Union of Concerned Scientists

February 26, 2024
To: The Honorable Lily Batchelder, Assistant Secretary for Tax Policy
Docket ID No. REG-117631-23

Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property. Vol. 88, Federal Register, No. 246, Tuesday, December 26, 2023. Notice of Proposed Rulemaking. Internal Revenue Service, Treasury: 26 CFR Part 1.

CC:PA:LPD:PR (REG-117631-23), Room 5203, Internal Revenue Service, P.O. Box 7604, Ben Franklin Station, Washington, DC 20044.

Submitted directly to *Regulations.gov*

Assistant Administrator Batchelder:

The Union of Concerned Scientists (UCS) puts rigorous, independent science to work to solve our planet's most pressing problems. On behalf of our half a million supporters and network of over 22,000 scientists, UCS appreciates the Department of the Treasury's (Treasury) work to implement multiple tax credits passed as part of the Inflation Reduction Act (IRA) intended to support the nation's achievement of a carbon-free electricity system by 2035 and net-zero economy by 2050, including the Section 45V Credit for Production of Clean Hydrogen ("45V").

Hydrogen has a valuable role to play in the nation's clean energy transition—but only if it is cleanly produced, strategically targeted in its use, and subject to rigorous environmental, health, and safety standards. As the 45V credit has the potential to dramatically accelerate investments in hydrogen production infrastructure, it is critical that implementation of the credit ensures that "qualified clean hydrogen production" is indeed climate-aligned from the outset. If it is not, then 45V is at significant risk of instead wastefully subsidizing the buildout of hydrogen production infrastructure entirely out of step with that ultimately demanded by the clean energy transition.

The proposed regulations released in December 2023 make clear that Treasury is deeply reckoning with the complexities of its charge and the critical importance of getting the implementation guidance right from the start. UCS strongly supports Treasury's practical interpretation of the statute and the overarching implementation framework that it has advanced. Still, certain issues under consideration in the proposal would radically depart from the necessarily rigorous implementation framework it has put forward and result in outcomes that would fall far afield of statutory requirements. Moreover, major issues remain unresolved related to the treatment of biomethane and fugitive methane in implementation of the tax credit; if the wrong decisions are made about these issues, the entire rigor of the implementation framework could be undermined. These topics demand careful resolution.

In particular, UCS offers the following topline comments, detailed in the associated sections below:

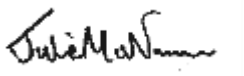
1. **Overall approach.** Treasury has correctly adhered to the statutory text in setting its overall 45V implementation approach.

2. **Electrolyzer emissions accounting.** By adopting the three-pillars approach, Treasury has appropriately ensured accurate accounting of direct and significant indirect emissions from electrolytically produced hydrogen. Broad-based exemptions from this approach would be arbitrary and undermine necessary rigor.
3. **Fossil fuel-based emissions accounting.** Treasury has failed to adequately account for certain sources of greenhouse gas emissions associated with fossil fuel-based hydrogen production facilities.
4. **Treatment of biomethane and fugitive methane.** Treasury must rigorously and responsibly implement accounting for, and eligibility of, biomethane and fugitive methane sources to avoid enabling major pollution loopholes.

As Treasury moves to finalize regulations governing implementation of 45V, it must maintain a rigorous approach that is responsive to its statutory charge. The costs and consequences of doing anything less would result in serious harms to people and the environment.

We appreciate the opportunity to comment on this proposed rule and look forward to further opportunities to support finalization of a robust approach to implementation.

On behalf of the Union of Concerned Scientists:



Julie McNamara
Deputy Policy Director
Climate and Energy Program

1. Treasury has correctly adhered to the statutory text in setting its overall 45V implementation approach.

- *Treasury's overall approach to 45V implementation aligns with a plain reading of the statutory text.*
- *Treasury must adopt a precautionary approach in the face of uncertainties capable of yielding divergent outcomes.*
- *Treasury must deploy and enforce safeguards that defend against gaming.*

Treasury is charged with implementing 45V, including creating any necessary regulations or other guidance to enable that implementation.[1] The December proposed regulations, plus the accompanying 45VH2-GREET model and supporting materials, demonstrate Treasury is carefully and rigorously approaching this implementation process. The proposed regulations are considerate of the requirements demanded by the statutory text, including evaluation and incorporation of direct and significant indirect emissions in facility lifecycle emissions rate calculations, and advance an overarching implementation framework that properly reflects its charge. As Treasury finalizes implementation regulations and guidance, it must proceed cautiously and conservatively in the face of deep uncertainties that could fundamentally shift outcomes, such as exemptions from the three-pillars framework and assumptions around biomethane. Throughout, Treasury must ensure it is incorporating safeguards that defend against gaming, given the magnitude of the credit and the complexities of emissions accounting.

1.1. Treasury's overall approach to 45V implementation aligns with a plain reading of the statutory text.

Despite the complexity of issues related to accurately accounting for emissions associated with various forms of hydrogen production, the statutory text for 45V ultimately provides a straightforward framework for implementation—and with the proposed regulations released in December, Treasury has clearly followed that framework. Treasury's overall approach to 45V implementation fully comports with a plain reading of the text. In particular, by designating that qualified clean hydrogen will be determined based on a lifecycle greenhouse gas emissions rate, and by explicitly defining "lifecycle greenhouse gas emissions" as having the same meaning as that under subparagraph (H) of section 211(o)(1) of the Clean Air Act,[2] the statutory text leaves little ambiguity about the appropriate approach to take for implementation.

Of foremost importance in conducting lifecycle analyses is establishing the bounds within which the evaluation is to take place. Here, the statue is unambiguous: By referencing the definition within the Clean Air Act as it does, the statute intentionally points to a definition that includes direct emissions and significant indirect emissions. This is the foundation from which all implementation decisions must follow. The proposed regulations reflect a careful undertaking of that task, including as evidenced through adoption of the three pillars for evaluation of electrolytic facility emissions, as further detailed in Section 2.1 below. Still, to fully meet its charge, Treasury must make some changes to its underlying analysis and add some safeguards to its approach. For example, Treasury must update assumptions around methane emissions rates, as explained in Section 3.1 below, and it must adopt rigorous requirements for biomethane, as detailed in Section 4 below.

[1] 26 U.S. Code § 45V – Credit for production of clean hydrogen, https://www.law.cornell.edu/uscode/text/26/45V.
[2] 42 U.S. Code § 7545 – Regulation of fuels, https://www.law.cornell.edu/uscode/text/26/45V.

1.2. Treasury must adopt a precautionary approach in the face of uncertainties capable of yielding divergent outcomes.

Despite the unmistakable clarity of the appropriate framework to be employed in overall implementation of 45V, it is simultaneously the case that numerous specific issues remain uncertain—and many of these issues could have a pronounced effect on final lifecycle calculations. As a result, it is vital that Treasury adopt a precautionary approach, declining to finalize pathways or assumptions that have not yet been thoroughly interrogated. This opt-in positioning helps to defend against situations where Treasury initially assigns a lifecycle score that is favorable to a given project, then, based on an improved understanding of the issue, subsequently adjusts assumptions in such a way that the project no longer receives the same emissions rate—which for many such possible adjustments, could mean falling out of eligibility altogether.

