

February 26, 2024

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

**RE: Comments Responding to U.S. Department of Treasury and Internal Revenue Service Notice of Proposed Rulemaking Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property (REG-117631-23)**

Dear Sirs and Madams:

Fidelis New Energy, LLC (“Fidelis”) respectfully submits these comments in response to the Notice of Proposed Rulemaking (“NPRM”) from the Department of the Treasury (“Treasury Department”) and the Internal Revenue Service (“IRS”) in REG-117631-23, which proposed regulations relating to the credit for production of clean hydrogen (Section 45V) and energy credit (Section 48(a)(15)) as established and amended by Public Law 117-169, commonly known as the Inflation Reduction Act of 2022 (“IRA”).

Fidelis New Energy, LLC (“Fidelis”) is a U.S. decarbonization company developing multiple large-scale, climate-positive, carbon-negative infrastructure projects in the hydrogen, sustainable aviation fuel, renewable diesel, carbon management, and biomass energy sectors. Using proven technologies configured in novel, proprietary, and optimized ways, Fidelis aims to develop, invest in, and deliver infrastructure projects that promote job creation, strengthen the U.S. clean energy sector, and support the Administration’s stated carbon reduction targets.

Fidelis has invested in and developed a proprietary, patented technology called FidelisH2®, that can significantly reduce carbon emissions in the hydrogen production sector in the very near term. This technology would be deployed as part of Fidelis’ Mountaineer GigaSystem™ in West Virginia, an anchor hydrogen supplier within the ARCH2 Hydrogen Hub. The ARCH2 Hub was among seven chosen for DOE funding negotiations under the Clean Hydrogen Hub Program.

We applaud the proposed regulation’s commitment to a carbon intensity-based incentive framework and broad suite of technologies and approaches. The proposed regulation will ensure real emission reductions in the near term, while providing a level playing field for innovative technologies and delivering real investment and high-paying jobs for the American people.

Fidelis welcomes the opportunity to provide comments on certain questions posed within the NPRM Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to

Treat Clean Hydrogen Production Facilities as Energy property. Specifically, the comments address regulatory uncertainty introduced in the proposed guidance requiring the most recent 45VH2-GREET model, the inability to claim 45V prior to verification, the over designation of key parameters as background data, and the recommended project maturity threshold for PER process. We appreciate the opportunity to comment on these important issues through this comment letter.

For ease of review, please see the following table summarizing each area of comment, the challenges created by said area, and Fidelis’ recommended solutions to said challenges.

<b>NPRM Comment Area:</b>	<b>Challenges with NPRM:</b>	<b>Recommended Solutions:</b>
<p>Requiring the use of the “most recent 45VH2-GREET model” each taxable year.</p>	<p>Forcing clean hydrogen facilities to use the most recent 45VH2-GREET model each taxable year will prevent any clean hydrogen facilities from being financed and built.</p> <p>A clean hydrogen facility, whether retrofit or new build, needs significant investment, often billions of dollars, over a three-to-five-year period before beginning operations.</p> <p>Investors require certainty that a clean hydrogen facility will benefit from the full 10-year 45V credit to compete with traditional hydrogen sources, without which they will not invest.</p> <p>Multiple existing hydrogen producers currently exploring whether to build clean hydrogen facilities in the United States confirmed their complete unwillingness to develop and construct any new or retrofitted clean hydrogen facilities if this uncertainty over forcing clean hydrogen facilities to use the most recent 45VH2-GREET model each taxable year remains in place.</p>	<p>Treasury must allow a taxpayer to claim the 45V credit in each taxable year during the clean hydrogen facility’s 10-year eligibility period after the start of commercial operation using a 45VH2-GREET model that was in effect during the 24 months prior to “start of construction” (as already defined by Treasury). This would allow the taxpayer to “grandfather” the 45VH2-GREET model in effect when it began developing the clean hydrogen production facility.</p> <p>For clarity, a taxpayer may elect to use the latest 45VH2-GREET during any taxable year it claims the 45V credit, but the taxpayer would not be forced to do so.</p>

<p>Ineligibility to claim 45V credit until all verification requirements are complete.</p>	<p>Requiring the completion of verification prior to claiming 45V credit significantly devalues the 45V and introduces ambiguity.</p> <p>This rule greatly reduces the 45V incentive's effectiveness in encouraging investment, as clean hydrogen facilities opting for direct pay under section 6417 incur substantial upfront costs before generating credits the next year. This time value along with current debt rates significantly devalues the 45V credit.</p> <p>In addition, the current regulations are significantly ambiguous on the ability to transfer under 6418 between companies with different fiscal years. Specifically, the regulations do not address how 45V credits are claimed and transferred for hydrogen production that occurred in overlapping, different fiscal years.</p>	<p>The Treasury and IRS should allow taxpayers to transfer or receive direct pay of 45V credits on a quarterly basis with an annual verification.</p> <p>Quarterly 45V claims would include provisions for the IRS to recapture 45V credit after verification for the clean hydrogen production facility.</p>
<p>Transition of “background data” to “foreground data” in 45VH2-GREET</p>	<p>Proposed guidance discourages emission reductions and innovations by restricting key verifiable data to “background data”. Further, in cases such as natural gas transmission distances, specific electricity generation emission factors, and methane leakage, this locked background data prevents the accurate lifecycle accounting of clean hydrogen production.</p>	<p>Treasury and IRS should transition specific electricity generation emission factors and natural gas transmission distances to foreground data to reflect the verifiable nature of these parameters today.</p> <p>Treasury and IRS should provide clear guidance on the methodology of future updates to natural gas leakage and allow for methane leakage for system to transition to foreground data using reporting and verification through the EPA’s Methane Emission Reduction Program as the basis.</p>

