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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

Submitted via Regulations.gov

Re: Comments under REG – 117631-23 Pertaining to the Section 45V Credit for Production of Clean Hydrogen

Thank you for the opportunity to comment regarding the Notice of Proposed Rulemaking (REG-117631-23[1]) ("Proposed Regulations") relating to Internal Revenue Code[2] Section 45V, credit for production of clean hydrogen ("45V Credit"), as established by the Inflation Reduction Act of 2022 ("IRA")[3].

Background

CNX Resources Corporation ("CNX") is a premier, low-carbon intensive natural gas development, production, midstream, and technology company with primary operations within Pennsylvania, West Virginia, Ohio, Kentucky, and southwest Virginia that develops and operates methane capture systems to collect and utilize fugitive methane emitted from sources, such as active and abandoned mines. In addition, CNX develops proprietary, innovative technologies that produce ultra-low carbon natural gas and other derivative products for beneficial use, including for the production of clean hydrogen with a lower carbon intensity ("CI").

CNX is uniquely qualified to provide insight on Coal Mine Methane ("CMM") capture for productive use projects as it has successfully developed projects in the past and has evaluated many opportunities for new, future projects. CNX has worked through a rigorous vetting and diligence process with a wide stakeholder group to identify the challenges facing CMM capture projects. Such stakeholders included operators, service providers, carbon market professionals, low carbon gas users, life cycle assessment professionals, state agencies, the Global Methane Initiative ("GMI"), the United States Environmental Protection Agency's ("EPA") Coalbed Methane Outreach Program ("CMOP"), and the United States Department of Energy ("DOE"). Unfortunately, as of today, there is no clear economic incentive to capture CMM for productive use. However, the 45V Credit for production of clean hydrogen could prove to be such an incentive, if the implementation of this policy aligns with the goals of reducing emissions, creating jobs, and kickstarting the clean hydrogen economy.

[1] Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, 88 Fed. Reg. 89,220 (proposed Dec. 26, 2023)(to be codified at 26 C.F.R. pt 1).
[2] Unless otherwise indicated, all textual references to "section" herein are to sections of the Internal Revenue Code of 1986, as amended (the "Code").
[3] Pub. L. 117-169, 136 Stat. 1936, 1938, 1939 (2022).

CNX employs 470 personnel and supports numerous local companies within its contractor base who work and live within our operational footprint in the Appalachian basin. Our region has suffered severe employment and economic consequences from the energy transition, but CNX believes that Appalachia can be a launchpad to a more efficient and sustainable future. Fortunately for the region and the Biden Administration's decarbonization goals, the 45V Credit has the potential to tip the economic scale and change the perception of the climate transition across Appalachia by utilizing an abundant resource within our region to help achieve such decarbonization goals. A clean hydrogen economy that utilizes low CI natural gas will help generate jobs and robust economic activity in disadvantaged energy communities, improve air quality, decrease carbon emissions, encourage partnerships with labor organizations, strengthen our existing regional supply chain, and generate new tax revenues in the energy communities most impacted by the new energy economy.

Methane represents approximately 10 percent of human caused anthropogenic greenhouse gas ("GHG") emissions and accounts for approximately 20 percent of total global GHGs.[4] Methane emissions reduction plays a key role in our national strategy to meet climate goals. CMM, a major source of fugitive methane emissions, represents eight percent of U.S. methane emissions.[5] Mine operators are obligated to degasify mining operations to comply with federal requirements governing safety. Inactive and abandoned mines continue to liberate CMM to atmosphere decades after mining operations have ceased at the location. CMM is frequently an overlooked potential source of energy and is abundant across the Appalachian region. CMM is a by-product of the coal mining process that is necessarily liberated and generally vented from active underground mines and abandoned or closed mines, leading to an environmental challenge without a current economic incentive to reduce emissions. The 45V Credit can drive the necessary innovation and investment in capturing fugitive CMM emissions. Specifically, the capture and the productive use of CMM to produce ultra-low carbon natural gas to be used in the production of clean hydrogen will significantly decrease the CI of hydrogen projects.

One key limiting factor associated with deploying wide scale CMM capture systems is that such investments, absent a government subsidy or market demand side premiums, are often uneconomical. CMM capture systems involve significant up-front capital expenditures, including, but not limited to, the installation of new gathering and transmission pipeline across long distances, processing stations, compression facilities, and measurement/telemetry facilities, along with interconnections to existing interstate pipeline systems. In addition, ongoing active mining operations are constantly expanding, which requires the deployment of new and ongoing capture infrastructure. Furthermore, there are significant operational expenses with operating CMM capture systems, including the transportation and processing of gas, and increasing costs of parts and supplies associated with the capture of CMM for productive use. Due to the significant capital and operational expenses required, combined with the dearth of tax credits or other economic incentives for CMM, many investors and developers cannot justify investing in such projects.

In addition to broad-based environmental benefits underpinning the Biden Administration's decarbonization goals, the 45V Credit has the potential to drive innovation and significant investment in the capturing, processing, and utilization of fugitive CMM emissions. Captured CMM provides an ultra-low

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[4] Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019 (Apr. 2021). https://www.epa.gov/ghgemissions/inventory-usgreenhouse-gas-emissions-and-sinks-1990-2019.; *see also* Environmental Protection Agency, Coal Mine Methane Finance Guide, July 2019. https://www.epa.gov/sites/default/files/2016-04/documents/cmop_finance_guide_march_2016_revision.pdf.

[5] U.S. Environmental Protection Agency (2023) Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021. EPA 430-R-23-002. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2021

CI feedstock option for clean hydrogen production, especially within the Appalachia region where CMM is most prevalent, and significantly decreases the carbon intensity of hydrogen projects. The emerging clean hydrogen economy also provides a valuable opportunity to scale coal mine methane capture operations for use in producing other low CI fuels, such as ammonia and sustainable aviation fuel. Therefore, the 45V Credit could prove to be a consequential economic catalyst across an array of critical goals including decarbonizing the mining industry and steel supply chains, mitigating a significant source of GHG emissions, increasing production of clean hydrogen, and providing substantial job creation in local communities most impacted by the energy transition.