These uncertainties cut across a range of issues, but most prominent include possible exemptions to incrementality requirements for existing zero-emitting resources and appropriate lifecycle accounting treatment of biomethane and fugitive methane. Each of these issues are further detailed in Sections 2 and 4 below, respectively. Certain other issues may be resolved as tracking, monitoring, and/or other associated frameworks are developed, such as for carbon dioxide tracking and accounting. However, until these issues are resolved, such as through designated evaluation efforts or advancement of enabling frameworks, Treasury should avoid committing to pathway accounting decisions that are at high future risk of significant readjustment or reversal.

The provisional emissions rate (PER) process provides a possible bridge on these issues, though still requires caution in the face of issues with deep uncertainties and high likelihood of significantly impacting final lifecycle calculations. Treasury should adopt a conservative approach in the PER process.

Treasury should also incorporate lifecycle greenhouse gas emissions rates on a GWP-20 timeframe alongside GWP-100. This is particularly important given that methane and hydrogen both have outsized near-term climate impacts, failure of which to consider could leave 45V out of step with achievement of near-term and mid-century climate targets. Relatedly, Treasury should require that facilities monitor and report hydrogen emissions that are produced but not sold and incorporate those into the facility's lifecycle greenhouse gas emissions rate. Treasury has rightly proposed to decline crediting hydrogen that is not sold or put to productive use; however, Treasury should further require that any such hydrogen also be factored into the facility emissions rate both as a waste deterrent and to ensure accurate facility emissions rate accounting given the high impact of hydrogen emissions, especially over the near term.[3]

1.3. Treasury must deploy and enforce safeguards that defend against gaming.

The size of the 45V credit is substantial, both on its own and in comparison to alternative ways in which the consumed resources could be deployed. This informs necessary concerns regarding rigor of the rule structure to ensure the tax credit's intent matches the tax credit's outcomes; it also creates a fundamental risk of gaming. Treasury must ensure that it seriously contends with this threat.

In the proposed regulations, Treasury correctly advances a series of safeguards to defend against such outcomes. This includes only crediting hydrogen produced for sale or use, as well as excluding hydrogen-

[3] Sun, T., E. Shrestha, S.P. Hamburg, R. Kupers, and I.B. Ocko. 2024. *Climate impacts of hydrogen and methane emissions can considerably reduce the climate benefits across key hydrogen use cases and time scales.* Environ. Sci. Technol. Online at https://doi.org/10.1021/acs.est.3c09030.

powered electricity generators as eligible resources given the potential for a cyclical loop leading to outsized credit generation with no productive benefit to society.

Final regulations governing facility emissions rate determinations must also be considerate of gaming risks. This includes by defending against cherry-picking or shuffling of emissions into a subset of calculated hours that are exempted from an annual aggregate calculation. Treasury is faced with multiple competing priorities on this issue; it must make sure that whatever approach it finalizes is clearly attuned to, transparent about, and capable of defending against emissions gaming for credit eligibility purposes.

Finally, Treasury must ensure that co-product allocation is rigorously evaluated, both generally and with a specific eye toward credit gaming. Deep and significant uncertainties exist around appropriate allocation of many co-products; Treasury should proceed with a precautionary approach before broadly expanding what may be covered and how it is evaluated.

2. By adopting the three-pillars approach, Treasury has appropriately ensured accurate accounting of direct and significant indirect emissions from electrolytically produced hydrogen. Broad-based exemptions from this approach would be arbitrary and undermine necessary rigor.

- *With the three pillars, Treasury has proposed the best approach for capturing direct and significant indirect emissions from electrolyzer operations.*
- *Broad-based exemptions to the incrementality requirement fail to sufficiently attend to induced grid emissions; any exemption must be carefully tailored and targeted to ensure such emissions impacts are avoided.*
- *Treasury must finalize rigorous implementation for multiple outstanding issues.*

Electrolysis presents a promising pathway to clean hydrogen production. In certain scenarios, emissions accounting for electrolyzer operations can be straightforward; however, as Treasury rightfully covered in the proposed regulations and as the Department of Energy (DOE) further detailed in a supporting memo,[4] when electrolyzers are drawing electricity from the broader grid, even if they procure clean electricity to cover their operations they can still cause a large increase in overall greenhouse gas pollution due to fossil fuel plants ramping up as a result. This effect, known as induced grid emissions, requires consideration within the 45V framework given that it is a source of significant indirect emissions, which the statute specifically references as a necessary component of the lifecycle greenhouse gas emissions evaluation. By adopting the three-pillars requirements of incrementality, deliverability, and time-matching, however, Treasury has advanced a system that enables facilities to treat induced emissions as zero and consumed generation as reflective of procured generation. These standards are common sense and critical to maintaining the rigor of the credit qualification process; any weakening would threaten to undermine the utility and function of the three-pillars framework as a whole. Throughout, this framework must be accompanied by necessary additional safeguards to ensure the credit is implemented in alignment with statutory requirements.

[4] U.S. Department of Energy. 2023. *Assessing Lifecycle Greenhouse Gas Emissions Associated with Electricity Use for the Section 45V Clean Hydrogen Production Tax Credit.* Online at https://www.energy.gov/sites/default/files/2023-12/Assessing_Lifecycle_Greenhouse_Gas_Emissions_Associated_with_Electricity_Use_for_the_Section_45V_Clean_Hydrogen_Production_Tax_Credit.pdf.

2.1. With the three pillars, Treasury has proposed the best approach for capturing direct and significant indirect emissions from electrolyzer operations.

As outlined in Section 1.1 above, Treasury has advanced an appropriate overall framework for 45V implementation given the statute's explicit use of "lifecycle greenhouse gas emissions" as defined in an existing section of the Clean Air Act, which explicitly requires incorporation of direct *and* significant indirect emissions. This appropriateness of approach is unequivocally the case with Treasury's proposed adoption of the three-pillars framework—consisting of incrementality, deliverability, and time-matching requirements—as a means of accounting for both direct and significant indirect emissions associated with electrolytic hydrogen production facilities.

Electrolysis is an energy-intensive process. If electrolyzers are allowed to plug into the existing electricity system with no safeguards in place, even if the electrolyzers are themselves running on zero-emitting resources, grid-wide emissions are likely to spike.[5] That's because with today's electricity generating mix, renewable resources are typically running full-out whenever available, meaning if electricity demand significantly increases to serve new electrolyzer loads—be it directly or indirectly to make up for diverted existing zero-emitting resources—the increase in generation is likely to be overwhelmingly met by coal- and gas-fired power plants. Notably, as renewable resources grow to become the dominant share of the electricity generating mix, this issue will resolve as zero-emitting resources will become the marginal resource ramping to meet added load. That, however, is decidedly not the case today. As a result, rigorous requirements to protect against induced emissions are critical. Otherwise, 45V will result in billions of dollars of tax credit investments intended to support the clean energy transition instead ultimately increasing our nation's overall carbon emissions.