<p>Provisional Emissions Rate Determination Process &amp; Project Readiness Thresholds</p>	<p>The requirement for a complete FEED study prior to application for an emission rate determination from the Department of Energy (“DOE”) stifles innovation by placing undue burden on innovative technologies and small companies.</p> <p>FEED studies introduce significant costs to technology developers and as such require significant investment from shareholders and backers. Uncertainty on the outcome of the emission rate determination from the DOE will discourage investment in FEED required to get the emission rate determination.</p>	<p>DOE, Treasury, and IRS should accept an Association for the Advancement of Cost Engineering (“AACE”) Class 4 cost estimate and supporting documentation as justification of project maturity.</p> <p>AACE Class 4 estimates provide sufficient detail on the process technology and cost estimate to evaluate the economic viability of the project and accurately model the lifecycle. Further, the AACE Class 4 estimate provides a uniform basis with a clear definition of deliverables and maturity to evaluate projects on.</p>
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**Comments Responding to Key Provisions and Request for Comments in 45V NPRM.**

*Comments highlighting the regulatory uncertainty created by requiring the “most recent 45VH2-GREET model.”*

The 45V hydrogen production tax credit and DOE’s regional clean hydrogen hubs established under the Bipartisan Infrastructure Law (“BIL”) have the potential to deliver transformational change to the United States and deliver significant greenhouse gas (“GHG”) emission reductions, invest billions in infrastructure, and generate well-paying jobs for hundreds of thousands of Americans across the nation.<sup>1</sup> The 45V clean hydrogen production credit (“45V”) is critical to delivering on the promise of the clean hydrogen hubs and broader clean hydrogen adoption. Specifically, the 45V enables the private underwriting of billions of dollars of infrastructure investment to support the building of a clean hydrogen economy and development of thousands of jobs across the nation.

While Fidelis applauds the clarity the Treasury and IRS have provided through the 45V NPRM with respect to the incorporation of electricity from specific generation sources through EACs meeting the “three pillars” of incrementality, temporal matching, and deliverability, the 45V NPRM introduces significant financial risk elsewhere in the guidance. Specifically, the 45V’s potential to act as a catalyst for investment is significantly constrained with the proposed guidance requiring the utilization of the “most recent GREET model”. The proposed requirement induces significant regulatory uncertainty that future model updates could result in a facility no longer being able to qualify for 45V (or qualify at the expected credit tier) over the 10-year credit term when the project was originally financed. The potential for model updates to “locked” background

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<sup>1</sup> <https://www.whitehouse.gov/briefing-room/statements-releases/2023/10/13/biden-harris-administration-announces-regional-clean-hydrogen-hubs-to-drive-clean-manufacturing-and-jobs/> & <https://www.whitehouse.gov/cleanenergy/clean-energy-updates/2023/12/22/treasury-sets-out-proposed-rules-for-transformative-clean-hydrogen-incentives/>

data as well as the potential for previously approved clean hydrogen pathways to be removed in subsequent 45VH2-GREET model releases, will prevent the billions of dollars of private investment required to support development of the Administration’s objectives for clean hydrogen and transition to a low emission economy.

To provide clarity on the impact that potential model updates could have on the 45V, consider the following examples of how changes in “locked” background data can impact clean hydrogen production. For clean hydrogen production from natural gas, changes to the upstream methane leakage factor in the 45VH2-GREET and underlying R&D GREET model have the potential to result in the hydrogen facility to no longer qualifying for higher tier credit or not qualifying for credit under 45V at all. As shown in Figure 1, updates to the “locked” background data can have significant impact for the eligible 45V credit of a natural gas-based reformer. The credit difference from qualifying for the \$0.75 per kg H2 vs. \$0.60 per kg H2 45V PTC credit significantly jeopardizes needed investments for the decarbonization of heavy industries reliant on large, ratable hydrogen production that natural gas pathways provide.

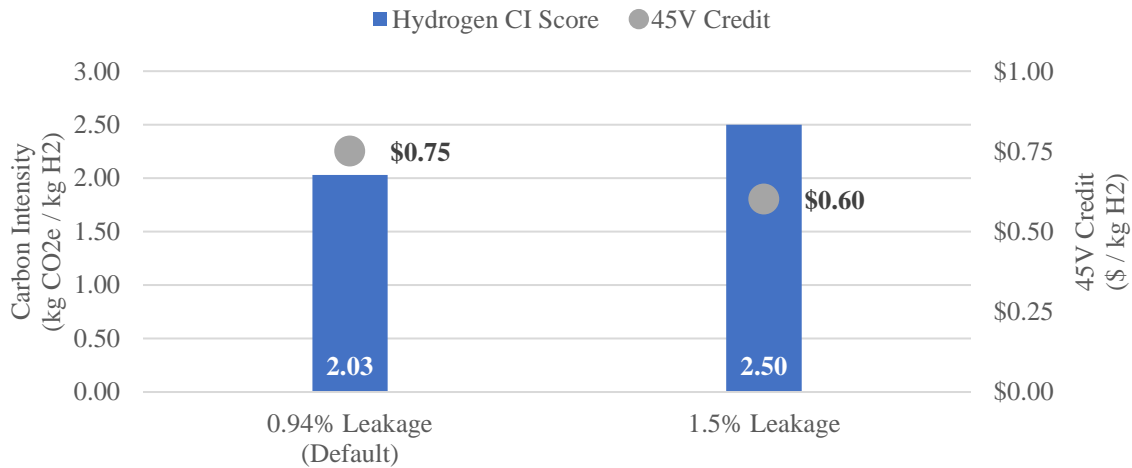


Figure 1. Potential impact from increasing the “background” methane leakage rate on the 45V for a natural gas with CCS-based clean hydrogen production facility.<sup>2</sup>