The Internal Revenue Service (the "IRS") and the United States Department of Treasury (the "Treasury") intend to provide rules addressing hydrogen production pathways that use renewable natural gas ("RNG") or other fugitive sources of methane, including CMM, for purposes of the 45V Credit. The IRS and the Treasury requested comments on several key rules relevant to our business and industry with respect to the 45V Credit as such rules, if not modified or clarified, will dictate investment decisions for hydrogen production facilities. **Accordingly, CNX submits the following comments on the Proposed Regulations:**

I. Align the final regulations with the statutory language and congressional intent of the 45V Credit by revising the 45VH2-GREET Model (defined below) to include the feedstocks and technologies recognized by the R&D GREET Model (defined below) and to incorporate the R&D GREET Model's methodology for measuring lifecycle GHG emissions, including methane emissions avoidance accounting into the 45VH2-GREET Model.

II. Eliminate the first productive use and incrementality requirements as such requirements relate to the production of clean hydrogen with ultra-low carbon natural gas from CMM.

III. If the IRS and the Treasury determine that the first productive use requirements are applicable, then the final regulations should define the CMM source as an individual borehole or ventilation shaft.

IV. Adopt reasonable waste production anti-abuse rules with examples to mitigate waste causality. The IRS and the Treasury should not "freeze" or disallow CMM waste streams that existed on or before the enactment of the IRA as reported to the greenhouse gas reporting program ("GHGRP"). Alternatively, the IRS and the Treasury should (i) provide that qualifying sources include mines that had Mine Safety and Health Administration ("MSHA") IDs prior to January 1, 2023, or (ii) follow European and Asian market waste product registration methodologies.

V. Clarify that the R&D GREET Model can be used as evidence when requesting a PER.

VI. Exclude geographic and temporal matching requirements as such requirements relate to the use of ultra-low carbon natural gas for producing clean hydrogen. Furthermore, adopt verification requirements under the existing RFS (defined below) and LCFS (defined below) programs, and permit the use of existing book-and-claim systems, such as M-RETS, for tracking purposes.

VII. Implement the functionalities of the R&D GREET Model into the 45VH2-GREET Model, which will allow proper accounting of various process emissions, such as methane leakage.

Please be advised that our stated positions on these topics is further supported by a broad and diverse group of trade organizations and individual companies who have also submitted comment letters, such as

the Waste Gas Capture Initiative[6], Allegheny Conference on Community Development[7], Allegheny-Fayette Central Labor Council[8], Appalachian Clean Hydrogen Hub (ARCH2), Pittsburgh Regional Building and Construction Trades Council[9], Allegheny County Airport Authority (Pittsburgh International Airport), HYCO1[10], and Anew Climate, among others. Please see below for a detailed summary of each comment.

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The Creation of the 45VH2-GREET Model Deviates from Congressional Intent

The 45V Credit is a federal income tax credit for the production of qualified clean hydrogen.[11] Qualified clean hydrogen is defined as hydrogen (i) with a lifecycle GHG emissions rate of not more than four kilograms of carbon dioxide equivalent ("CO2e")/kilogram of hydrogen, (ii) produced (A) in the United States (or a United States territory), (B) in the ordinary course of a trade or business of the taxpayer, and (C) for sale or use, and (iii) the production and sale or use of such hydrogen must be verified by an unrelated third party.[12]

Lifecycle GHG emissions has the same meaning given such term under section 211(o)(1)(H) of the Clean Air Act.[13] The 45V Credit defines the term "lifecycle greenhouse gas emissions" to mean the aggregate lifecycle GHG emissions related to hydrogen produced at a hydrogen production facility during the taxable year through the point of production (i.e., well-to-gate), as determined using the most recent Greenhouse gases, Regulated Emissions, and Energy use in Technologies ("GREET") model, or a successor model.[14] We are concerned, however, that the Proposed Regulation exceeded the congressional intent underlying section 45V by prescribing a new GREET model, in the form of 45VH2-GREET ("45VH2-GREET Model"), that is specifically tailored to apply to the 45V Credit rather than utilizing the existing GREET model in place at the time the IRA was enacted.

The Proposed Regulations provided that the term "most recent GREET model" means the latest version of 45VH2-GREET developed by Argonne National Laboratory ("ANL") that is publicly available on the first day of the taxpayer's taxable year in which the qualified clean hydrogen for which the taxpayer is claiming the 45V Credit was produced.[15] The IRS and the Treasury added that "after consultation with the DOE, the Treasury and the IRS believe that the use of the latest version of the 45VH2-GREET Model would be appropriate because it is tailored to the administration of [section 45V] and includes features that make it easy to use for taxpayers." Furthermore, the IRS and the Treasury believe that "[u]se of the latest version of 45VH2–GREET would also ensure that the pathways and approaches provided for determining well-to-

[6] Comment ID: IRS–2023–0066-6254
[7] Comment ID: IRS-2023-066-17233
[8] Comment ID: IRS-2023-066-17234
[9] Comment ID: IRS-2023-066-17235
[10] Comment ID: IRS-2023-0066-22001
[11] Code section 45V(a)(1).
[12] Code section 45V(c)(2)(A) and (B); *see also* Prop. Treas. Reg. §§ 1.45V-1(a)(9) and 1.45V-5.
[13] 42 U.S.C. 7545(o)(1).
[14] Code section 45V(c)(1)(B); *see also* Prop. Treas. Reg. § 1.45V-1(a)(8)(iii).
[15] Prop. Treas. Reg. § 1.45V-1(a)(8)(ii).

gate emissions for various hydrogen production processes are of sufficient methodological certainty to be appropriate for determining eligibility of tax credits."[16]

Under section 45V(f), Congress authorized the Treasury to "issue regulations or other guidance to carry out the purposes of [section 45V], including regulations or other guidance for determining lifecycle greenhouse gas emissions."[17] The Secretary's authority, however, is limited by the statutory text and structure, and it can only be used "to carry out the purposes of" section 45V.[18] Congress did not authorize the Secretary to introduce a new GREET model and associated qualification requirements, as such requirements are contrary to the plain language of section 45V.[19] The Treasury is limited to the powers conferred upon it by Congress and such authority is expressly limited by the statutory text and structure.[20]

Further evidence of Congressional intent came from eleven members of the United States Senate. On November 6, 2023 the United States Senate wrote to Secretary Yellen, Secretary Granholm, and Mr. John Podesta to ensure that the Proposed Regulations for the 45V Credit are consistent with their "**intent to provide a robust and flexible incentive that will catalyze and quickly scale a domestic hydrogen economy** (emphasis added)".[21] The Senators expressed their hope that the IRS and the Treasury would avoid evolving and complex eligibility criteria – such as the overly stringent additionality [i.e., incrementality], deliverability, and time matching [i.e., temporal matching] requirements.[22] The Senators further stated, "45V was intended to be technology-agnostic and clearly states that GHG lifecycle assessments ("LCA") should be determined using the well-established GREET model through the point of production. While the 45V Credit allows for "a successor model (as determined by the Secretary)," this additional flexibility was included as a safeguard in the unlikely event the GREET model was no longer available at some future date and should not be interpreted as license to create a new LCA model or additional regulatory prescriptions."[23]

