show lenders they are able to repay their financial obligations. Any PPA must be expected to provide sufficient EACs to cover the planned volume of hydrogen production, and achieve a target CI (e.g., less than 0.45 kg CO2 per kg H2 to achieve the $3/kg H2 tax credit tier). However, in any given year, it is highly likely that a renewable generator's production will be subject to significant random variation in renewable power availability, that would make an electrolysis facility's contracted EAC supply unstable from year to year – especially in early years where renewable electricity markets face constraints imposed via lacking transmission and other barriers.

For example, industry standard assumptions[1] about wind speed variation suggest that over the course of 20 years—a typical project lifetime—a developer could expect wind project output to drop by more than 10% below the average in that timeframe in at least one year. In rare cases, variation could be even more extreme, making it challenging for individual electrolysis developers to know with reasonable certainty whether the EACs they may have contracted for in advance will be enough to support compliance at the target tier. Furthermore, recent data suggest that renewables' underperformance relative to expectations has been growing in recent years[2] (likely due in part to increased curtailment), magnifying the potential burden of an accounting approach that levies outsized penalties for small and potentially unexpected changes in carbon intensity performance.

Assuming 100% gas-fired electricity were to fill in the gap in a year where EACs come in short, an electrolysis facility normally producing hydrogen that is 100%-backed by compliant EACs would have to drop only to 97%-backed by EACs to drop over the cliff from $3/kg to $1/kg.[3] In this example, the non-linearity of the credit tiers means a 3% drop in CI performance could lead to a ~67% loss in credit value for the year.

In theory, electrolyzer facilities could use a mix of strategies to avoid these risks, including proactive renewable power over-procurement or project designs that enable electrolyzer operations to respond flexibly to real-time EAC supply (e.g., use of electrolyzer technologies with lower minimum working loads and improved ramping capabilities; deployment of hydrogen or electricity storage). However, these approaches would increase costs, risk, and project complexity and be limited by the constraints of firm offtake commitments.

For example, overbuilding of renewable energy (where procured renewables capacity exceeds electrolyzer capacity) potentially leads to hydrogen producers needing to sell an increasing portion of their procured electricity back to the grid. Exposure to price risk in the merchant power market would grow with increasing rates of over-procurement (see Figure 1). Crucially, it may also be challenging for project developers to determine in advance how much they would need to invest in these strategies to sufficiently mitigate the risks of falling over the credit tier cliff in a down year.

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[1] https://wes.copernicus.org/articles/3/651/2018/

[2] https://www.kwhanalytics.com/blog-archive/kwh-analytics-publishes-2022-solar-generation-index-solar-energy-continues-underperform-against-estimates

[3] Assumes electrolytic hydrogen produced using gas-fired electricity has a CI of 20 kgCO2e per kgH2 and roughly zero when backed by compliant EACs.