Table 1. Autothermal reformer (ATR) operating assumptions for CI & 45V analysis

Autothermal Reformer Operating Assumptions		
Natural Gas Consumption	MMBTU / MT (LHV)	145
Electrical Consumption	MWh / MT	3.5
CO2 Capture	%	99%
Electricity Source		100% Renewables

The potential risk of a facility no longer qualifying is not limited to natural gas reforming pathways. Updates to the “locked” upstream electricity emission factor significantly impact electrolytic hydrogen production. For example, if a subsequent version of 45VH2-GREET were to

<sup>2</sup> Analysis performed in R&D GREET 2023 with AR5-100 year GWP based on 45VH2-GREET 2023 system boundary and guidance. 45V credit shown with multiplier for meeting prevailing wage and apprenticeship requirements.

be released incorporating infrastructure and material emissions related to the construction and equipment manufacturing of power generation facilities, typically referred to as “embodied emissions”, then electrolytic facilities utilizing wind or solar energy would see significant impacts. The inclusion of “embodied emissions” in the carbon intensity (“CI”) of solar and wind power would increase the produced hydrogen's CI from 0.00 kg CO<sub>2</sub>e / kg H<sub>2</sub> for solar and wind-based hydrogen to 2.09 and 0.57 kg CO<sub>2</sub>e / kg H<sub>2</sub>, respectively. This increased hydrogen CI would mean that the 45V credit value would drop from \$3.00 / kg to \$0.75 and \$1.00 for solar and wind hydrogen, respectively. Further, the taxpayer would have no control or ability to mitigate this drastic 75% and 66% loss in credit value due to a unilateral decision to include embodied emissions. Please see Figure 2 below for the potential impact of this regulatory uncertainty for green hydrogen production.

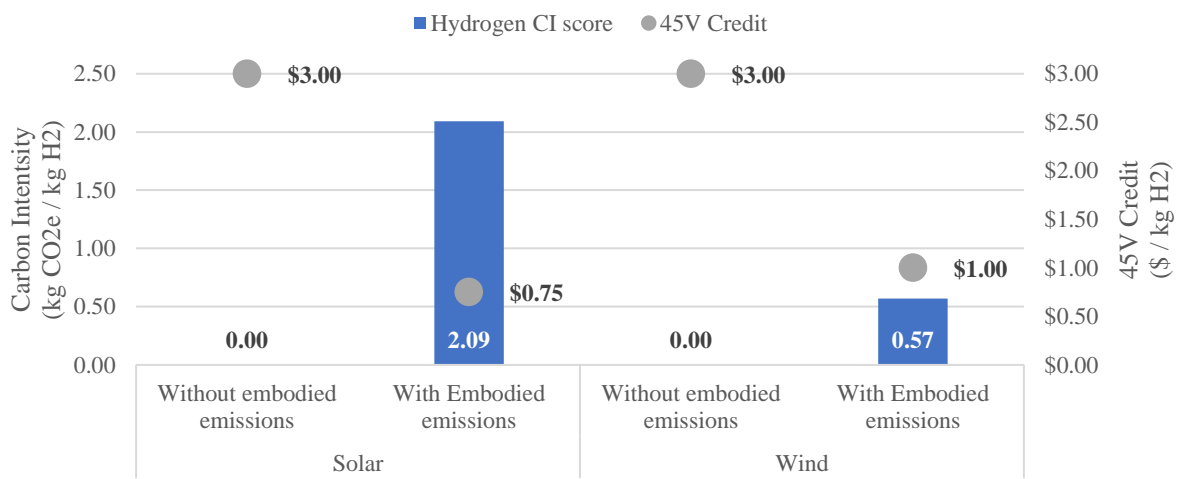


Figure 2. Incorporating “embodied emissions” for electrolytic hydrogen production would result in a 75% and 66% 45V credit for solar and wind-based hydrogen.<sup>3</sup>

For 45V PTC to deliver on the Administration’s objectives of reducing emissions and delivering thousands of American jobs, investors need long term confidence in a clean hydrogen project’s compliance with the 45V regulations. As shown in the examples above, model updates to “locked” background data can significantly jeopardize a project’s viability. The current proposed guidance requiring the use of the most recent version of the 45VH2-GREET model introduces significant regulatory risk and endangers financial feasibility of clean hydrogen projects through the 45V. This means forcing clean hydrogen facilities to use the most recent 45VH2-GREET model each taxable year will prevent any clean hydrogen facilities from being financed and built.

<sup>3</sup> Electrolyzer modeled on a well-to-gate basis utilizing R&D GREET 2023 default PEM Electrolyzer efficiency of 60.1% or 55.5 kWh / kg H<sub>2</sub>. Emission factors for photovoltaic solar electricity with (37.71 g CO<sub>2</sub>e/kWh) and without (0 g CO<sub>2</sub>e / kWh) embodied emissions and wind electricity with (10.3 g CO<sub>2</sub>e/kWh) and without (0 g CO<sub>2</sub>e/kWh) embodied emissions were determined per R&D GREET 2023 utilizing AR5 100-year GWP in alignment 45VH2-GREET 2023. The 45V credit shown includes multiplier for meeting prevailing wage and apprenticeship requirements.

A clean hydrogen facility, whether a retrofit or new build, needs significant investment, often billions of dollars, over a three-to-five-year period before beginning operations. Investors require certainty that a clean hydrogen facility will benefit from the full 10-year 45V credit to compete with traditional hydrogen sources, without which they will not invest. The regulatory uncertainty in regard to project revenues is simply too high. This is why many projects that are likely to qualify for the tax benefits of the IRA of 2022 have not progressed significantly since the passage of the of the IRA 18 months ago. The investors and customers are simply waiting at the starting line for the rules to be finalized, so that they know if the potentially IRA qualifying project qualify for the incentives or not. Fidelis has first-hand knowledge of several multi-billion-dollar clean energy projects with significant investor interest that continue to be delayed until the IRA rules are finalized. Requiring the use of the “most recent GREET model” will perpetuate this uncertainty and will result in investors and developers walking away from IRA qualifying projects.