The three pillars present the best approach to rigorously ensure that the lifecycle greenhouse gas emissions rate claimed by an electrolytic production facility is, indeed, correct, when fully factoring in direct and significant indirect emissions. Each of the following requirements is valuable but insufficient on its own; all three are required to ensure the accuracy of emissions assessment:

- **Incrementality.** Also sometimes referred to as "additionality," this sets the requirement for how to verify procured clean energy is coming from new sources—not just diverting those already on the system and currently being consumed by others. The proposed regulations require that to be eligible, clean resources must begin commercial operations within 36 months of a hydrogen production facility being placed into service—a sufficient administrability buffer—with additional allowances made for uprates at existing facilities.
    - UCS supports Treasury's proposed incrementality requirement.
- **Geographic deliverability.** To ensure the clean resources procured by a hydrogen producer are actually able to be consumed by that producer—and not instead met by local fossil fuel plants due to transmission constraints between the producer and consumer—the proposed regulations require that procured resources must be located within the same region as the electrolyzer, as determined via DOE's recent National Transmission Needs Study.[6]

[5] Numerous studies have documented this effect. See, e.g., EPRI's *Impacts of IRA's 45V Clean Hydrogen Production Tax Credit,* for one such example. Online at https://www.epri.com/research/products/000000003002028407.

[6] Department of Energy. 2023. *National Transmission Needs Study*. Online at https://www.energy.gov/gdo/national-transmission-needs-study.

    - UCS supports Treasury's proposed deliverability requirement, though encourages Treasury to incorporate periodic updating to ensure regions appropriately match grid realities.
- **Hourly matching.** Recognizing that there could be a temporal mismatch between clean energy production and periods of electrolyzer operations—a gap likely to be filled by fossil-fuel resources—the proposed regulations require that procured clean resources are matched on an hourly basis with electrolyzer operations. However, to enable scaling up of the systems required for such hourly matching, the proposed regulations would allow for producers to use annual matching until 2028, at which time all producers—new and existing—must convert to hourly matching.
    - **UCS supports Treasury's proposed temporal-**matching requirement, with a phase-in of hourly matching by 2028 with no granting of compliance exemptions to legacy producers. A transition to hourly tracking by 2028 is entirely feasible, appropriate, and necessary.[7] Delays in hourly phase-in, or broad-based exemptions to hourly compliance, could result in significant emission impacts.

These criteria are not only well-reasoned but required by a plain reading of the statutory text. Treasury must issue regulations governing implementation of the tax credit that enable accurate incorporation of direct and significant indirect emissions; together, these three stipulations do that. In particular, deliverability and time-matching requirements ensure that the resources claimed by a producer are indeed what occur in reality, as opposed to transmission constraints or mis-matches in production and consumption ultimately leading to fossil fuel-fired power plants needing to increase generation to meet electrolyzer load when claimed resources are not, in fact, available to the facility at the time and in the place required. When these criteria are coupled with incrementality requirements, facilities can plausibly zero out induced grid emissions from facility operations.

It is especially important to recognize the criticality of accounting for induced grid emissions and the "incrementality" requirement as a rigorous response to that concern. The referenced lifecycle greenhouse gas emissions definition provides an in-text example of significant indirect emissions that helps to further clarify: "such as significant emissions from land use change."[8] This is an example, not an exhaustive list of significant indirect emissions. And in the case of electrolyzer operations, induced grid emissions have the potential to be highly significant. As a result, Treasury has no choice but to identify a mechanism for holding induced grid emissions to zero; an incrementality requirement does just that. Treasury is further correct to recognize that in situations where induced grid emissions may otherwise be zero, such as use of curtailed power or in a deeply decarbonized electricity system, an incrementality requirement may no longer be necessary.

While Treasury's approach stands strongly on its own given the clear alignment with a plain reading of the text and the clear deference the text affords the secretary on this matter, it's also important to note that the Environmental Protection Agency (EPA) provided a strong and clear affirmation of the appropriateness of Treasury's proposed approach in light of EPA's long-standing interpretation and implementation of the referenced lifecycle greenhouse gas emissions definition and its included capture

[7] See, e.g., comments submitted to this record from EnergyTag et al.
[8] 42 U.S. Code § 7545 – Regulation of fuels, https://www.law.cornell.edu/uscode/text/26/45V.

of "significant indirect emissions."[9] This letter helpfully steps through EPA's implementation of the term in the Renewable Fuels Standard (RFS) program, and how that framework can be more broadly applied in the context of the 45V credit. The letter further supports Treasury's proposed use of three-pillar compliant energy attribute certificates (EACs) as a means of documenting and verifying claims of zero direct and indirect emissions.

2.2. Broad-based exemptions to the incrementality requirement fail to sufficiently attend to induced grid emissions; any exemption must be carefully tailored and targeted to ensure such emissions impacts are avoided.

Treasury's proposed use of incrementality as part of the three-pillars framework for electrolyzer emissions accounting purposes is necessary to align tax credit implementation with the required stipulations within the underlying statute. Flexibilities in that approach can only deliver similarly rigorous assessments of electrolyzer facility emissions if they are sufficiently tailored in application and use; inaptly applied flexibilities or generic framework exemptions, on the other hand, would fully undermine the rigor of the framework and set implementation afoul of the statutory text.

Treasury specifically floats issue-specific exemptions from the incrementality requirement as well as a broad-based general exemption as a formulaic proxy for the issue-specific considerations. The broad-based exemption fails to uphold robust outcomes across multiple dimensions; the issue-specific exemptions are also likely to fail unless deployed under carefully targeted, extremely limited, and rigorously analyzed scenarios.[10]

Avoided retirements. In the proposed regulations, Treasury considers treating EACs generated by existing zero-emitting resources that would have retired but for access to 45V as incremental generation.[11] For this exemption to have any merit, it would have to subject each such resource to rigorous financial analysis clearly demonstrating need. For nuclear facilities, this demonstration of need would have to occur on top of any demonstration submitted for 45U *and* incorporate any financial support awarded via 45U. It is also critical that for nuclear and hydropower generators in particular, given their real and persistent risk of environmental and safety harms, no facility should be deemed eligible to receive access to 45V via the avoided retirements pathway if it cannot demonstrate that it is in compliance on all environmental, health, and safety fronts.[12]

Curtailments. In theory, curtailed zero-emitting generation should be allowable within the 45V framework given the very nature of curtailment means that if that electricity is not consumed, it would be otherwise wasted, thereby sidestepping concerns about induced grid emissions. In practice, however, it is extremely challenging to design a robust, generalizable approach to ensure that procured electricity would

[9] Letter from EPA Deputy Administrator Janet G. McCabe to the Honorable Lily Batchelder regarding EPA information related to the definition of lifecycle greenhouse gas emissions under the Clean Air Act (December 20, 2023. Online at https://home.treasury.gov/system/files/136/45V-NPRM-EPA-letter.pdf.

[10] See, e.g., Esposito, D., E. Gimon, and M. O'Boyle. 2024. *45V Exemptions Need Strong Guardrails to Protect Climate, Grow Hydrogen Industry.* Energy Innovation. Online at https://energyinnovation.org/publication/45v-exemptions-need-strong-guardrails-to-protect-climate-grow-hydrogen-industry/.

[11] Fed. Reg. 89230.

[12] See comments submitted to this record by the Low Impact Hydropower Institute for a further detailing of safeguards necessary to avoid 45V perpetuating or, worse, exacerbating environmental and/or safety harms from hydropower resources.

otherwise have been curtailed—and insufficiently robust systems are at risk of leading to high-emissions outcomes.[13] That's because curtailments are specific to localized areas and time periods, both of which can rapidly change and, outside of those places and periods, can quickly return to periods of high-emitting marginal generation. Tying curtailment eligibility to locational marginal pricing can present a reasonable proxy; however, this would only be possible in a subset of grid regions. Any attempt to generalize a curtailment approach, such as by exempting a share of generation in specific time periods and seasons that have previously seen episodes of heavy curtailment, would fail to capture annual variability in wind, solar, and hydropower resource availability. It would also fail to capture the highly dynamic nature of the electricity system where newly constructed transmission lines, storage systems, and/or electricity loads could significantly reduce a location's likelihood to experience curtailment. As a result, the preponderance of evidence suggests that Treasury must proceed with caution when considering incorporation of curtailed existing zero-emitting resources within the 45V framework, and that at this time, generalized approaches are ill-equipped to deliver necessarily tailored outcomes.