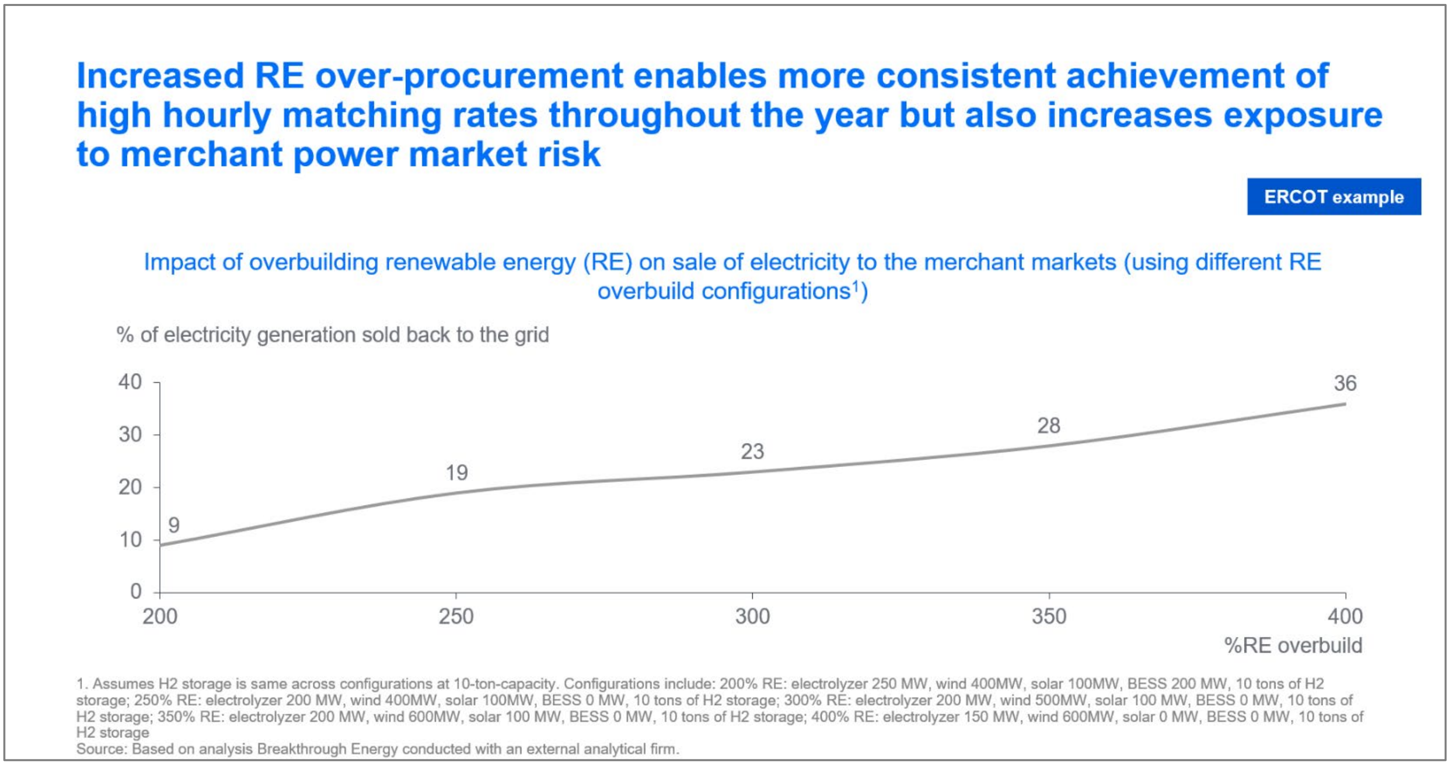

Figure 1

If a liquid spot market for compliant hourly EACs were to exist in the future, electrolysis projects may be able to "true up" their CI score by purchasing unbundled EACs when their contracted supply falls short enough to push them from \$3/kg to \$1/kg. However, such an hourly spot market does not exist broadly today, and uncertainty around when projects may have that option to mitigate "small miss" events could make financing significantly more challenging.

Alternative Approaches for Emissions Allocation

Numerous changes can be made to mitigate the intermittency and volatility risk of annual average CI accounting, with each option presenting advantages and disadvantages. Two options – hour-by-hour and feedstock-by-feedstock CI accounting – reduce most or all such risk.

1. *Feedstock-by-feedstock* accounting would involve determining the amount of Section 45V credit received by a taxpayer separately for each "feedstock" and assigning an emissions rate to each feedstock that all hydrogen producers could use. A "feedstock" would be defined as a distinct form of primary energy used to fuel a hydrogen producing process. Examples of feedstocks could include: wind (onsite or via energy attribute credits), solar (onsite or via energy attribute credits), grid average electricity, natural gas, renewable natural gas, etc. An individual feedstock would be assigned an average CI and corresponding credit tier applying to all hydrogen produced by that feedstock in a given facility for each year. For example, any hydrogen produced during the year using grid electricity with a non-compliant CI would receive no credit, but the CI of that hydrogen production would not count against other volumes of hydrogen produced by the facility in that year using wind or solar energy backed by compliant EACs.

   A "feedstock-by-feedstock" lifecycle emissions accounting approach, if applied to all forms of clean hydrogen, would also eliminate the risk that methane offsets from RNG with potentially negative CI scores would enable small quantities of RNG to cause annual average CI scores for fossil-based hydrogen production facilities to appear artificially low and receive the highest Section 45V credit tier.

Instead, hydrogen production volumes and their corresponding CI scores would be aggregated and calculated separately for RNG feedstocks and natural gas feedstocks.