The IRA directed the use of the former GREET model, which is now referred to as the R&D GREET model ("R&D GREET Model"), and it did not authorize Treasury to create a new model that limits the functionality and methodology of the existing R&D GREET Model. A policy version of the GREET model that contradicts the R&D GREET Model introduces biases that jeopardize the scientific objectivity, which was intended to be technology and feedstock neutral. While the 45VH2-GREET Model is targeted to section 45V, any proper "successor" model should have at least the same scope as the R&D GREET Model. In addition, the R&D GREET Model, for the first time since its creation in 1995, contains new cautionary statements and disclaimers to pathways and methodologies with an extensive history of upholding scientific standards. The creation of the new variant of a GREET model "tailored to the administration of the section 45V, tax credit,"[24] which supersedes the established R&D GREET Model, was not authorized by the statute and runs contrary to the legislative intent underlying section 45V, as exemplified here by the

[16] 88 Fed. Reg. 89, 2020 at 89,223.
[17] Code section 45V(f); *see also* Code section 45V(e)(5).
[18] Code section 45V(f).
[19] *See, e.g., Ethyl Corp. v. EPA*, 51 F.3d 1053, 1058–60 (D.C. Cir. 1995) (holding agency "acted contrary to the plain language of" the statue when it based its decision on criteria not included in the statute).
[20] *Mozilla Corp. v. FCC*, 940 F.3d 1, 74 (D.C. Cir. 2019).
[21] United States Senate, Letter Re: Implementation of the Section 45V Clean Hydrogen Production Tax Credit, November 6, 2023. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://subscriber.politicopro.com/f/?id=0000018b-ab2e-d7df-abbb-ef6fb5ca0000.
[22] *Id.*
[23] *Id.*
[24] 88 Fed. Reg. 89, 2020 at 89,223.

letter[25] written by Senator Thomas R. Carper, Chairman of the United States Senate Committee on Environment and Public Works, to Secretaries Yellen and Granholm and Mr. Podesta. In 2021, Senator Carper authored and led the Senate Finance Committee's consideration of the Clean H2 Production Act (S. 1807), which served as the basis for the 45V Credit. He notes in the letter that "Section 13204 of the IRA directs the Secretary to use a well-established greenhouse gas lifecycle assessment model (GREET) through the point of production with flexibility for use of a successor model, **but not the direction to create a new model"** (emphasis added).[26] The introduction of the new 45VH2-GREET Model clearly oversteps the spirit and intent of the legislation.

Based on the statutory language and further support from the Senators who authored the 45V Credit, the IRS and the Treasury should incorporate the feedstocks and technologies recognized by the R&D GREET Model and such model's methodology for measuring lifecycle GHG emissions in the 45VH2-GREET Model as intended by Congress for purposes of computing the emissions rate of lifecycle GHG emissions for the production of clean hydrogen under section 45V. Therefore, CNX respectfully requests the IRS and the Treasury incorporate the R&D GREET Model's methodology for measuring lifecycle GHG emissions, including available feedstocks and methane emissions avoidance accounting, as described in more detail below.

The Differentiation Between the R&D GREET Model and 45VH2-GREET Model Jeopardizes Fugitive Methane & RNG Project Viability

The IRS and the Treasury seek comments on the appropriate lifecycle analysis considerations associated with specific fugitive methane sources, such as counterfactual scenarios, to account for direct and significant indirect emissions, and the manner in which to assess methane from these sources if the current practice is flaring. Specifically, the IRS and the Treasury requested comments on the following:

"(11) What counterfactual assumptions and data should be used to address the lifecycle GHG emissions of hydrogen production pathways that rely on RNG? Is venting an appropriate counterfactual assumption for some pathways? If not, what other factors should be considered?"[27]

CNX kindly asks the IRS and the Treasury to clarify that the R&D GREET Model is the appropriate model for measuring lifecycle GHG emissions because the GREET Model has been the gold standard for independent LCA of processes, including methane emissions avoidance activities, for decades. The former ANL GREET Model, now R&D GREET Model, is based on science, relies upon the deep technical expertise of ANL staff, and used a robust, LCA-based approach as the foundation for the implementation of the 45V Credit. CNX appreciates the work that ANL has done to include CMM to hydrogen production as a pathway within their model. Accordingly, CNX recommends that the IRS and the Treasury validate the long-standing measures in the R&D GREET Model, such as methane avoidance accounting for various feedstocks, within the 45VH2-GREET Model.

In December of 2023, ANL published a summary of their LCA, which recognized methane venting as the counterfactual baseline scenario for CMM. It is of particular importance to the CMM pathway that a scientific and fair process be implemented to allow pathways currently within the R&D GREET Model to

[25] Senator Carper Letter regarding implementation of the IRC section 45V credit, November 9, 2023. https://www.epw.senate.gov/public/index.cfm/2023/11/carper-urges-effective-implementation-of-the-inflation-reduction-act-s-clean-hydrogen-tax-credit.

[26] *Id.*

[27] 88 Fed. Reg. 89, 2020 at 89,240.

be included in the 45VH2-GREET Model and acknowledge methane venting to atmosphere as the counterfactual scenario in emissions avoidance accounting for CMM capture projects. If instead, the most negative score for CMM is zero, and the counterfactual scenario is assumed to be flaring, no new CMM capture projects will be developed, as the costs associated with new capture projects will outweigh the benefits of the 45V Credit available to projects using CMM.

Given the IRS's and the Treasury's intention to separate the 45VH2-GREET Model from the R&D GREET Model, the following key takeaways from the ANL analysis[28] of CMM are equally applicable to the 45V Credit and should be incorporated into the 45VH2 GREET Model:

a. There is no legal requirement to destroy the CMM that must be liberated for health and safety.
b. Unlike oil and natural gas wells, CMM sources are not governed by EPA 40 Code Federal Regulations, Part 60, Subpart OOOO, or Section 60113 of the IRA (Methane Emissions Reduction Program).
c. Current CMM destruction activities are entirely voluntary and primarily motivated by the valuation of GHG emission reductions in carbon markets.
d. EPA acknowledges that "the recovery and use of CMM are considered emissions avoidance."[29]
e. Capture of CMM for productive use is decreasing.[30]
f. The observed increase in flaring projects is not material due to small volumes and low adoption rate (less than three percent by volume[31], and less than one percent by number of mines).[32]
g. Analysis supports 100 percent of CMM would be released in the counterfactual scenario.[33]
h. CMM emissions in EPA's GHGRP exclude abandoned mines. GEM estimates active mine CMM emissions are two to three times higher than GHGRP.[34]
i. CMM emissions are expected to increase by eight times over this century.[35]
j. CMM captured for productive use can help the United States decarbonize and meet GHG reduction targets.[36]

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[28] Argonne National Laboratory, Summary of Expansions and Updates in R&D GREET 2023 (December 2023). https://greet.es.anl.gov/files/greet-2023-summary.