Zero or minimal induced grid emissions through modeling or other evidence. In the proposed regulations, Treasury considers exemptions to the incrementality requirement in scenarios where diversion of existing zero-emitting resources would not result in significant induced grid emissions, such as if demonstrated through modeling, regional grid characteristics, or state policies. Feasibility of such an exemption turns on the specific scenarios where the potential for no induced grid emissions from diversion of existing resources could be rigorously demonstrated. At this time, no such scenarios exist, either due to insufficiently stringent state policies or insufficient share of zero-emitting resources within a regional grid mix.[14] Treasury cannot finalize an exemption that does not bear out on the merits. Before any such exemption is allowed, Treasury should commit to establishing a rigorous evaluation framework to understand the policies—and necessary associated policy safeguards, such as protections against regional emissions leakage despite strong in-state policies—or grid characteristics sufficient to ensure existing resource diversion would not result in induced grid emissions. This should be advanced through an intentional research effort, potentially in collaboration with one of the national laboratories and the Department of Energy's Office of Policy.

Formulaic approach to exempting existing generators from incrementality requirements. Reckoning with the challenges of devising issue-specific exemptions from the incrementality requirement, as examined above, Treasury also floated consideration of a formulaic approach to serve as a proxy. This approach, such as a 5 or 10 percent generation exemption, entirely fails on the merits, lacking in logical reasoning and quantitative evidence. Such an approach does not actually serve as a proxy for situations that would enable use of existing zero-emitting generators without inducing grid emissions; instead, it is a costly, highly polluting give-away to hydrogen producers that is entirely divorced from statutory requirements. The insufficiency and inappropriateness of such an approach has been underscored by

[13] See, e.g., Esposito et al. (2024).
[14] See, e.g., research addendum from Ricks and Jenkin. 2024. *Examination of proposed exemptions from incrementality requirements for Section 45V.*

multiple analyses.[15] If Treasury is to allow for any exemptions from the incrementality requirement, they *must* be rigorously rooted in factual determinations.

2.3. Treasury must finalize rigorous implementation protocols for multiple outstanding issues. While the three-pillars framework presents a rigorous approach to generally ensuring the veracity of electrolyzer emissions accounting, it's insufficient on its own to address the full range of complexities at hand when implementing the 45V credit for electrolyzer facilities. Several of these key issues are further considered below; absence of comment on other issues should not be interpreted as a reflection of relative importance or correctness.

Treatment of EACs. While EACs present a potentially robust approach for tracking energy attributes, it's critical that protocols are in place to ensure that the system is, indeed, performing as intended. In particular, EACs must be designed to include all necessary information about electricity generating facilities to enable eligibility verification, and they must be certified in a system that enables tracking, verification, and transparent retirement. Risks around double-counting are of particular concern when using EACs given that the environmental attributes documented by the certificate are only valid if they are claimed by a single user; if those claims are made by more than one user, either through double-counting of an actual certificate or through implicit double counting by otherwise crediting the generator's environmental attributes, then the veracity of the claim is entirely undermined. This is true regardless of whether a project is entirely behind the meter or grid-tied.

As a result, in the final regulations Treasury must explicitly forbid double-counting of EACs used for compliance with 45V. Other policies relying on EACs, such as state renewable portfolio standard programs or voluntary procurement programs, are outside of Treasury's control and may amend their programs to recognize the clean resources procured by electrolyzers. However, Treasury should do all it can to ensure 45V does not facilitate or tolerate double-counting; at minimum, that requires strict adherence to certificate, and thereby attribute, retirement. Moreover, if any registry or operator is found to be allowing the double-counting of attributes, it should be rendered ineligible for 45V participation and, in the case of credited facilities, subject to clawback mechanisms.

Treatment of biomethane and fugitive methane. As detailed in Section 4 below, inclusion of biomethane and fugitive methane within 45V risks undermining all other systems and safeguards intended to ensure the rigor and accuracy of facility emissions rate accounting. This risk is most often considered in the context of reforming facilities; however, it is also a critically important and impactful issue for electrolyzer emissions accounting. That's because in a lifecycle emissions accounting framework, and especially when a facility's emissions rate is evaluated as an annual aggregate emissions rate, negative carbon intensity scores can function as an offsetting mechanism. In such a scenario, an electrolyzer that fails to meet the top tier of the credit could turn to procure EACs from a gas generator running on negative carbon intensity biomethane, thereby generating negative carbon intensity EACs, which could then enable the netting out of non-compliant emissions at whatever level is required for a facility to achieve the top tier of the credit.

[15] See, e.g., Ricks and Jenkins (2024), and Rhodium Group. 2024. *How Clean Will US Hydrogen Get? Unpacking Treasury's Proposed 45V Tax Credit Guidance.* Online at https://rhg.com/research/clean-hydrogen-45v-tax-guidance/.

This would be fundamentally at odds with the intention of the tax credit and a profound abuse of carbon accounting frameworks. It is also readily defended against through the uptake of specific safeguards and protocols. In particular, offsetting generally and negative carbon intensity values specifically should not be allowed within 45V, which was not designed with the intention of including carbon offsets and lacks all necessary safeguards. In electrolytic emissions accounting, then, this would translate to mean no facility emissions could be reduced through the use of offsetting mechanisms, including via generators running on biomethane or fugitive methane. These issues and additional safeguards are further detailed in Section 4 below.

Treatment of electricity generating resources using CCS. Treasury is right to cautiously examine the appropriate treatment of fossil fuel-fired electricity generating resources coupled with carbon capture, both as to the emissions associated with their electricity production and whether or not conversion from unabated to abated operations should be treated as incremental.

Regarding emissions accounting, such resources should not be treated as "minimal-emitting generators." Instead, these resources must be assigned EACs with carbon intensity values based on performance. It should also be expected that these carbon intensity scores would be highly variable over time, and they must be continuously tied to the final fate of the captured carbon, making it critical that EACs are assigned per hour as opposed to generically based on expected or even average facility performance. However, no such accounting and tracking mechanisms currently exist, meaning Treasury presently cannot allow use of EACs from fossil fuel-fired facilities using carbon capture systems.

Regarding whether or not addition of carbon capture satisfies the incrementality requirement, in brief, it does not. The addition of hydrogen load will still need to be met by an increase in system generation, which a retrofitted facility cannot supply. Treasury should not allow retrofitted facilities to count as incremental resources.

3. Treasury has failed to adequately account for certain sources of greenhouse gas emissions associated with fossil fuel-based hydrogen production facilities.