To address this concern and ensure the 45V PTC catalyzes critical infrastructure development, emission reductions, and the generation of thousands of jobs, Fidelis recommends the adoption of the following into the proposed guidance for the 45V PTC to ensure that the 45V catalyzes clean hydrogen development in the United States:

- 1. Treasury and IRS should enable a taxpayer to file for 45V credit with a 45VH2-GREET model that was in effect during the 24 months prior to “beginning construction” for the entire 10-year life of the credit with the ability to subsequently elect to use the latest annual release available.**
- 2. Treasury and the IRS should significantly reduce the amount of locked background data in 45VH2-GREET allowing for 3<sup>rd</sup> party verification of key background data including electricity generation emission factors, natural gas transmission distance, and natural gas leakage.**

These recommendations are critical to providing the required clarity and confidence for private investments in clean hydrogen infrastructure and deliver emissions reduction and job creation potential of the Hydrogen Hubs and hydrogen economy. The following expands on the recommendations above.

**Recommendation 1: Treasury and IRS should enable a taxpayer to file for 45V credit with a 45VH2-GREET model that was in effect during the 24 months prior to “beginning construction” for the entire 10-year life of the credit with the ability to subsequently elect to use the latest annual release available.**

To eliminate this uncertainty, a facility should be able to continually utilize and rely on the 45VH2-GREET and regulatory requirements that were in effect during the 24 months prior to “beginning construction.” This proposed solution is referred to herein as “Grandfathering 45VH2-GREET.” The “beginning construction” definition should be as established under the 48 ITC tests of either the “Physical Work Test” or “Five Percent Safe Harbor”:

- “Physical Work Test” – undertaking physical work of a significant nature.

- “Five Percent Safe Harbor” – paying or incurring five percent or more of the total cost of the energy project.

Grandfathering 45VH2-GREET does not need to apply to clearly established future requirements such as the transition from annual to hourly temporal matching after 12/31/2027. This is because the transition to hourly matching is explicitly and clearly established in the regulations enabling taxpayers to adequately develop facilities to meet this requirement from the outset.

Our proposed Grandfathering 45VH2-GREET, allows for the 45VH2-GREET to be updated and refined complying with the legislative intent of the “most recent GREET model” but eliminates the unfinanceable risk that millions of dollars invested in engineering and development and the billions of dollars of capital invested during construction of a clean hydrogen facility are subject to a binary risk of unilateral change to the 45VH2-GREET model after a final investment decision is made.

Further as the development of clean hydrogen facilities typically takes two or more years, it is essential that the 45VH2-GREET assumptions are known from the outset of development. Without a clear basis on which to develop the project, it is difficult to attract the investment required to develop the project to the start of construction or final investment decision. To ensure that the rules and regulations embedded in the 45VH2-GREET model can be relied upon during the development and subsequent 10-year credit life, the rules should allow the taxpayer to elect any 45VH2-GREET model that was in effect during the 24 months prior to start “beginning of construction.” This allows the taxpayer to attract investment and develop the project with the flexibility to select a model with increased clarity.

Grandfathering 45VH2-GREET for the full 10-year life of the 45V credit enables a project to complete FEED and reach FID with clarity on the expected 45V credit generation over the 10-year credit life of the project. Further, Grandfathering 45VH2-GREET enables the 45V to deliver on significant emissions reductions, thousands of high paying jobs, and critical infrastructure for a clean energy future. Facilities should always be allowed to elect to use the “most recent GREET model.”

**Recommendation 2: Treasury and the IRS should significantly reduce the amount of locked background data in 45VH2-GREET allowing for 3<sup>rd</sup> party verification of key background data including upstream natural gas leakage and electricity generation emission factors.**

The ability to input facility and system specific electricity generation emission factors, natural gas transmission, and natural gas leakage in place of locked background significantly reduces regulatory risk from 45VH2-GREET Model updates. Allowing for the utilization of emission factors, which are verifiable with high fidelity, shifts regulatory uncertainty from arbitrary model updates on “locked background data” to values subject to verification. This mitigates unforeseen changes in emission factors and increases the ability to privately finance these projects. In addition to introducing significant regulatory uncertainty, assigning key emission factors as background data significantly discourages innovation and the deployment of lower emitting technologies by locking in status quo. Therefore, reducing the amount of “locked”



background data in the 45VH2-GREET model not only decreases obstacles to financing clean hydrogen projects, but it will also maximize the emission reduction potential of the 45V.

Outlined in additional comments below are specific recommendations on transitioning key background data to foreground data as well as recommendations on verification of these key emission factors as part of the hydrogen facility's verification to ensure that these emissions factors are independently verifiable with high fidelity.

*Comments addressing the ability to claim section 45V Credit prior to the completion of the verification.*

The prohibition on claiming section 45V credit "... until all relevant verification requirements, and the verification itself, have been completed for both the production of the hydrogen and the sale or use of that hydrogen" directly undercuts the ability for the 45V to deliver on the Administration goals and the production of meaningful quantities of clean hydrogen needed to decarbonize heavy industries. This prohibition on claiming credit under 45V prior to verification is also catastrophic for the ability to elect direct pay or transfer of 45V Credits under sections 6417 and 6418, respectively. Created under in the IRA, the ability to transfer credits through section 6418 is already driving significant growth in the renewables and advanced manufacturing sectors and is acting as a "force multiplier" as intended.<sup>4</sup> The proposed requirement that the verification be complete effectively prior to claiming 45V eliminates any ability for section 6417 or 6418 to be a force multiplier. This is because clean hydrogen production facilities electing to tax direct pay under 6417 would have significant cash outlays prior to credit generation the following fiscal year. This time value along with current debt rates significantly devalues the 45V credit.