[29] U.S. Environmental Protection Agency, Coalbed Methane Outreach Program (accessed February 24, 2024). https://www.epa.gov/cmop/about-coal-mine-methane.

[30] Cote', M. Climate and Clean Air Coalition, Global Methane, Climate and Clean Air Forum, Methane Mitigation in Action: Opportunity for CMM in India and Other Countries (September 28, 2022). https://www.youtube.com/watch?v=lVNdd1t7xps.

[31] U.S. Environmental Protection Agency (2023) Underground Coal Mines. Greenhouse Gas Reporting Program (GHGRP), Office of Atmospheric Protection. https://enviro.epa.gov/query-builder/ghg.

[32] U.S. Energy Information Administration (2023) Annual Coal Report 2022. https://www.eia.gov/coal/annual/pdf/acr.pdf; *see also* Mine Safety and Health Administration (2023) Mine Employment and Coal Production. U.S. Department of Labor. https://www.msha.gov/data-and-reports/statistics/mine-employment-and-coal-production.

[33] Mucho, T. P., Diamond, W. P., Garcia, F., Byars, J. D., Cario, S. L. (2000). Implications of Recent NIOSH Tracer Gas Studies on Bleeder and Gob Gas Ventilation Design. 2000 SME Annual Meeting, Salt Lake City, Utah, February 28 - March 1, 2000. Littleton, CO: Society for Mining, Metallurgy, and Exploration, Inc., Preprint 00-08, 1-17. https://stacks.cdc.gov/view/cdc/9025; *see also* Schatzel, S. J., Krog, R. B., Dougherty, H. (2017). Methane emissions and airflow patterns on a longwall face: Potential influences from longwall gob permeability distributions on a bleederless longwall. Transactions of Society for Mining, Metallurgy, and Exploration, 342(1), 51–61. http://transactions.smenet.org/abstract.cfm?articleID=8108&page=51.

[34] Global Energy Monitor, Global Coal Mine Tracker, October 2023 release

[35] Kholod, N., Evans, M., Pilcher, R., et al. (February 2020). Global methane emissions from coal mining to continue growing even with declining coal production. Journal of Cleaner Production, 256. https://www.globalmethane.org/documents/Global_Methane_Emissions_from_Coal_Mining.pdf.

[36] California Air Resources Board (2013) The Mine Methane Capture Protocol and Mining Economics. https://www.arb.ca.gov/regact/2013/capandtrade13/1mmcecon.pdf.

The introduction of the differences between the 45VH2-GREET Model and the R&D GREET Model opens new questions as to how these differences will be reconciled. Omitting methane avoidance accounting from the 45VH2-GREET Model, and the resultant lifecycle GHG emissions determinations, is prohibitive to the productive use of waste methane and would make the only federal policy providing economic justification to capture CMM inaccessible.

John Kerry, the United States Special Presidential Envoy for Climate spoke about CMM as a portion of methane emissions while participating in a July 13, 2023 hearing before the House Foreign Affairs Committee, Oversight Subcommittee entitled: *The State Department's Climate Agenda: A Budget Overview by the Special Presidential Envoy for Climate*. In addition, Mr. Kerry has made a variety of statements on methane's impact on global warming and how CMM capture will help make significant strides in combatting global warming. Specifically, Mr. Kerry has made the following statements:

i. *"We also think [methane]'s the easiest, quickest, fastest, cheapest way to begin to get gains against the warming. So, there'll be a major focus on methane." (COP28 Briefing, 2023)*
ii. *"There is a new global consensus on the need for methane action, and the need to bring it from the bottom of the global climate agenda to the top." (Remarks at the Global Methane Forum, 2022)*
iii. *"We are catalyzing methane action in each of the key methane emitting sectors – energy, agriculture, and waste. The methane challenge does not stop at oil and gas." (Remarks at the Global Methane Forum, 2022)*
iv. *"But while we consider the long-term, we must also sprint to do what we can today and tomorrow to limit temperature and emissions now, in this decade. It's called "fast mitigation," a series of emergency brakes we can apply to prevent warming immediately: we need to tackle methane." (Speech at the American University Cairo, 2022)*
v. *"If you can capture the [methane] emissions — literally, genuinely — then you're reducing the problem." (Interview with Bloomberg Television, 2022)*

Full Recognition of the CI of Low CI Gases Must Be Allowed

Some environmental justice groups have presented arguments to limit CI scores on low CI gases to zero, based on the intention to disallow steam methane reforming ("SMR") and auto thermal reforming ("ATR") facilities from qualifying for the maximum $3/kg 45V Credit. These arguments focus on the blend ratio of low CI gas with traditional fossil natural gas. Blending fugitive methane emissions, such as RNG and CMM, with traditional fossil natural gas is necessary because these sources are dispersed in nature, and not of a significant enough volume within a given capture project to justify the construction of hydrogen production facilities. Particularly as it applies to CMM, mine locations are often long-distances from population centers where a hydrogen demand exists, and CMM sources need to leverage traditional gas infrastructure to be transported to the market. Flaring adoption is only three percent of reported CMM volume to GHGRP. In fact, 99 percent of mines in the United States have no form of CMM capture. Accordingly, if emissions avoidance accounting is not recognized for CMM, then there will be no economic justification to invest in new CMM capture projects for clean hydrogen production. As the adoption of CMM capture for productive use projects increases, or regulatory requirements change, the reference case and associated methane avoidance percentages would follow regular updates, as is common practice for ANL. Therefore, the IRS and the Treasury should incorporate the emissions avoidance accounting methodology, as it is currently used in the R&D GREET Model, into the 45VH2-GREET Model.