2. *Hour-by-hour* accounting would involve determining the average CI separately for all hydrogen volumes produced in each hour. In this way, the hydrogen produced in one hour of the year could receive $3/kg with a near-zero CI in that hour, while hydrogen produced in another hour with a non-compliant CI could receive a lower tier or zero. An hour for this purpose should be defined as any sixty-minute period of the day.

There is a concern that providing more flexibility in the form of feedstock-by-feedstock or hour-by-hour accounting could result in the tax credit inadvertently incentivizing hydrogen production using grid electricity without the backing of compliant EACs. However, under the feedstock-by-feedstock approach, an electrolysis facility would only receive tax credits for the quantities of hydrogen produced that are backed by compliant EACs. Similarly, under the hour-by-hour approach, volumes in each hour would only be credited at a given tier if the average CI of all hydrogen produced in that hour achieved compliance at that tier.

Under feedstock-by-feedstock accounting, every unit decrease in compliant EAC supply would result in a linear reduction in tax credits, incentivizing facilities to use higher rates of low-CI feedstocks. Under hour-by-hour accounting, every additional hour that achieves a CI sufficient for Section 45V compliance would increase a facility’s tax credit amount. In both approaches, there would be strong incentives to decrease CI when feasible, including via spot market purchases of compliant EACs once such a market materializes.

Additionally, there are likely to be relatively few periods when power prices are low enough to make the production of a marginal unit of electrolytic hydrogen profitable with no Section 45V subsidy, assuming it would compete with fossil-based “grey” hydrogen, which is produced at costs as low as $1/kg. To achieve cost parity, power prices would have to be below ~$17/MWh. In ERCOT, which has some of the lowest power prices in the U.S., prices below ~$17/MWh are uncommon and tend to occur at times when grid carbon intensity is also low (See Figure 2).

Hour-by-hour accounting may provide greater certainty that electrolysis facilities are configured to achieve near 100% hourly EAC matching of electricity demand in at least a substantial portion of hours. For example, if an electrolysis facility had a constant supply of hourly EACs that matched 80% of its electricity demand in every hour, it would likely receive no 45V tax credits under an hour-by-hour credit allocation regime, while it could receive up to $3/kg for 80% of its hydrogen production under feedstock-by-feedstock accounting.

In practice, however, this outcome appears unlikely. Most facilities will need to procure a supply of hourly EACs via long-term contracts for wind or solar generation. Because wind and solar generation are variable, and because greater than 100% matching rates in any given hour cannot be used to offset underperformance in other hours, an electrolysis project aiming for 80% hourly EAC matching on average under feedstock-by-feedstock accounting would likely have to achieve significantly higher than 80% matching rates (if not 100%) in many hours.

For this reason, even under feedstock-by-feedstock accounting, most facilities which seek to receive tax credits for a large portion of their production will likely need to be configured in such a way that they can achieve close to 100% hourly EAC matching in many hours out of the year. As described previously, feedstock-by-feedstock accounting would also incentivize facilities to increase their matching rate to receive 45V tax credits for a greater portion of their production.

Implementation of hour-by-hour accounting may also be challenged by the current absence of hourly EAC registries. During the proposed phase-in period for hourly EACs, hour-by-hour accounting may not be possible implying that facilities would have to use annual average CI accounting during the transition period. This would expose facilities to the previously detailed risks of annual average accounting until hourly EAC registries are operational.

For these reasons, feedstock-by-feedstock accounting would likely provide the greatest certainty to projects and be the simplest to implement from day one. Breakthrough Energy would welcome the opportunity to meet with the Treasury and IRS to further discuss the practical application of the proposed alternatives.