Further, significant ambiguity exists under the proposed regulations on the election under 6418 to transferring credits. For facilities with different fiscal years, can hydrogen produced and claimed under Form 7210 be transferred to and claimed by a company with a different overlapping fiscal year? This ambiguity and potential complexity on how to treat hydrogen produced by a clean hydrogen production facility and transferred to another in different fiscal years needs to be clarified prior to 45V and section 6418 having catalyzing impact on clean hydrogen. As such, Fidelis recommends the adoption of the following into the proposed guidance to ensure that the 45V catalyzes clean hydrogen development in the United States:

**3. The Treasury and IRS should allow taxpayers to transfer or receive direct pay of 45V credits on a quarterly basis with an annual verification.**

The restriction to make annual 45V tax credit claims (rather than quarterly) significantly devalue the 45V credit and introduces potential complexity. As outlined above, the ability to claim 45V credits on a quarterly basis is essential for the 45V to spur production and growth of clean hydrogen especially as it relates to the ability to take direct pay or transfer under section 6417 or 6418. The ability to claim 45V credit prior to verification is supported by the proposed regulations as it relates to the section 48(a)15 election to treat clean hydrogen production facilities as energy property. Under the proposed rules, while the election and 48(a)15 investment credit happen first,

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<sup>4</sup> <https://www.wsj.com/us-news/climate-environment/companies-are-snapping-up-new-clean-energy-tax-credits-593a7461>

the Treasury and the IRS can claw back credit through a “emissions tier recapture event” after annual verification. Quarterly credit generation and annual verification would be similar – credits claimed during a quarter would be subject to recapture from the clean hydrogen production facility if verification showed the credits were claimed or allowed at an incorrect emissions tier or amount.

*Comments addressing readiness of certification mechanisms incorporation of certain background data to foreground data.*

As addressed above, the 45V has the potential to drive significant emission reduction in the United States through the decarbonization of hard to abate industries. To this end, the 45V proposed guidance contains several positive regulations to ensure that the emission rate determined for a facility accurately matches the production pathway and related emissions, in alignment with legislative intent. Specifically, the guidance’s inclusion of a broad suite of hydrogen production technologies, the requirements on Energy Attribute Certificates (“EACs”) for the sourcing of electricity from specific sources, facility specific emission rate determination through foreground data in 45VH2-GREET, and subsequent verification all support the legislative intent that facilities receive credit corresponding to the specific carbon intensity of the hydrogen produced. However, the guidance is overly restrictive in designating certain data “background data” in 45VH2-GREET which restrict the decarbonization potential of the 45V and in some cases prohibits the accurate determination of emissions contradicting the Administration’s objectives and legislative intent.

The current restrictions on background data discourages further emission reductions and lock in the “status quo” emissions for many key inputs on the premise that this data cannot be verified with high fidelity. Significant emissions reductions are possible by reducing upstream methane leakage in natural gas supply or by implementing low emission electricity generation technologies. While it is possible that a select few parameters may not be independently verifiable with high fidelity today, the 45VH2-GREET 2023 model and proposed regulations inaccurately label several key data points that are verifiable today or will be verifiable soon. Fidelis recommends the 45VH2-GREET and 45V regulations adopt the following in the publication of the 45V regulations:

- 4. The Treasury and IRS should transition the emission rates for specific power generation types to foreground data and allow for the specification of feedstock properties, feedstock consumption rate, energy production, and carbon capture rates for thermal combustion technologies regardless of feedstock whether it be natural gas, coal, or the combustion of logging residues.**
- 5. The Treasury and IRS should modify 45VH2-GREET to transition natural gas transmission and distribution distance from locked background data to foreground data to ensure accurate accounting of GHG emissions for the determination of credit under 45V.**
- 6. The Treasury and IRS should provide clarity on the transition methane leakage for natural gas from background to foreground data by establishing a transition period after which natural gas system specific leakage rates will be based on reporting and compliance within the EPA’s Methane Emission Reduction Program (“MERP”).**

These recommendations will enable the 45V to deliver on the emission reduction potential of clean hydrogen in the United States and ensure accurate crediting for clean hydrogen production and judicious spending of taxpayer dollars. The following expands on the above recommendations to provide specific implementation recommendations.

**Recommendation 4: The 45VH2-GREET and 45V regulations should be amended to bring emission rates for specific generator types to foreground data to reflect the ability to accurately account for emissions rates with high fidelity today.**

Reporting of GHG emissions is industry standard today through federal and state programs for electricity generating facilities. At the federal level, most thermal power generation and combustion turbines in the U.S. are mandated to report annual emissions to the US EPA under the Greenhouse Gas Reporting Program (“GHGRP”) 40 C.F.R. Part 98 (Subpart D).<sup>5</sup> This requirement mandates the reporting of direct emissions aggregated in metric tons of CO<sub>2</sub>e and activity data including fuel use, feedstock inputs, and quality assurance or quality control data specified under the applicable sub-part.<sup>6</sup> The activity data in combination with the direct emissions reporting enables the accurate lifecycle emission modeling of the electricity facility for purposes of the 45V.

In addition to federal reporting, California, Washington<sup>7,8</sup>, and 15 more other states,<sup>9</sup> require reporting similar to the US EPA’s GHGRP for electricity generating facilities. While the GHGRP reporting at a federal level is verified by the EPA, independent 3<sup>rd</sup> party verification of electricity emissions is a requirement in California and Washington under their respective reporting systems.<sup>10,11</sup> It is well demonstrated that emissions from specific generator types are verifiable with high fidelity today, and GHG emissions reporting is standard industry practice with many generators legally required to submit facility specific emission rates to state and federal programs.