- *Treasury must improve its approach to characterizing upstream methane emissions to ensure accurate determination of a facility's emissions rate.*
- *Treasury must ensure emissions associated with carbon capture, transport, and storage or utilization are adequately tracked and reported.*
- *Treasury is correct to disallow valorization of steam as a co-product in reforming facilities with carbon capture.*

In 45V, any hydrogen production process that can demonstrate achievement of the qualified clean hydrogen production emissions rate threshold is eligible to receive the credit, including fossil fuel-based hydrogen production projects. However, in the proposed regulations Treasury has failed to accurately characterize and account for a major component of the fossil fuel-based process's greenhouse gas emissions footprint: methane emissions. As a result, Treasury is at risk of crediting fossil fuel-based hydrogen production facilities as "clean" when they in fact fully fail to meet the eligibility threshold. Treasury must quickly correct this error to reflect the best available science and understanding, thereby

avoiding inadvertently incentivizing the buildout of hydrogen production infrastructure entirely misaligned with truly clean hydrogen production processes. Treasury must also carefully tend to carbon dioxide accounting and tracking given the inadequacy of current systems, developing protocols to defend against double-counting and pollution greenwashing.

3.1. Treasury must improve its approach to characterizing upstream methane emissions to ensure accurate determination of a facility's emissions rate.

Upstream methane emissions are a potentially substantial share of the lifecycle greenhouse gas emissions rate of methane-based hydrogen production facilities. It's critical that these upstream emissions are accurately assessed and assigned to ensure that the full emissions footprint of methane use is factored into the final facility emissions rate calculation to determine qualified clean hydrogen production. If it is not, then a producer may receive the clean hydrogen incentive despite relying on fuels, processes, and practices that ultimately fail to produce low-GHG hydrogen.

As the government's own recent emissions analysis of methane-based hydrogen production facilities made clear, even facilities achieving high rates of onsite carbon capture would be rendered ineligible for any tier of the tax credit—let alone the top tier—due to expected upstream methane emissions.[16]

However, in the December proposal, Treasury inexplicably put forward an upstream methane emissions rate of 0.9%, far below that which has been documented across a wide range of studies and observations.[17] In the final rule, Treasury must update this number to ensure that it accurately captures the reality of much higher leakage rates across and throughout the system. While it is appropriate to continually re-evaluate and update this number as improved monitoring efforts are brought online and multiple applicable standards, incentives, and fees enter into force—something which the annual GREET update process would be well-suited to reflect—it is *not* appropriate for Treasury to begin with an upstream methane emissions number that is indefensibly low. Doing so would give methane-based hydrogen production facilities an inaccurately low overall facility emissions rate, thereby subsidizing the buildout of facilities and infrastructure entirely ill-equipped to actually produce clean hydrogen.

To ensure the 45VH2-GREET model is correctly capturing upstream methane emissions, Treasury should consider developing an interagency task force to verify and update this number. Further, given the range of emission rates observed across basins, Treasury should recommend that such a task force explore the appropriateness of moving from a national average gas emissions rate to a basin-specific rate. This would better align input parameters with downstream facilities, and potentially help to discourage further expansion of gas use in regions with particularly poor leak avoidance practices and procedures. However, this approach should only be undertaken if a rigorous apportionment and tracking system is developed,

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[16] S. McNaul, C. White, R. Wallace, T. Warner, H. S. Matthews, J. Ma, M. Ramezan, E. Lewis, *Hydrogen Shot Technology Assessment: Thermal Conversion Approaches*, National Energy Technology Laboratory, Pittsburgh, December 5, 2023. Online at https://www.netl.doe.gov/projects/files/HydrogenShotTechnologyAssessmentThermalConversionApproachesRevised_120523.pdf.

[17] See, e.g., Alvarez et al., *Assessment of methane emissions from the U.S. oil and gas supply chain*, 361 Science (186), online at https://doi.org/10.1126/science.aar7204; Chen et al., *Quantifying regional methane emissions in the New Mexico Permian Basin with a comprehensive aerial survey*, 56 Environ. Sci. Technol. (4317), online at https://doi.org/10.1021/acs.est.1c06458.

accompanied by safeguards to defend against gaming of carbon accounting ledgers and hiding of pollution within the pollution attribution scheme.

Certified gas theoretically provides a means of improving the resolution by which a facility's upstream methane emissions can be tracked and assigned; however, no system presently exists that can ensure emissions are indeed accurately measured and tracked, either at the asset level or the system level, and the presently inconsistent approach to tracking and accounting for upstream methane emissions could mean use of certified gas in 45V would simply result in resource and pollution shuffling, with no net system gains. To reach a place where certified gas could be allowed, there would have to be a rigorous monitoring and verification system *as well as* a rigorous and proven approach to defending against asset and pollution shuffling, across operators, basins, and system-wide. No such systems or approaches are currently in place, thereby requiring that Treasury not allow for use of certified gas within 45V at this time.

3.2. Treasury must ensure emissions associated with carbon capture, transport, and storage or utilization are adequately tracked and reported.

Treasury is correct to include the emissions associated with carbon capture processes as well as carbon transport and storage within a hydrogen production facility's lifecycle greenhouse gas emissions rate. These can be energy-intensive and carbon-intensive processes, and they are interdependent with a facility's production of qualified clean hydrogen, thereby requiring they be considered in-scope.

This carbon dioxide emissions tracking and verification must also cover the sequestration of the carbon dioxide itself, including documentation of permanence of that storage, both via design and ongoing monitoring. If these tracking and verification systems are insufficiently rigorous, then Treasury risks awarding credit to facilities that ultimately fail to permanently store carbon and thus ultimately fail to produce truly qualified clean hydrogen.

If instead of being stored captured carbon is subsequently utilized, such as in the form of a feedstock, Treasury must require use of accurate and consistent accounting practices. Such a scenario is at high risk of double counting of emissions benefits, which would ultimately mean associated hydrogen producers would be perpetrating accounting fraud. To defend against such situations, especially before carbon tracking registries are widely available and capable of delivering robust outcomes, Treasury should consider adopting a single accounting approach. The far likelier to ensure accurate accounting would be to bundle the captured carbon attributes with the captured carbon, meaning the attribute would be passed to the point of utilization as opposed to staying with the point of capture. Regardless of approach taken, however, Treasury must ensure that it has a robust system in place before allowing pathways for facilities that capture carbon for subsequent utilization.

3.3. Treasury is correct to disallow valorization of steam as a co-product in reforming facilities with carbon capture.

In 45VH2-GREET, steam is not allowed as a co-product for steam methane reforming facilities coupled with carbon capture and sequestration. The proposed regulations and 45VH2-GREET user guide explain

that this decision is based on research demonstrating that optimal facility design would instead direct steam to improve the efficiency of CCS operations.[18]

This is an important and appropriate safeguard that Treasury should include in the final regulations. Co-product allocation opens the door to serious risk of gaming lifecycle emissions rates. Wherever a clear boundary can be drawn to protect against obvious abuses, it should. The reasoning underpinning the redline precluding steam co-product allocation is appropriate and necessary.

4. Treasury must rigorously and responsibly implement accounting for, and eligibility of, biomethane and fugitive methane sources to avoid enabling major pollution loopholes.