Other Recognition for Methane Emissions Avoidance Accounting

In addition to contradicting the Special Presidential Envoy for Climate's direction, removing incentives for CMM capture and productive use through emissions avoidance accounting would also contradict direction from the International Energy Agency ("IEA"). The IEA issued a report in 2023, "Driving Down Coal Mine Methane Emissions: A Regulatory Roadmap and Toolkit"[37], where it has clearly stated the challenges and IEA's support of providing government incentives to support CMM capture projects. Specifically, the IEA said, "Policy and regulation are needed to encourage companies to reduce methane emissions from coal mines. Methane emissions cause harm not only to the climate but also to crops, the health of communities, the safety of mining operations and to energy security. Policy makers should not assume that the industry has the right incentives to undertake voluntary action sufficient to address its methane emissions. While the industry may take action on its own, most mitigation opportunities are not cost-effective without pricing externalities. In such cases, policy and regulation can be used to change company incentives. Sound strategies will be needed to overcome the technical, institutional, and economic barriers to coal mine methane reduction. This includes promoting best industry practice to monitor and manage emissions, facilitating access to energy markets and establishing the right mix of carrots and sticks to drive CMM mitigation. Voluntary industry initiatives can complement and broaden these policy efforts."[38]

Emissions avoidance accounting has been well recognized and utilized for decades by lifecycle assessment professionals. According to International Organization for Standardization ("ISO") 14044:2006, "Environmental management — Life cycle assessment — Requirements and guidelines", LCA is primarily used for "identifying opportunities to improve the environmental performance of products at various points in their life cycle", and "informing decision-makers in industry, government or non-government organizations".[39] For example, ISO 14044[40] requires a "reference system" under Section 4.4 life cycle impact assessment. A reference system is used to illustrate the alternative fate and consequences of different production systems.

The Renewable Fuel Standard ("RFS") and the California Low Carbon Fuel Standards ("LCFS") have established similar baseline and default reference systems. As it applies to hydrogen production, the "reference system" is fossil natural gas extracted from drilled wells and converted to hydrogen without carbon capture sequestration ("CCS"). As it applies to CMM, the reference case is methane being vented to atmosphere, causing a global warming impact. ISO 14067:2018, as utilized for LCFS and RFS, specifically states "Fossil GHG emissions and removals shall be included in the carbon footprint of a product ('CFP') or the partial CFP and documented separately as a net result. Biogenic GHG emissions and removals shall be included in the CFP or the partial CFP and should each be expressed separately."[41]

Furthermore, the World Business Council for Sustainable Development recently released Guidance on Avoided Emissions[42], utilizing methane avoidance crediting accounting. In addition, at an international scale, European and Asian markets recognize the methane avoidance life cycle assessment accounting through the Renewable Energy Directive's methodology, implemented by certification

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[37] International Energy Agency, Driving Down Coal Mine Methane Emissions: A Regulatory Roadmap and Toolkit (February 2023). https://iea.blob.core.windows.net/assets/ab2115cd-2b04-4e66-9a71-ec2c14d13acf/DrivingDownCoalMineMethaneEmissions.pdf.
[38] *Id.*
[39] International Organization for Standardization, ISO Standard 14044:2006 (2022). https://www.iso.org/standard/38498.html.
[40] *Id.*
[41] International Organization for Standardization, ISO Standard 14067:2018 (2018). https://www.iso.org/standard/71206.html.
[42] World Business council for Sustainable Development, 2023

standards, such as the International Sustainability and Carbon Certification ("ISCC"). Furthermore, the European Union ("EU") implemented rules governing the methodology for assessing GHG emissions savings are further detailed in Commission Delegated Regulation (EU) 2023/1185 of 10 February 2023 supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council. By harmonizing with the European Union and other global actors on the treatment of methane, the United States will be better positioned to incentivize mitigation and reduce the risk of incompatible accounting and certification practices.

Emissions avoidance accounting is a core aspect inherent to LCA science and is critical to driving investments in waste methane capture to reduce emissions. The use of LCA-based carbon intensities in energy policy should follow the same principles and incentivize processes and products that contribute to reducing GHG emissions and such emissions impact on climate change. Implementing guidance for the 45V Credit in a way that would disregard emissions reduction innovation is in direct contradiction to the objectives of the IRA and the Biden Administration's decarbonization goals, which the Biden Administration has mandated to include emissions reductions. By not including emissions avoidance accounting in the 45VH2-GREET Model, the IRS and the Treasury have inherently created blind spots that will squander the best opportunities to mitigate environmental issues, such as fugitive methane and impacts to global warming. Accordingly, blending CMM with fossil natural gas will significantly reduce the CI of the hydrogen produced over the taxable year, which will result in significant climate benefits.

In conclusion, the IRS and the Treasury should encourage emissions avoidance accounting as it will accelerate investments in capturing harmful methane pollution and conversion to clean hydrogen production. Therefore, as stated previously, CNX requests that the IRS and the Treasury incorporate the functionalities and methodologies of the R&D GREET Model into the 45VH2-GREET Model for implementation of the 45V Credit. The IRS and the Treasury should work swiftly with the DOE to update the 45VH2-GREET Model to ensure that feedstocks with methane avoidance are verified and included for use in the subsequent model.

Use of the R&D GREET Model's Functionalities and Methodologies for the 45V Credit would be Consistent with the Clean Regional Hydrogen Hubs Requirements

As part of the Bipartisan Infrastructure Law, the Department of Energy ("DOE") announced $7 billion in funding to launch seven Regional Clean Hydrogen Hubs ("H2Hubs") across the United States and accelerate the commercial-scale deployment of low-cost, clean hydrogen. The H2Hubs will kickstart a national network of clean hydrogen producers, consumers, and connective infrastructure while supporting the production, storage, delivery, and end-use of clean hydrogen.[43] One selected project particularly relevant to the Appalachian region is the Appalachian Regional Clean Hydrogen Hub ("ARCH2"), which will leverage the region's ample access to low-cost natural gas to produce low-cost clean hydrogen and permanently store the associated carbon emissions, and of which CNX is a participant with an anchor project within the hub. ARCH2 was selected to advance within DOE's portfolio of seven hubs to diversify domestic hydrogen production and to provide a just economic benefit to some of the most impoverished regions in the nation.