The current foreground inputs of feedstock specification, feedstock consumption, energy production, and carbon capture rates are accurately considered verifiable foreground data for the clean hydrogen production facility in 45VH2-GREET 2023. 45VH2-GREET allows users to specify the capture rate for natural gas combine cycle with CCS as shown in Figure 3. The verification of this foreground data is directly equivalent to data required to verify emission rates for specific generator types. As such, the Treasury and IRS should adopt regulations moving the source generation emission factor to foreground data.

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<sup>5</sup> 40 C.F.R. §98

<sup>6</sup> [https://www.epa.gov/sites/default/files/2018-02/documents/generalprovisions\\_infosheet.pdf](https://www.epa.gov/sites/default/files/2018-02/documents/generalprovisions_infosheet.pdf)

<sup>7</sup> [California Air Resources Board - Mandatory GHG Reporting](#)

<sup>8</sup> [Washington Department of Ecology - Mandatory GHG Reports](#)

<sup>9</sup> Additional Stats included CT, DE, FL, IA, ME, MD, MA, NH, NJ, NM, NY, NC, VT, WV, & WI

<sup>10</sup> Cal. Code Regs. tit. 17 § 95130(f)

<sup>11</sup> WAC 173-441-085 Third-party verification

Process Inputs	Value	Units	Process Outputs	Value	Units	Notes	Product Hydrogen Composition	mol [%]	Molar Mass
<b>Autothermal Reforming (ATR)</b>							H <sub>2</sub>	100.00%	2.016
Natural Gas	Enter Value	MMBtu	Hydrogen	Enter Value	kg		N <sub>2</sub>	0.00%	28.020
Electricity	Enter Value	kWh	Steam Co-Product	0	Btu	Steam co-p	O <sub>2</sub>	0.00%	32.000
Electricity Generation Mix*	User Defined Mix		Hydrogen Production Pressure	300	psia		H <sub>2</sub> O	0.00%	18.015
Nitrogen Co-Product	No						CO	0.00%	28.010
CO <sub>2</sub> Capture and Storage	Yes		Sequestered CO <sub>2</sub>	Enter Value	kg		CO <sub>2</sub>	0.00%	44.010
							CH <sub>4</sub>	0.00%	16.040
							NH <sub>3</sub>	0.00%	17.031
							H <sub>2</sub> S	0.00%	34.082
							S	0.00%	32.065
							Ar	0.00%	39.948
							All others	0.00%	0.000
<b>Technology</b>	<b>Value [%]</b>		<b>Technology</b>	<b>Value [%]</b>			<b>Total</b>	<b>100.00%</b>	
Residual oil	Enter Value		Hydroelectric	Enter Value					
Natural gas	Enter Value		Geothermal	Enter Value					
Coal	Enter Value		Wind	Enter Value					
Nuclear power	Enter Value		Solar PV	Enter Value					
Combustion of logging residue	Enter Value		ASCC Mix	Enter Value					
NGCC wCCS	100.00%		<b>Total</b>	<b>100.0%</b>					
NGCC CO <sub>2</sub> Capture & Storage Rate	95.00%								
							<b>Custom Conventional Natural Gas Properties (at norm)</b>		
							Lower Heating Value	983	Btu/ft <sup>3</sup> at r
							Density	22	g/ft <sup>3</sup> at noi
							C ratio (% by wt)	72.4%	(g of Carbo

Figure 3. 45VH2-GREET 2023 Model showing natural gas combined cycle with a specific CCS rate as an allowed specific electricity source.

Additionally, it is likely that most of these power sources would be co-located or directly connected to the hydrogen production facility. Because of this co-location, the Treasury and IRS should allow for the specific emission rate to be verified as part the verification report for the hydrogen production facility. This ensures that the verification of the power generation’s emission rate meets the same verification requirements and standards as the hydrogen production facilities themselves and eliminates any concerns on the inaccuracy of verifying emissions associated with power generation from specific generator types.

As shown, it is equally feasible to verify emission rates for specific power generators as it is for qualified clean hydrogen production facilities. Further, Fidelis recommends the Treasury and IRS adopt the following as part of transitioning generator specific electricity emission factors to foreground data.

**Recommendation 4A: The Treasury and IRS should allow EACs with source specific lifecycle emission factors to be claimed by the qualified clean hydrogen facility. These lifecycle emissions factors would be subject to verification as part of the verification of the qualified clean hydrogen production facility.**

As stated in the NPRM, as part of the clean hydrogen production facility’s verification and attestation, the acquiring and retiring of qualifying EACs for electricity would be subject to verification. This verification should be expanded to also allow for the verification of the lifecycle emission rate for the claimed power through the qualified clean hydrogen facility’s verification.

The required key parameters such as feedstock source, feedstock consumption rate, carbon capture rate, and electricity generating consumption are all verifiable components of a qualified clean hydrogen facility. These parameters are the same as required for the accurate determination of the lifecycle emissions rate for the electric generating source, and as such can be verified with the same rigor to insure high fidelity. Further recommendations on the implementation of this structure are outlined in Fidelis’s supplemental comments.

**Recommendation 5: The Treasury and IRS should transition natural gas transportation distance to foreground data with verification through supply contracts and pipeline transportation distance.**

The upstream transmission of natural gas accounts for approximately 35%<sup>12</sup> of the total GHG emissions of natural gas to the hydrogen plant fence line. As such, the emissions associated with transmission have a substantial impact on the emission rate for the qualified clean hydrogen production facility as shown in Figure 4. Further, the 680-mile basis for the natural gas transportation distance to the hydrogen production facility, which is the basis used for 45VH2-GREET, is based on the 2009 average of natural gas transportation around the U.S. and does not factor in end-use. This makes it a poor basis for the determination of the hydrogen plant carbon intensity for the purposes of the 45V.<sup>13</sup> Additionally, natural gas transportation is inconsistent between end-uses (power generation, hydrogen generation, LNG export, etc.) in the R&D GREET and 45VH2-GREET 2023. For example, while the assumed transportation distance for natural gas is 680 miles to a hydrogen facility, the assumed transportation distance to an electrical generating facility is only 375 miles the GREET models. This means that under the current rules a co-located hydrogen and combine cycle power plant would have different assumed natural gas transportation distances under 45VH2-GREET even though the facilities would share the same natural gas supply and interconnection.