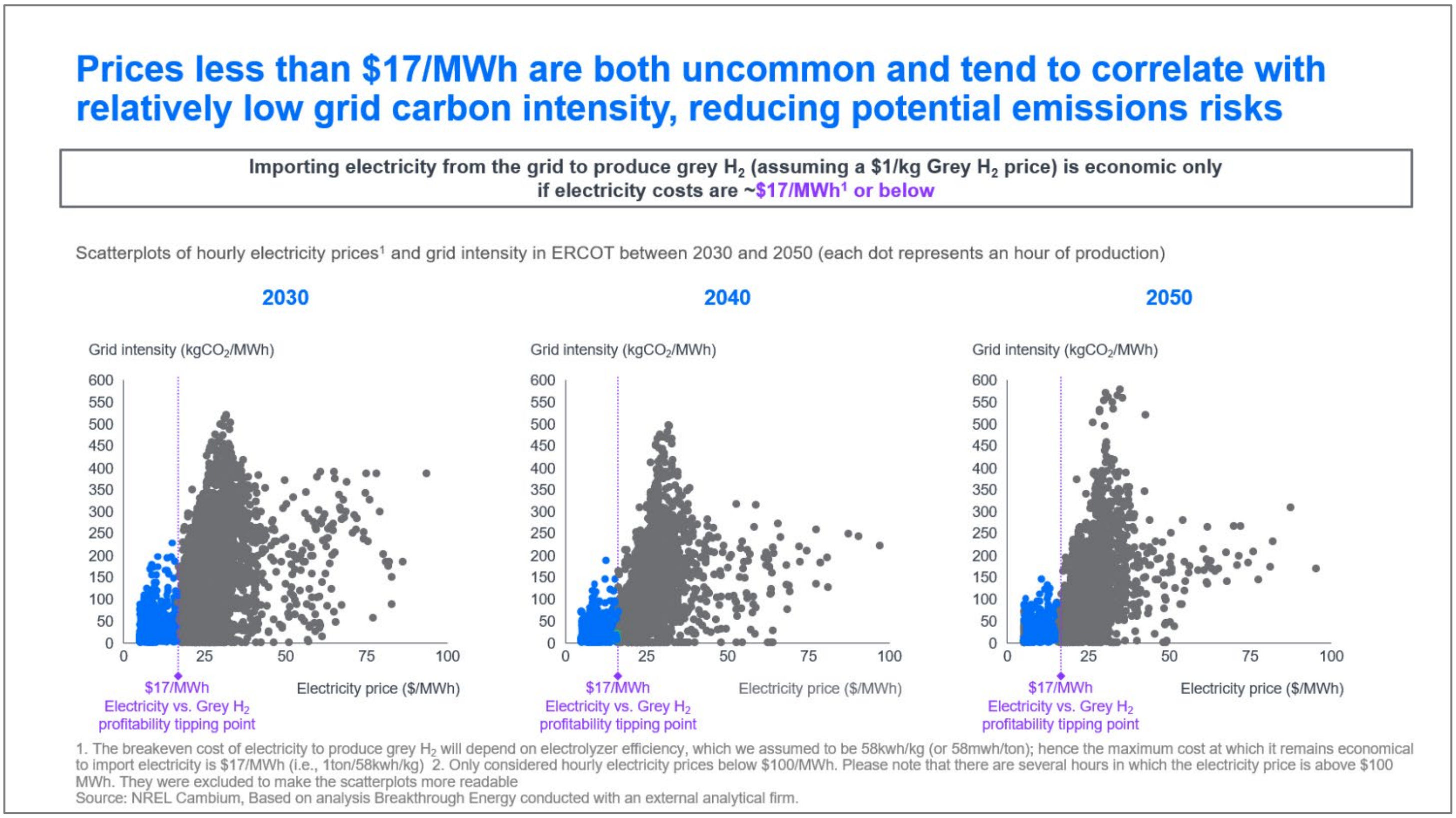

Figure 2

Pairing an Alternative Emissions Allocation Approach with an Emissions Cap

One approach to further disincentivize any hydrogen facilities receiving 45V tax credits from producing parallel quantities of unsubsidized hydrogen is to pair feedstock-by-feedstock or hour-by-hour accounting with an "annual average emissions cap" consistent with the DOE's Clean Hydrogen Production Standard (CHPS) of 4 kgCO2e/kgH2. This would require a facility to demonstrate that all hydrogen produced in a given year had an average CI of less than or equal to the cap. Upon meeting that standard, the facility could then be eligible to receive credits under feedstock-by-feedstock or hour-by-hour accounting.