- *Treasury is right to carefully evaluate the appropriate treatment of biomethane and fugitive methane fuels within 45V before developing implementation guidance.*
- *Treasury must assign credible carbon intensity scores to alternative methane sources; in 45V, methane venting is never an appropriate counterfactual.*
- *Treasury must prohibit pollution offsets of any kind within 45V. If negative carbon intensity fuels are allowed, they cannot be used to offset any amount of a facility's real emissions.*
- *Treasury must establish rigorous feedstock eligibility requirements to actualize pollution benefits while defending against perverse outcomes.*
- *Treasury must set geographic bounds around eligible fuel deliverability regions and rigorous book-and-claim tracking and certification requirements to ensure the environmental attributes promised are the environmental attributes delivered.*

The 45V credit is intended to accelerate the transition away from today's heavily climate- and health-harming hydrogen production processes to low- and non-emitting processes, as required to support our nation's clean energy transition. The statute's framing for determining eligibility of produced hydrogen, coupled with the steep drop-off in the incentive for higher-emitting facilities, underscores the clear intent to incentivize and scale truly low-GHG hydrogen *production* technologies. However, biomethane threatens to fully undermine that intent. In the absence of rigorous guardrails and diligent carbon accounting practices, biomethane would enable carbon-intensive facilities, exactly the same facilities 45V was designed to incentivize the shift away from, to count as "clean" without any change to technology or process. In so doing, the credit would also perversely drive an *increase* in the production of methane, the exact climate-harming waste needing to be managed and abated—including from processes that could have fully avoided methane creation from the outset. Treasury must finalize regulations that avoid such deeply adverse outcomes.

4.1. Treasury is right to carefully evaluate treatment of biomethane and fugitive methane fuels within 45V before developing implementation guidance.

In the December proposal, Treasury correctly recognized the risk of real and cascading harms arising from inappropriate treatment of biomethane and fugitive methane in the 45V credit and the ensuing need for caution in the face of uncertainty. Multiple such uncertainties exist, each of which has the potential to result in policy outcomes fully opposite to that which was intended. These uncertainties include:

[18] Fed. Reg. 89225; U.S. Department of Energy (DOE). 2023. *Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways Using 45VH2- GREET 2023* (p. 12).

- The magnitude of climate contributions from use of biomethane and fugitive methane—and not just scale, but even whether or not capture and use of biomethane and fugitive methane should be considered a climate benefit or a climate burden. As in, a biomethane or fugitive methane fuel source credited as reducing overall carbon emissions could, in fact, be driving an increase in carbon emissions.[19]
- The degree to which any possible climate contributions can be accurately attributed to a specific policy intervention given numerous co-existing policies incentivizing the deployment of methane abatement technologies, including anaerobic digesters.[20]
- The potential for perverse incentives, with policy mechanisms intended to address the climate impacts of these waste streams instead increasing their production and harms.[21]
- The degree to which environmental attributes associated with biomethane and fugitive methane production, transport, and use can be accurately and robustly documented, tracked, certified, and exchanged.
- The inability of climate-focused interventions to account for the deeply harmful additional impacts associated with certain of these fuel sources, and how climate-focused solutions can in fact lead to net-worse outcomes across a range of impacts.[22]

The severity of these issues means that if Treasury advances implementation regulations prior to fully and accurately resolving them, 45V could unintentionally end up incentivizing projects that fail to actually deliver climate benefits in the immediate.[23] What's more, when the tax credit is over and any flawed carbon accounting goes away, the greenwashing will stop and left in its wake will be nearly two decade's worth of investments in heavily polluting infrastructure. This would be an egregious waste of taxpayer dollars and an untenable waste of finite time for investing in projects that actually unlock real and durable climate progress. Moreover, in the absence of sufficiently informed safeguards, 45V could incentivize an increase in sources of biomethane that are tightly intertwined with non-climate harms to people and the environment, including local water and air, threatening to exacerbate already towering environmental injustices.[24]

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[19] See, e.g., Grubert, E. At scale, renewable natural gas systems could be climate intensive: the influence of methane feedstock and leakage rates. *Environmental Research Letters* 15(8). Online at https://iopscience.iop.org/article/10.1088/1748-9326/ab9335.

[20] See, e.g., U.S. Environmental Protection Agency (EPA), n.d., "Govt. Resources for Identifying AD Project Financing," online at https://www.epa.gov/system/files/documents/2023-11/government-resources-ad-project-financing.pdf; Food and Water Watch. 2024. *The Big Oil and Big Ag Ponzi Scheme: Factory Farm Biogas*, online at https://www.foodandwaterwatch.org/2024/01/09/the-big-oil-and-big-ag-ponzi-scheme-factory-farm-biogas/.

[21] See, e.g., Lazenby, R. 2022. *Rethinking Manure Biogas: Policy Considerations to Promote Equity and Protect the Climate and Environment.* Vermont Law and Graduate School, Center for Agriculture and Food Systems. Online at https://www.vermontlaw.edu/sites/default/files/2022-08/Rethinking_Manure_Biogas.pdf.

[22] Lazenby, R. 2024. *Mitigating Emissions from California's Dairies: Considering the Role of Digesters in Mitigating Emissions from California's Dairies.* UCLA School of Law: Emmett Institute on Climate Change & the Environment. Online at https://law.ucla.edu/sites/default/files/PDFs/Publications/Emmett%20Institute/UCLA_Emmett_CA_Dairies_1%2018%2024.pdf.

[23] See, e.g., Grubert, E. and D. Cullenward. 2024. *The New Hydrogen Rules Risk Opening the Door to Methane Offsets*. Heatmap, 9 Feb, online at https://heatmap.news/climate/hydrogen-tax-credit-final-methane-offsets.

[24] See, e.g., Leadership Counsel for Justice & Accountability. 2023. *Factory Farm Dairies, Biogas, and the Dangerous Path California is On.* Online at https://leadershipcounsel.org/factory-farm-dairies-biogas-and-the-

Treasury rightly includes numerous requests for comment in the proposed regulations that would help to inform decisions around these issues. Furthermore, Treasury identifies the need for requirements that will ensure the incentive delivers robust climate outcomes. This includes consideration of an approach that is "logically consistent" with the three pillars while simultaneously recognizing the significant differences between electricity and gas systems and, critically, between increased deployment of carbon-free electricity—a societal benefit—and increased deployment of biomethane and fugitive methane sources—a societal harm. To that end, Treasury also rightly identifies the risk of perverse incentives and requests comment on safeguards to defend against such outcomes.

These are critical priorities and necessary frameworks by which to evaluate and finalize treatment of biomethane and fugitive methane in the rule. Treasury should carry these priorities forward. Where the record remains ambiguous, Treasury must continue to decline to advance policy positions, appropriately adopting a precautionary stance given the magnitude of harms that could otherwise result. This need for caution is further compounded by the fact that path dependency and incumbency bias would make it extremely challenging for Treasury to fully reverse course should it subsequently realize it erred, underscoring the gravity of the decisions now being made and the clear need to fully and deeply interrogate the appropriate approach before finalizing specific pathways and overall guidance.[25]

Finally, Treasury was correct to propose that for the purposes of 45V, fuel switching—such as by switching from fossil methane to biomethane—does not qualify as a modification or retrofit.

4.2. Treasury must assign credible carbon intensity scores to alternative methane sources; in 45V, methane venting is never an appropriate counterfactual.

Eligibility for 45V is premised on a facility's lifecycle greenhouse gas emissions rate. Within that calculation, the emissions associated with use of methane can change based on assumptions about where it came from and what might have otherwise happened to it. This counterfactual scenario can have an enormous impact on the emissions associated with use of the fuel, making it critically important that the counterfactual is accurately set. Of particular concern is an assumption of avoided methane[26] (i.e., counterfactual of venting), which can result in the assignment of deeply negative carbon intensity scores. A counterfactual of venting assumes that methane captured and used downstream would have otherwise been directly released to the atmosphere, meaning use of the fuel—even when it subsequently produces carbon dioxide—is credited as avoiding methane. These scores can fundamentally reshape lifecycle accounting analyses, turning the credited fuel into a de facto offset mechanism, thereby undermining incentives to actually reduce emissions via technologies or processes, as required by the statutory text of 45V. They are also fundamentally flawed.