In preparing for the DOE's funding opportunity announcement ("FOA"), the H2Hubs were encouraged to use the GREET 1 Series (fuel cycle) Model (i.e., the predecessor version of the R&D GREET

[43] U.S. Department of Energy, Biden-Harris Administration Announces $7 Billion for America's First Clean Hydrogen Hubs, Driving Clean Manufacturing and Delivering New Economic Opportunities Nationwide, October 13, 2023. https://www.energy.gov/articles/biden-harris-administration-announces-7-billion-americas-first-clean-hydrogen-hubs-drivin

Model before such model was renamed in December 2023) for completing their LCA .[44] The DOE stated it "will use GREET [1 Series] to consistently evaluate the well-to-gate CI and criteria air pollutant emissions estimated by the applicant for hydrogen production within each H2Hub."[45] The DOE further elaborated that the definition of "well-to-gate" and "lifecycle" are consistent with such terms in section 45V.[46] In addition, the FOA provided applicants with guidance on computing their upstream emission sources.[47] The H2Hubs were additionally encouraged to exercise best practices that mitigate fugitive emissions associated with fossil fuel extraction and delivery to their H2Hubs to the extent feasible.[48] The DOE acknowledged that feasible best practices would vary across H2Hubs, but examples include: siting the H2Hubs (hydrogen production sites) near the point of natural gas recovery to mitigate gas transmission; sourcing natural gas from regions of the country with low fugitive emissions; and designing high efficiency systems that minimize the use of natural gas.[49] Applicants were encouraged to provide fugitive emission rate estimates specific to the H2Hub, along with a justification, if applicable.[50] If project-specific estimates are not provided, DOE will use national average default assumptions within the GREET 1 Series Model.[51]

The H2Hubs were permitted to use the GREET 1 Series Model (i.e., the predecessor version of the R&D GREET Model) in computing their respective well-to-gate lifecycle GHG emissions, which provided applicants with the freedom to correctly represent their direct and indirect emissions correlated with their specific facts and circumstances. The FOA did not introduce restrictions on emissions avoidance accounting. The FOA, however, did require an applicant to disclose whether it intended to "pursue federal (or state) incentives, such as the 45V Credit, and clearly state the credit value that they are targeting based on their respective well-to-gate lifecycle GHG emissions."[52] Because the H2Hubs computed their LCAs under the GREET 1 Series Model and such model is not analogous with the 45VH2-GREET Model mandated under the Proposed Regulations, the lifecycle GHG emissions will now have inconsistencies.

As emphasized above, the H2Hubs, along with other clean hydrogen producers, will face challenges if there is any uncertainty in the project economics. By requiring the very hubs funded under the Bipartisan Infrastructure Law to utilize the 45VH2-GREET Model for purposes of the 45V Credit and the GREET 1 Series Model (i.e., the R&D GREET Model) for purposes of the DOE's consistent evaluation of well-to-gate CI and criteria air pollutant emissions, the IRS and the Treasury are placing the H2Hubs under an undue burden. Specifically, a shift in policy on life cycle assessments and associated 45V Credit value will negatively impact ARCH2, a project overwhelmingly reliant on emissions avoidance accounting to be competitive amongst domestic alternatives. Without the DOE funding and the 45V Credit, the project will be at an economic disadvantage due to the distance of Appalachia's key resources from end use markets, ports, and hydrogen infrastructure, which will increase costs for hydrogen projects. Accordingly, we respectfully request that the IRS and the Treasury incorporate the R&D GREET Model's functionalities and methodologies into the 45VH2-GREET Model to ensure consistent and accurate accounting of direct and indirect emissions between the H2Hubs program and the 45V Credit.

The R&D GREET Model Ensures Proper Emissions Accounting and is Readily Available for Use

[44] U.S. Department of Energy, Regional Clean Hydrogen Hub Funding Opportunity Announcement (Last Updated: January 26, 2023). https://oced-exchange.energy.gov/FileContent.aspx?FileID=40a1ff87-622d-4ef5-8d7c-89bfe089fd11.
[45] *Id.*
[46] *Id.*
[47] *Id.*
[48] *Id.*
[49] *Id.*
[50] *Id.*
[51] *Id.*
[52] *Id.*

The IRS and the Treasury inquired and requested public comments with respect to the following:

"(2) What conditions for the use of biogas and RNG would ensure that emissions accounting for purposes of the section 45V credit reflects and reduces the risk of indirect emissions effects from hydrogen production using biogas and RNG? How can taxpayers verify that they have met these requirements?"[53]

Indirect emissions effects from hydrogen production utilizing CMM have been addressed by the R&D GREET Model. The LCA-based approach of such model includes the quantification of typical indirect emissions, such as electricity consumption, process fuel burn, pipeline methane leakage, chemical usage, equipment leakage, and many other potential indirect emissions sources. Conversely, certain parameters within the new 45VH2-GREET Model are fixed assumptions (i.e., "background data") and may not be changed by the user.[54] Examples of background data in the model include upstream methane loss rates, emissions associated with power generation from specific generator types, and emissions associated with regional electricity grids.[55] All other parameters are "foreground data" and must be input by the user.[56] The IRS and the Treasury's rationale is that the specified background data are parameters for which bespoke inputs from hydrogen producers are unlikely to be independently verifiable with high fidelity, given the current status of verification mechanisms. The IRS and the Treasury seek comments on the readiness of verification mechanisms that could be utilized for certain background data in the 45VH2–GREET Model if it were reverted to foreground data in future releases.

CNX respectfully requests that the IRS and the Treasury leverage the LCA-based approach in the R&D GREET Model by incorporating the R&D GREET Model's functionalities into the 45VH2-GREET Model. The 45VH2-GREET Model's default values are intended to represent the industry, but the values are based on extrapolations from estimates and modeling and penalize proactive hydrogen producers implementing technologies to reduce direct and indirect emissions. Actual data readings are currently used in the R&D GREET Model to calculate, monitor, and audit a hydrogen production facility's emission throughout the process (i.e., well-to-gate). It is noteworthy that if the IRS and the Treasury intend to penalize clean hydrogen projects that utilize feedstocks that are less efficient than the default assumptions provided by the 45VH2-GREET Model, a corresponding equal treatment for clean hydrogen projects that outperform the default assumptions provided by the 45VH2-GREET Model would be to allow independent project crediting benefits in such project's GHG lifecycle emissions assessment.

If independent, project-specific, indirect emissions quantification is required to justify the quantities reported by fugitive methane project operators, then CNX would kindly recommend that the IRS and the Treasury recognize such verification procedures have been established for the quantification and verification of indirect emissions associated with the capture and the productive use of CMM within an established voluntary carbon offset registry managed CMM protocol. Within these protocols, qualified independent verifiers are required to audit CMM operations, which validates compliance with the program and quantification of indirect emissions. Therefore, CNX recommends that the IRS and the

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[53] 88 Fed. Reg. 89, 2020 at 89,239.