For the same autothermal reformer modeled in Table 1, reducing the natural gas transportation distance to 100 miles would result in the hydrogen emission rate decreasing by > 0.5 kg CO<sub>2</sub>e / kg H<sub>2</sub> and result in a 45V credit generation of \$1.00 / kg H<sub>2</sub>. While increasing the transportation distance to 1250 miles, would reduce the 45V credit generation to \$0.6 / kg H<sub>2</sub> as shown in Figure 4.

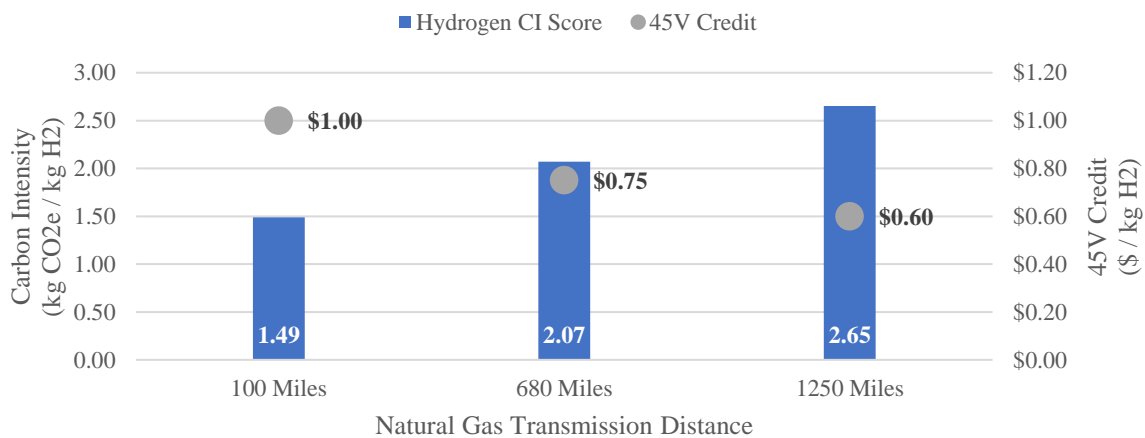


Figure 4. Impact of natural gas transmission distance on hydrogen carbon intensity and 45V credit generation.<sup>14</sup>

<sup>12</sup> R&D GREET1 2023 Model, standard 680 miles of transportation, includes methane leakage from transmission.

<sup>13</sup> Dunn JB, Elgowainy A, Vyas A, et al. *Update to Transportation Parameters in GREET*. Argonne National Laboratory. October 25, 2013. <https://greet.es.anl.gov/publication-transportation-distribution-13>

<sup>14</sup> Modeled in R&D GREET 2023 with default methane leakage rates and AR5 100-year GWP. The 45V credit shown includes multiplier for meeting prevailing wage and apprenticeship requirements.

By locking natural gas transportation distance in as background data, the Treasury and IRS incentivize companies utilizing long shipping distances of natural gas as there is not penalty for the additional energy it takes to transport the natural gas the longer distance or the increased methane emissions that occur over such longer shipping distances. Conversely, it disincentivizes companies from locating their clean hydrogen facilities close to natural gas sources where the natural gas would have less methane leakage and require less transportation energy. Using locked-in transportation distances results in inaccurate emissions calculations and credit generation.

To ensure accurate crediting for clean hydrogen production and judicious spending of taxpayer dollars, the Treasury and IRS should transition natural gas transportation distance to foreground data. This foreground data can be readily verified through reviewing the natural gas supply agreement and a supply map for the natural gas system and should apply to both the hydrogen plant and a co-located or direct connected electricity generating facility.

**Recommendation 6: The Treasury and IRS should provide clarity on the transition of methane leakage for natural gas from background to foreground data by establishing a transition period after which natural gas system specific leakage rates will be based on reporting and compliance within the EPA’s Methane Emission Reduction Program (“MERP”).**

As noted above, the proposed guidance establishing natural gas leakage as background data introduces significant regulatory uncertainty. As seen in Figure 1, updates to the upstream leakage rate can have material impacts on a project’s economics. Further, the taxpayer has no reasonable control or mitigation over these potential updates. This uncertainty prevents timely investment in clean hydrogen infrastructure. In conjunction with the recommendations above to allow for Grandfathering 45VH2-GREET, the Treasury and IRS can provide increased development certainty by establishing clear guidance on the transition of upstream leakage to foreground data and drive emissions reductions. Transitioning methane leakage to foreground data prevents the worst methane “leakers” from generating 45V value at the cost of the American taxpayer. Locking up fugitive methane emissions allows the worst methane “leaker” to sell natural gas with the same emissions factor as the best natural gas operators. This unfairly punishes responsible natural gas operators while rewarding highly emitting operators. To prevent this inaccuracy and ensure judicious spending of taxpayer dollars, the Treasury and IRS should allow for natural gas supply system specific leakage based on reporting and verification under the EPA’s Methane Emission Reduction Program beginning at the end of 2027.