While logical, we do not recommend this approach. As described above, feedstock-by-feedstock and hour-by-hour accounting both incentivize continuous improvement in annual average CI. And while many facilities may be able to comply with such a cap, it reintroduces uncertainty around whether underperformance in isolated periods of the year could impact tax credit eligibility for the entire year, and therefore it could be a barrier to financing for the same reasons previously detailed. It would also introduce some complexity for taxpayers and the IRS because it would require the use of two methods to determine the allowable Section 45V credit. If such a cap is pursued pursued in combination with feedstock-by-feedstock or hour-by-hour accounting, we recommend that the Treasury and IRS consider granting relief to projects that can demonstrate their failure to meet the cap in a given year was due to extenuating circumstances. For example:

1. Bottom-up: If a project could demonstrate that its previously contracted renewable electricity was reasonably expected to produce sufficient EACs to meet its contracted hydrogen offtake obligations and maintain safe operation of its electrolyzer, and it failed to meet the cap due to greater than expected fluctuations in EAC supply, then an exemption could be granted. Such a bottom-up exemption could be based on contracted renewable power performing worse than indicated by statistical forecasts submitted to lenders during financing (e.g., a contracted renewables project produces fewer EACs in a year than a P90 forecast predicts).
2. Top-down: Treasury could request that the DOE or the National Renewable Energy Laboratory conduct an annual assessment of EAC market liquidity in each deliverability region and provide a safe harbor to projects in regions where insufficient EAC supply was available.

Requirements for Qualifying EACs -- §1.45V–4(d)(3)

Background

In most cases, implementing incrementality, temporal matching, and deliverability qualification requirements for EACs will raise the cost of producing compliant hydrogen. By 2030, we expect that green hydrogen plants in ERCOT and the Midwest region could achieve LCOH of around $1.5-2.0/kg (inclusive of a $3/kg subsidy), while Western and Eastern US projects are expected to have LCOH of around $2.4 – $3.2/kg.[4] Though this LCOH range is higher than that of Grey and Blue hydrogen, a substantial amount of the previously projected demand for clean hydrogen through 2030 is still expected – and the EAC “3 pillar” requirements will help ensure the integrity of a tax credit designed to incentivize ultra-low carbon hydrogen production.

1. Incrementality Requirement for Qualifying EACs -- §1.45V–4(d)(3)(i)

As underscored by numerous academic studies, including analysis from the Rhodium Group commissioned by Breakthrough Energy, incrementality requirements are essential to ensure that the induced greenhouse gas emissions impact of additional power demand from hydrogen production is adequately mitigated. [5]

Analysis that Breakthrough Energy conducted with an external analytical firm demonstrates that in regions where early clean hydrogen deployment is most likely and most competitive, EAC supply is expected to exceed EAC demand through at least 2030 (see Figure 3). This is because many renewables projects already in the interconnection queue and likely to reach commercial operations in the coming couple of years will be compliant with incrementality rules for the following 36 months. In addition, hydrogen producers in many regions may have the flexibility to procure EACs from renewables projects that get interconnected as energy-only assets, which require less wait time in the interconnection queue. Overall, we are optimistic this dynamic means compliance with incrementality is feasible for at least some projects across the country, depending on conditions within the region.

[4] Based on analysis Breakthrough Energy conducted with an external analytical firm.
[5] https://rhg.com/research/scaling-clean-hydrogen-ira/