[54] Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2–GREET (December 2023). https://www.energy.gov/sites/default/files/2023-12/greet-manual_2023-12-20.pdf.; The EU Delegated Act on RFNBO GHG emission calculation allows for the submission of a certain quantity of hydrogen on a non-aggregated basis, as well; *see* Annex to the Commission Delegated Regulation (EU) supplementing Directive (EU) 2018/2001 of the European Parliament and of the Council by establishing a minimum threshold for greenhouse gas emissions savings of recycled carbon fuels and by specifying a methodology for assessing greenhouse gas emissions savings from renewable liquid and gaseous transport fuels of non-biological origin and form recycled carbon fuels.

[55] *Id.*

[56] *Id.*

Treasury consider incorporating the functionality of the R&D GREET Model into the 45VH2-GREET Model so that a taxpayer may benefit from investments in technology that results in the lowest CI of the hydrogen produced. Furthermore, if the IRS and the Treasury require verification of the indirect emissions associated with the capture and the productive use of CMM, then CNX suggests that a verifier selected per the procedures established by voluntary carbon offset registry protocols be leveraged for purposes of the 45V Credit.

Recommended Data Sources and Peer Reviewed Studies

The IRS and the Treasury asked:

"(1) What data sources and peer reviewed studies provide information on RNG production systems (including biogas production and reforming systems), markets, monitoring, reporting, and verification processes, and GHG emissions associated with these production systems and markets?"[57]

Please see the Appendix for a list of data sources, peer reviewed studies, and other external references, which are useful in improving the understanding of markets, monitoring, reporting, verification, and GHG emissions associated with fugitive methane and CMM.

II. Eliminate the first productive use and incrementality requirements as such requirements relate to the production of clean hydrogen with ultra-low carbon natural gas from CMM.

First Productive Use Requirement

The IRS and the Treasury anticipate requiring that for purposes of section 45V, for fugitive methane, such as CMM, to receive an emission value consistent with that gas (and not standard natural gas), then the CMM used during the hydrogen production process must originate from the first productive use of the relevant methane.[58] For any specific source of CMM, productive use is generally defined as any valuable application of CMM (including to provide heat or cooling, generate electricity, or upgraded to CMM), and specifically excludes venting to the atmosphere or capture and flaring. The IRS and the Treasury further propose to define "first productive use" of the relevant methane as the time when a producer of that gas first begins using or selling it for productive use in the same taxable year as (or after) the relevant hydrogen production facility was placed in service.[59]

The implication of this proposal is that CMM from any source that had been productively used in a taxable year prior to the taxable year in which the relevant hydrogen production facility was placed in service would not receive an emission value consistent with CMM but would instead receive a value consistent with natural gas in the determination of the emissions value for that specific hydrogen production pathway. This proposal would limit emissions associated with the diversion of CMM from other pre-existing productive uses. For existing CMM sources that typically productively use or sell a portion of the CMM and flare or vent the excess, the flared or vented portion may be eligible for first productive use, as defined above, if the flaring or venting volume can be adequately demonstrated and verified. In such circumstances, the flared or vented volume may be determined based on the previous taxable year's flared or vented volume as demonstrated via reported data to programs, such as the GHGRP.

[57] 88 Fed. Reg. 89, 2020 at 89,239.
[58] 88 Fed. Reg. 89, 2020 at 89,239.
[59] *Id.*

For purposes of determining "first productive use" of fugitive methane sources captured from coal mining operations, CNX recommends the consideration of current project counts nationwide as well as assessing the issue through the lens of capital deployment for capture units and the ongoing nature of these investments to continue abatement and the productive use of the otherwise emitted methane. Accordingly, CNX recommends that the IRS and the Treasury reconsider incorporating a "first productive use" requirement. Such a requirement would create disparate treatment and unintended consequences. If the first productive use requirement is not eliminated, then CNX asks the IRS and the Treasury to ensure that the source of the CMM be defined as at an individual borehole or ventilation shaft and not at a mine level (described in more detail below).

As outlined above, the IRS and the Treasury further propose to define "first productive use" of the relevant methane as the time when a producer of that gas first begins using or selling it for productive use in the same taxable year as (or after) the relevant hydrogen production facility was placed in service. In response to its proposed definition, the IRS and the Treasury sought comments on:

"(4) How should RNG or fugitive methane resulting from the first productive use of methane be defined, documented, and verified? What industry best practices or alternative methods would enable such verification to be reflected in an RNG or methane certificate or other documentation? What additional information should be included in RNG certificates to help certify compliance?"[60]

The concept of first productive use is not broadly applicable to CMM given the low implementation rate of current productive use projects. Each new degasification borehole or ventilation shaft installed to release methane from a working mine represents a new project opportunity for fugitive methane capture and productive use.

Since 2010, the number of active mines in the U.S. performing pipeline injection decreased from 15 to only four. The onset of shale gas supply has lowered regional natural gas prices. Section 45K (previously designated as Section 29) provided a federal income tax credit for fuel produced from a nonconventional source, which included CMM capture for productive use operations. Although Section 45K has expired, the facilities installed because of the incentive require significant ongoing capital and operating expenses, which are not justified by existing gas sales revenue. As a result, most of the mines that undertook pipeline injection in 2010 are now ventilating to the atmosphere with no pipeline sales. Since 2017, zero productive use of CMM projects have been developed. The behavioral switch away from pipeline injection has been proven through historical data. The root cause is the shift in incentives and expenses over the last 15 years. At the same time, recent studies predict unabated CMM emissions are likely to increase approximately two-and-a-half times by 2050 and approximately four times by 2100, globally. The Energy Information Administration ("EIA") and the United Nations forecast flat global demand for coal. Legacy abandoned and inactive mines continue to vent methane to the atmosphere decades after such mines stop producing coal. Based on this data, there is no need to restrict the capture and use of CMM in determining suitable hydrogen production pathways and feedstocks given the dearth of CMM capture occurring today.

The up-front investment in capture systems for productive use is very cost prohibitive but represents a massive investment opportunity for the energy communities hardest hit by the energy transition. Given the high capex required for extending capture equipment as mining activities expand,

[60] 88 Fed. Reg. 89, 2020 at 89,239.

each new ventilation borehole, well, or ventilation shaft source should be viewed as a separate project. This position was established through the California Air Resource Board ("CARB") Mine Methane Capture Compliance Offset Protocol[61] as capturing each borehole or ventilation shaft is a discrete investment decision. Therefore, the IRS and the Treasury should eliminate the first productive use and additionality requirements to CMM.