The Methane Emission Reduction Program passed as part of the IRA established new authorities for the U.S. EPA to reduce methane emissions from the oil and gas sector notably implementing a fee on methane emissions, referred to as the Waste Emissions Charge (“WEC”).<sup>15</sup> The fee for WEC in 2024 is \$900 dollars per metric ton of methane increasing to \$1,200 in 2025 and by \$1,500 per metric of methane in 2026 onwards. The WEC establishes an industry segment-specific methane intensity and threshold for each segment of the natural gas supply chain for onshore and offshore with methane emissions above this threshold triggering the WEC fee. The WEC fees are determined based on emission reporting under the GHGRP part 98 subpart W and C based on the segment specific thresholds, and the emissions and fee or exemptions are subject

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<sup>15</sup> <https://www.epa.gov/inflation-reduction-act/methane-emissions-reduction-program>

to EPA verification. As such, Treasury should recognize the efforts of the EPA to create a rigorous measurement, monitoring, and reporting program through its GHG Reporting Program Subparts W and C and should recognize the enhancements of the EPA GHGRP for Oil & Gas and implementation of the NSPS OOOO B/C regulations.<sup>16</sup> In the next 2 to 3 years, these programs will result in significant reductions in methane emissions and increase the rigor of accounting and validation of those emissions. This rigorous measurement, monitoring, and reporting and penalty program developed through the MERP establishes the required accuracy and verifiability of the upstream leakage to allow for natural gas methane leakage to be foreground data in the 45VH2-GREET model.

Further, systems with performance that achieve methane reductions below the threshold for the WEC, as determined through reporting under 40 CFR part 98 and 99, should be allowed to use the methane leakage factor determined under reporting to the GHGRP for the system under 45VH2-GREET. This methane leakage factor as determined in reporting for the prior year would be verified as part of the verification report for the clean hydrogen production facility.

To maximize the emission reduction potential of the 45V PTC and ensure that emission rate determined for 45V accurately reflect the specific facility emissions, the Treasury and IRS should establish a transition at the end of 2027 to natural gas supply system specific leakage allowing EPA's regulatory programs to be fully implemented thereby giving the certainty of the fidelity of effectiveness and verifiability of the data. This transition timeline would mirror the transition to hourly matching for qualifying EACS based on the expected timeline for the broader adoption of EAC systems with hourly matching capabilities.

*Comments addressing appropriate indicators of project readiness for request for emission value from the Department of Energy as part of a provisional emission rate.*

The provisional emission rate determination process is critical to the implementation of novel hydrogen production technologies and pathways that will enable further deployment of clean hydrogen at lower carbon intensities and costs. Requiring the completion of FEED study or similar indicator to demonstrate "significant commercial interest" departs from the legislative intent of the Clean Hydrogen Production Credit and creates a "chicken or egg" paradox. It is likely that the ability to secure financing or investment from counterparties will be based on having a DOE emission value determination which itself requires significant investment to apply for under the proposed guidance. This will inhibit the commercialization of novel production technologies, especially by smaller companies. However, it is reasonable to establish some thresholds for project maturity to file for a provisional emission rate determination to prevent trivial applications for uneconomical and technologically infeasible projects. To support the development of novel production pathways, while safeguarding against trivial provisional emission rate determination applications, Fidelis recommends the following as an indicator of project readiness for which a provisional emission rate application can proceed.

**7. The Treasury and IRS should allow for an Association for the Advancement of Cost Engineering ("ACE") Class IV cost estimate and supporting estimate basis**

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<sup>16</sup> 40 C.F.R Part 60



**to demonstrate project readiness for the purpose of applying for an emission value determination with the DOE.**

AACE Class IV cost estimates are industry standard for evaluating project feasibility and represent a well-defined standard to baseline project readiness. These cost estimates and supporting documentation enable the DOE to rapidly review the feasibility of hydrogen production on the basis of technological feasibility, carbon intensity, and economics.

Unlike a FEED study that has no single industry agreed upon requirements, the AACE Classification system and Class IV estimate has pre-defined maturity levels for key engineering deliverables. Class IV estimates and the defined required supporting documentation provide sufficient evidence to determine the project's economic feasibility and product carbon intensity. As defined in the AACE 24R-97,<sup>17</sup> the general supporting documentation for a Class IV estimate includes,

- General Project Data – Project Description, Plant Capacity, Location, and other documentation.
- Engineering Deliverables - Block Flow Diagrams, Plot Plans, Process Flow Diagrams, Utility Flow Diagrams, Heat and Material Balances, and other documentation

Class IV cost estimates and supporting documentation also minimize excess engineering development that is required for most FEED studies, which add significant developmental costs without improving certainty on anticipated carbon intensity. Furthermore, a FEED study would not significantly increase project economic certainty, despite being very expensive to conduct. Typical industry rule of thumb for the cost of a FEED study as a percentage of total installed cost is 1 to 3% for large capital facilities, like most hydrogen production facilities. Using this industry rule of thumb, the FEED study cost for a project with a total installed cost between 750 and 1,250 million dollars could range anywhere from 10 to 30+ million dollars, imposing significant cost barriers for small technology companies working to commercialize novel production pathways. Facilities filling with a PER, with an emission value determination from the DOE, will submit the verification report with annual operating data alongside the emission value determination. Therefore, there is no risk that utilizing either a FEED study or Class IV estimate will result in credit generation that is not verifiable.

To support the development of novel hydrogen production pathways and projects that will reduce greenhouse gases and reduce the cost of clean hydrogen production while generating American jobs, the Treasury, IRS, and DOE should consider an AACE Class IV cost estimate and its supporting documents sufficient to demonstrate project readiness for an emission value determination application with the DOE.

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<sup>17</sup> AACE 2020 (18R-97) Cost Estimate Classification System – As Applied in Engineering, Procurement and Construction for Process Industries. <https://www.pathlms.com/aace/courses/2928/documents/3803#>



Thank you for the opportunity to submit these comments. We welcome the opportunity to meet with the Treasury Department and the IRS to discuss these issues in greater detail and to answer any questions that you may have.

Respectfully submitted,

Fidelis New Energy, LLC