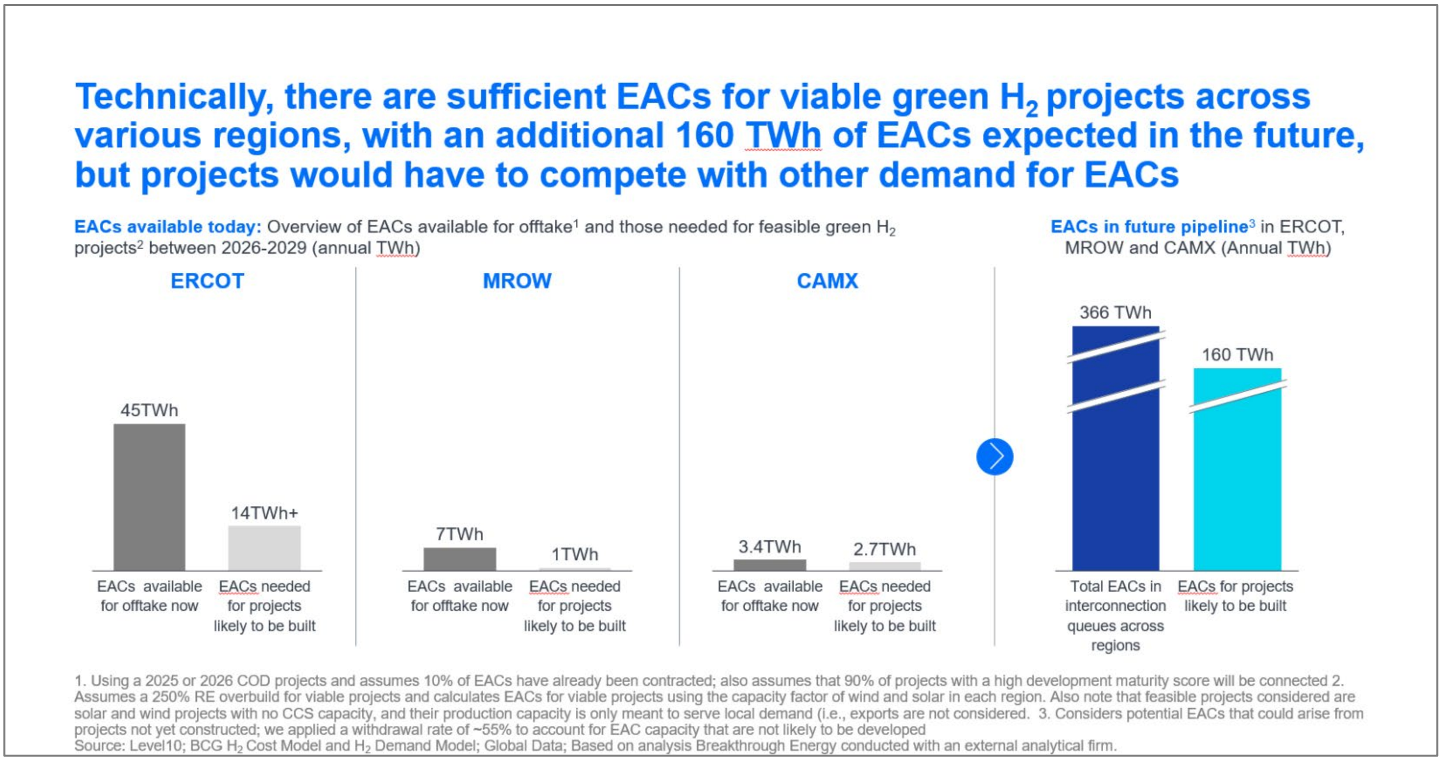

Figure 3

To be sure, despite the apparent ample availability of EACs from new renewables, the overall pace of renewable energy deployment and the construction of transmission systems is of major concern to Breakthrough Energy. This slow progress threatens to hinder not only the deployment of electrolyzers but also, and more importantly, the United States' ability to achieve its widespread decarbonization goals and ensure the resilience and reliability of the power grid. We strongly recommend that the DOE seek further measures to accelerate the development of new clean energy generation, transmission, and storage projects, thereby facilitating compliance with incrementality requirements for taxpayers in a feasible manner.

While compliance with incrementality is likely generally achievable for most projects, startups and companies developing emerging technologies encounter specific financing hurdles that can significantly hinder their market participation in the initial years. Startups often lack warranties, established credit, and a track record of successful projects, making it challenging for lenders and investors to evaluate their ability to fulfill project commitments. This limitation also affects their ability to secure long-term PPAs. Despite these challenges, it is these very startups that are at the forefront of developing innovative and highly efficient technologies that can position the United States' domestic electrolyzer industry as a leader in clean hydrogen production. It is crucial to ensure that these startups and small businesses have access to incentives like the 45V tax credit, to prevent market distortions that favor established players.

Incrementality Exemption for Startups

To ensure that startups and small businesses are not unduly burdened by the implementation of Section 45V, Breakthrough Energy recommends that Treasury and the IRS provide these taxpayers an exemption from the incrementality requirements established in the NPRM.

Specifically, we recommend that a taxpayer[6] only be eligible for an exemption from incrementality requirements for one facility during the lifetime of the credit, and to qualify for the exemption, the facility must be (1) demonstration scale (under 50MW), and (2) begin construction before January 1, 2029. To prevent taxpayers from gaming the proposed exemption by aggregating facilities, Breakthrough Energy also recommends that Treasury and the IRS apply similar factors listed in §7.01(2)(a) of Notice 2018-59 to determine when aggregation of facilities would be treated as one energy property rather than independent facilities. This would ensure that a facility that is combined with additional facilities under a single energy property does not qualify for a safe harbor unless the aggregation of the facilities meet the exemption eligibility requirements all together.