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dangerous-path-california-is-on/; and Coalition comments submitted to this record from groups related to the harmful impacts of dairy digesters in California (submitted 26 Feb 2024).

[25] See, e.g., ICCT. 2023. *2030 California Renewable Natural Gas Outlook: Resource Assessment, Market Opportunities, and Environmental Performance.* Online at https://theicct.org/publication/california-rng-outlook-2030-may23/.

[26] Grubert, E. At scale, renewable natural gas systems could be climate intensive: the influence of methane feedstock and leakage rates. *Environmental Research Letters* 15(8). Online at https://iopscience.iop.org/article/10.1088/1748-9326/ab9335.

First, crediting sources of methane pollution for voluntary avoidance is entirely inappropriate in an economywide net-zero framework, which is precisely the endpoint the tax credit is intended to support. In a net-zero framework, all sources of pollution "count." As a result, all sources need to be brought to zero, either directly or via atmospheric removal; if instead one source of pollution is credited as "avoided" and used to offset another, there will ultimately still be an ongoing source of pollution.[27] Allowing the offsetting of direct facility emissions via avoided methane credits would only result in the temporary *appearance* of emissions reductions from the evaluated source (here, hydrogen producers) without any actual ability to deliver durable emissions reductions. This would enable the subsidization and buildout of a hydrogen production industry that is entirely reliant on ephemeral carbon accounting mechanisms to count as "clean" and thereby ultimately entirely incompatible with an emissions framework that is evolved to be consistent with that demanded by net-zero climate accounting.

It is also important to note that the primary precedent for crediting avoided methane emissions is the California Low-Carbon Fuel Standard's treatment of biomethane from manure lagoons. Critically, however, this precedent proves the inappropriateness of its adoption in 45V. It is widely understood that the avoided methane calculation was specifically incorporated within the LCFS as a means of subsidizing investments in anaerobic digesters to address pollution from California's dairies, not to actually clean up transportation fuel.[28] This approach has been highly contested by experts and advocates.[29,30] Moreover, a similar repurposing of the 45V credit to subsidize other sectors of the economy would be entirely out of scope of the statute.

Second, any methane that *can* be captured should, at minimum, be assigned a baseline counterfactual of capture and flare. This appropriately reflects a consistent treatment of pollution sources, recognizing the cost of methane pollution and thus the need for methane abatement, as opposed to perversely rewarding a subset of polluters via voluntary crediting for pollution avoidance. However, a baseline of capture and flare should be considered a minimum performance requirement for a biomethane or fugitive methane source's baseline counterfactual. In many, if not most, scenarios, one of two other counterfactuals would be more appropriate for Treasury to adopt: diversion from higher productive use, and complete avoidance of methane creation via alternative source management practices. Each of these would deeply limit, if not outright reverse, the comparative climate benefits associated with biomethane or fugitive methane use, thereby making it critical for Treasury to ensure it fully interrogates the appropriateness of the assigned counterfactuals before finalizing any 45VH2-GREET pathways or PER processes.

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[27] Note: Avoided emissions are different from carbon removals. For a discussion of the incompatibility of offsets with a net-zero framework, see, e.g., Cullenward, D., G. Badgley, and F. Chay. 2023. *Carbon offsets are incompatible with the Paris Agreement.* One Earth (1085), online at https://doi.org/10.1016/j.oneear.2023.08.014.

[28] Smith, A. 2024. *Cow poop is now a big part of California fuel policy.* Ag Data News (22 Jan), online at *https://agdatanews.substack.com/p/cow-poop-is-now-a-big-part-of-california*.

[29] See, e.g., Comments from J. Martin et al. (Union of Concerned Scientists) to the California Air Resources Board re: LCFS amendments, 20 February 2024, online at https://www.arb.ca.gov/lists/com-attach/6955-lcfs2024-Wi8CZ1MhUFwHYgFu.pdf.

[30] Martin, J. 2024. *Something Stinks: California Must End Manure Biomethane Accounting Gimmicks in its Low Carbon Fuel Standard.* The Equation: A Blog of the Union of Concerned Scientists. 15 Feb. Online at https://blog.ucsusa.org/jeremy-martin/something-stinks-california-must-end-manure-biomethane-accounting-gimmicks-in-its-low-carbon-fuel-standard/.

It is particularly critical that Treasury not credit biomethane from sources that could have avoided methane creation in the first place had alternative practices been employed. Biomethane sources are typically highly polluting, and even solely evaluating their impact on climate, studies have increasingly shown that methane generation and capture can in fact lead to far worse climate outcomes overall.[31] As a result, a holistic perspective is required to evaluate the true climate impact of such sources, beginning with comparing any generated biogas or fugitive methane against a counterfactual representing the most favorable climate intervention, such as organic waste diversion for landfills or alternative manure management for dairies and other industrial animal farming operations.

Evaluating biomethane and fugitive methane sources against alternative management practices would rightly ensure 45V does not inadvertently reward a source for contributing to climate benefits when it is, in fact, driving overall climate harms. Furthermore, such a policy would appropriately place low- or non-emitting feedstock management practices on a level playing field with high-emitting practices, instead of perversely rewarding those practices that generate pollution by providing new revenue streams without any such compensation for far better options and alternatives.[32]

4.3. Treasury must prohibit pollution offsets of any kind within 45V. If negative carbon intensity fuels are allowed, they cannot be used to offset any amount of a facility's real emissions.

Because 45V is proposed to be determined by a facility's annual aggregate emissions divided by annual aggregate production, if fuels with negative carbon intensity values are included (see Section 4.2) and no offset restrictions are in place, then a polluter could simply procure credits for whatever amount of negative carbon intensity biomethane/fugitive methane necessary to get the annual emissions rate below the 45V threshold—even if the totality of their facility emissions would otherwise render them ineligible.

Offsets would be entirely discordant with the intention of 45V, which is specifically designed to incentivize technology and process innovations to enable truly clean hydrogen production. Allowing project qualification via offsetting undermines that innovation while further entrenching polluting production projects.

The non-linear credit structure further reinforces the incompatibility of offsets with the incentive. The steep decline in credit value after the top tier is clearly structured to highly incentivize processes and technologies that are truly clean; this mechanism would be fully undermined if pollution overages of any size could be simply erased via procurement offsetting to enable any production facility to ultimately qualify for the top tier.

In addition to offsets being incompatible with the conceptual framework of the tax credit, it's also the case that 45V does not include any of the necessary safeguards demanded by intentional offset policies. This should on its own render offsets ineligible for program qualification. Rigorous offset programs have themselves been repeatedly shown to fail to deliver real and durable emissions reductions; offsets in the absence of any such safeguards, such as is the case with 45V, are all the likelier to falter. As a result, 45V

[31] See, e.g., Lazenby 2024; Bakkaloglu, S., J. Cooper, and A. Hawkes. 2022. *Methane emissions along biomethane and biogas supply chains are underestimated.* One Earth, Vol. 5(6), 724-736. Online at https://doi.org/10.1016/j.oneear.2022.05.012.
[32] See, e.g., Lazenby 2023.

lifecycle assessments must not allow for the offsetting of: 1) direct facility emissions and/or upstream methane emissions in the case of reforming facilities, or 2) emissions associated with electricity directly powering electrolyzer facilities or induced grid emissions.