Establishing a limited exemption from incrementality requirements would provide new entrants flexibility necessary to participate in the market today and enable facilities that use a nascent technology to avoid unique challenges with getting access to incremental power for their first facility. Presumably, once a taxpayer places its first facility in service and proves its ability to meet the additional requirements under Section 45V, it will not face the same challenges with access to incremental power for future facilities.

Some stakeholders may be concerned that this limited exemption may result in significant induced emissions on the electric power grid. However, given the relatively small size of this market and the low volumes produced by demonstration projects, it is unlikely that a time-limited exemption would have a significant emissions impact and be in conflict with congressional intent. Moreover, given DOE's announced Hydrogen Shot goal, which seeks to reduce the cost of clean hydrogen to $1 per kilogram in one decade, the Treasury and IRS might deem it appropriate to provide first movers more flexibility to comply with 45V rules notwithstanding the potential emissions impact. Doing so will significantly improve prospects for a clean hydrogen market by supporting technology innovation, encouraging supply chain build out, incentivizing midstream and end-user demand creation, and reducing the green premium of electrolytic hydrogen.

2. ***Hourly Matching Requirement for Qualifying EACs -- §1.45V–4(d)(3)(ii)***
   a. *Phase in date*
      Given the scale and complexity of establishing a national hourly EAC market, a risk exists that setting a date of 2028 for hourly matching will prove to be insufficient ramp up time for these systems, which would pose significant operational, contractual, and financial challenges for the industry. However, without establishing a reasonably ambitious timeline for hourly matching, it is unlikely that the market to supply clean, incremental, and deliverable electricity will ramp up at sufficient pace and scale to meet demand and avoid reducing emissions elsewhere on the grid. To balance these two trade-offs, we recommend that the Treasury and IRS work with DOE to reassess, no later than a year before hourly matching is scheduled to apply, whether 2028 is still an appropriate phase-in timeline.

   b. *Treatment of Electricity Storage under Temporal Matching*
      Breakthrough Energy urges the Treasury and IRS to expeditiously issue rules for electricity storage that is used exclusively for the purpose of powering an electrolyzer. In those cases, stored electricity should be allowed to be treated as generated when it is released from storage and used to produce hydrogen.

[6] In this case a taxpayer could be defined as the taxpayer owning the pilot facility plus other entities under common control within the meaning of section 52(b) of the US tax code.

Electricity storage will likely serve as a valuable component of an electrolytic hydrogen production system designed to comply with Section 45V hourly matching requirements.[7] For example, electricity storage could improve alignment of variable renewable energy generation and hydrogen production by charging during hours when renewables are overproducing and discharging at a later hour. Smoothing clean power fluctuations in this way could reduce electrolyzer ramping or startup/shutdown cycles, improving electrolyzer efficiency and lifespan.[8] Some electricity storage use cases such as batteries that only charge from on-site generation may be able to be simply considered as generating assets for the purposes of hourly EAC tracking. Other forms of electricity storage, such as systems which charge and discharge from the grid and are used for value stacking revenue streams (e.g., power market arbitrage, ancillary services, etc.) likely require more complicated accounting guidance.

3. *Deliverability Requirement for Qualifying EACs -- §1.45V–4(d)(3)(iii)*

A deliverability standard will help demonstrate that electricity associated with a certain EAC can reasonably be expected to be delivered to the same power system as the electrolyzer, and thus not drawing power for marginal fossil generators. In this regard, measuring congestion is a useful representation of whether a system may be strained and struggle to deliver additional power necessary for hydrogen production. The DOE's National Transmission Needs study, released in late 2023, provides an accurate assessment of current and near-term transmission needs through 2040 – making it an ideal proxy for measuring congestion in the US power system. We strongly encourage the Treasury and IRS to retain this requirement as part of final regulations.

[7] With an external analytical firm, Breakthrough Energy conducted an assessment of optimized electrolysis facility configurations in ERCOT able to achieve compliance with the proposed rules, and electricity storage was deployed in ~40% of lowest-cost quintile of feasible configurations. This result suggests a significant number of developers would incorporate batteries into projects to achieve the lowest LCOH.

[8] https://www.sciencedirect.com/science/article/pii/S1364032122004695