Allowing avoided methane emissions to offset facility emissions would be an especially egregious and inappropriate policy decision. As discussed in Section 4.2 above, avoided methane credits should be excluded outright. If they are somehow still allowed, however, then Treasury must be sure to prohibit negative carbon intensity fuels from offsetting direct or indirect facility emissions. This means that in practice, when evaluating a facility's annual aggregate emissions, positive emissions could not be netted out by negative emissions, meaning any such negative value would operate as if it were cut off at zero.

However, it's appropriate for Treasury to consider further defenses against abuse of the tax credit's carbon accounting framework to ensure the rigor is not manipulated in service of capturing credit value by major sources of ongoing pollution. Because the credit is clearly not intended to reward achievement of the qualified clean hydrogen threshold via biomethane or fugitive methane blending, if Treasury still allows compliance via fuel procurement as opposed to process performance, it may merit adopting a no-blending safeguard, such that, at minimum, any time biomethane or fugitive methane is used as a form of compliance, it must be used to supply the full share of the fuel consumed, not a partial share.

Finally, it's critical to note that Treasury's current "facility" definition, which includes all components that function interdependently to produce qualified clean hydrogen, explicitly excludes upstream electricity production equipment but *not* upstream biomethane facilities.[33] Any facility that produces qualified clean hydrogen due to the specific attributes of biomethane, then, seemingly *must* be required to include the full footprint of the underlying biomethane feedstock facility and operations, too, given that those components are fundamental to the ultimate hydrogen qualification. This would bring in significantly more sources of climate pollution to consider and incorporate, potentially fundamentally changing the climate calculation at hand.

4.4. Treasury must establish rigorous feedstock eligibility requirements to actualize pollution benefits while defending against perverse outcomes.

Biomethane and fugitive methane are derived from specific sources and feedstocks; establishing eligibility requirements for these sources is a critical means of ensuring additionality of benefits on the one hand and limiting the likelihood of perverse outcomes on the other. Moreover, eligibility requirements can help to avoid rewarding sources and feedstocks that perpetuate public health and environmental justice harms.

Treasury has considered several limitations in the proposed regulations, either as a direct proposal or in requests for comment. UCS recommends five fuel eligibility limitations, each of which is intended to restrict fuel eligibility entirely as opposed to adjust the baseline counterfactual, as further discussed in Section 4.2 above:

[33] Fed. Reg. 89245.

- Prohibiting crediting of biomethane or fugitive methane that has previously been put to productive use—i.e., burned for energy or heat or used as a feedstock. Treasury has correctly proposed this necessary restriction to ensure emissions reductions claimed under 45V are indeed additional to the climate system overall.
- Prohibiting crediting of biomethane or fugitive methane derived from feedstocks arising after the date of implementation of the IRA. This is a necessary defense against 45V functioning as a perverse incentive to *increase* waste streams.
- Prohibiting crediting of fugitive methane from oil and gas operations. Methane emissions from oil and gas operations are a source of pollution incorporated within the GREET framework; allowing some accounting of methane emissions as pollution and others as a voluntary avoidance credit would entirely undermine the rigor of the lifecycle accounting framework and, worse, create a perverse incentive that rewards the worst-performing, least-responsible oil and gas operators.
- Prohibiting crediting biomethane or fugitive methane from sources that could have avoided creation of methane in the first place via alternative practices. As detailed in Section 4.2 above, Treasury must ensure that all counterfactuals are adjusted to appropriately reflect the best climate alternative; some sources of biomethane, however, can be entirely avoided from the outset, and these should be fully excluded from eligibility to avoid perverse incentives that tilt the playing field in favor of operators with the least responsible practices.
- Prohibiting crediting of biomethane or fugitive methane sources that are demonstrated to come from practices harmful to surrounding communities. Biomethane and fugitive methane are often sourced from operations that generate real and significant harms to local communities. At minimum, Treasury should not allow crediting of any source that is out of compliance with necessary safety, health, and environmental regulations.

Together, these eligibility requirements can help strengthen the climate integrity of any credited biomethane or fugitive methane source, limit the risk of perverse incentives, and avoid exacerbating severe environmental justice harms tightly intertwined with many such sources today.

4.5. Treasury must set geographic bounds around eligible fuel deliverability regions and rigorous book-and-claim tracking and certification requirements to ensure the environmental attributes promised are the environmental attributes delivered.

Treasury was correct to decline pathway eligibility beyond direct pipeline connection in the proposed regulations in the absence of necessary safeguards and protocols governing fuel deliverability and fuel tracking and certification. These issues are vital to ensuring that the environmental attributes biomethane and fugitive methane are credited with inside the 45V framework are indeed delivered in the real world. Even with direct pipeline connection, however, insufficient tracking and certification systems present real concerns around failure to measure and account for methane emissions at the fuel source and lack protections against attribute double counting. Until these issues are rigorously resolved, Treasury must not allow for any credit to be premised on use of biomethane or fugitive methane.

Source methane emissions. Production of biogas and fugitive methane can be an extremely climate-polluting process, prone to methane leaks in the capture, storage, and processing segments. Furthermore, certain biomethane sources can generate multiple additional greenhouse gas pollutants, each of which must be accounted for. Today, source emissions of methane and other greenhouse gases are frequently

severely underreported if they are reported at all.[34] However, these emissions are critical to assigning an appropriate carbon intensity value for the procured biomethane or fugitive methane, just as correctly accounting for upstream methane emissions—including at the point of extraction—are critical for fully and accurately accounting for the greenhouse gas burden associated with fossil methane. Treasury must require onsite monitoring, reporting, and verification of these emissions such that they can be fully incorporated into the lifecycle emissions rate analysis.

Deliverability. Treasury must set geographic bounds around eligible fuel deliverability regions. It should also look to the RFS for possible examples of physical deliverability requirements such as injection upstream of use. Treasury should also consider incorporating temporal restrictions alongside geographic restrictions to ensure plausibility of procurement claims and avoiding deleterious system work-arounds in its absence. Ultimately, it is not appropriate to treat the nation's gas system as a single, interconnected whole. Such an approach fails to reckon with real-world system constraints that result in differentiated pricing, uneven emission rates, and pipeline capacity limits, all of which can shape investment decisions in the broader energy system, particularly influencing uptake of alternative fuel resources such as conversion to electrified end uses.

Book-and-claim. Biomethane and fugitive methane are indistinguishable from fossil methane once injected into a gas pipeline. Robust tracking and verification of environmental attributes are fundamental to ensuring the veracity of climate claims by hydrogen producers; however, unlike in the power sector, no systems currently exist for sufficiently tracking and verifying attributes associated with biomethane or fugitive methane from source to sink. Treasury must ensure that book-and-claim systems are required and equipped to document all information necessary to evaluate climate impacts, fuel eligibility (see Section 4.4 above), feedstock derivation and timing of supply, attestation regarding first productive use, and documentation of no community or area harms to water, land, or air. Any tracking system must also be equipped to document location and timing of injection, as well as ensure full retirement of attributes to ensure no double counting.

[34] Bakkaloglu et al. 2022.