The First Productive Use Rule for Existing Sources

Utilizing the obligated reporting data for the GHGRP as the basis for determining first productive use for existing CMM sources would be a fundamentally flawed approach for several reasons:

i. Ninety Nine percent of mines in the United States, including abandoned mines, surface mines, and mines below certain emissions thresholds are not obligated to report to GHGRP.
ii. The highest fugitive methane volume from CMM production typically occurs within the first six months of the life of a source. If a productive use project were obligated to wait for the mine operator to report the source to GHGRP before connecting to a productive use project, approximately 50 percent of the volume associated with the life of the source would be vented to atmosphere prior to a connection to productive use. This policy would create the unintended consequence of requiring methane liberation to atmosphere as a pre-condition to subsequent qualifying productive use.
iii. Existing GHGRP CMM emissions reporting is not independently verified.
iv. Even existing capture facilities require incentives to continue capturing CMM, as high operating expenses risk the closure of capture and the switch to venting. This is evidenced by the trend of closing productive use facilities.
v. Disincentivizes the reduction of total methane ventilated to atmosphere through degasification methodologies by disqualifying new techniques. For example, the installation of new emission reduction techniques, such as drilling gob ventilation boreholes, has been proven to reduce the connected bleeder shaft ventilation air methane emissions.

Once a fugitive methane source has demonstrated first productive use, it should qualify for any clean hydrogen production facility during the respective facility's 45V Credit period. A fugitive methane source should not be locked into supplying one hydrogen plant but should be allowed to redirect to a newer hydrogen facility.

General Incrementality Requirements

To align with energy attribute certificates ("EACs") for electricity used in the production of clean hydrogen, ultra-low carbon natural gas should be allowed a 36-month lookback from when the applicable offtake agreement was signed with the hydrogen production facility. Existing facilities that are capturing and putting methane to a productive use may return to flaring or for CMM, venting. Alternatively, existing ultra-low carbon natural gas capture facilities could incur an indirect emissions charge equal to +13 gCO2e/MJ, which represents the emissions associated with fossil natural gas extraction, processing, and delivery. This CI adjustment would address the prior productive use of the gas. Accordingly, we ask that

[61] California Air Resources Board. June 8, 2016. ARB Compliance Offset Program. Mine Methane Capture Projects Compliance Offset Protocol Frequently Asked Questions. Question 1.c.

the IRS and the Treasury apply reasonable and consistent lookback rules by allowing clean hydrogen producers to satisfy the additionality requirement if an offtake agreement was signed with the hydrogen production facility within 36-months of the clean hydrogen's production.

Incrementality Requirements for Existing Facilities

For EACs, the IRS and the Treasury are appropriately considering avoided facility closures when structuring incrementality requirements (either facility-specific or through the macro five percent formulaic approach). CNX kindly requests that the IRS and the Treasury extend its concern of avoiding facility closures to existing CMM capture projects, as well. This is especially pertinent for CMM, where discontinuing productive use and shifting to flaring is the economic optimum today due to existing perverse incentives, such as CARB's compliance offset program, which incentivizes for flares, but not productive uses.

III. If the IRS and the Treasury determine that the first productive use requirements are applicable, then the final regulations should define the CMM source as an individual borehole, or ventilation shaft.

The source of the CMM should be defined as an individual borehole or ventilation shaft and not at a mine level. Any CMM project that achieves meaningful methane abatement is necessarily expansive and spans multiple point sources for methane capture (i.e., boreholes or ventilation shafts) (as seen in *Figure 1* below).

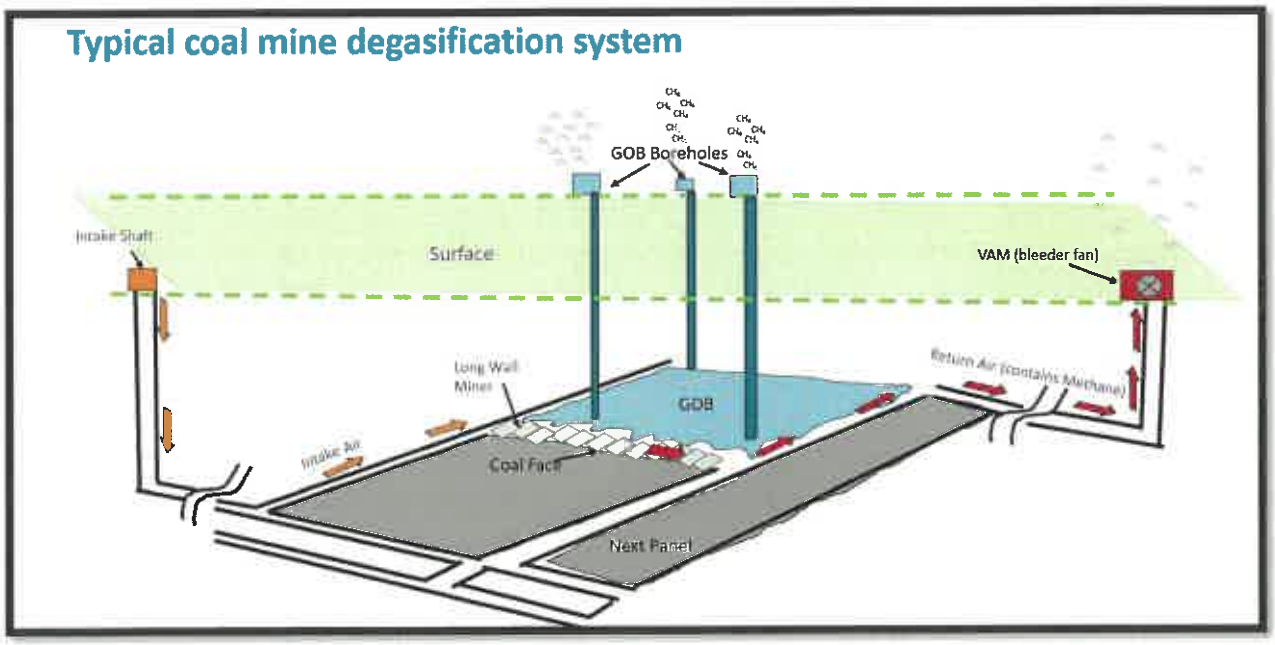

Figure 1: Diagram of Typical Coal Mine Degasification System

Capturing each discrete new CMM source (i.e., borehole or ventilation shaft) for productive use is an incremental, discrete investment decision that is unjustified economically today since the capture and collection infrastructure for each source has significant investment and ongoing operational expenditure demands. It is therefore extremely important that the final regulations recognize this

important circumstance and establish that the first productive use requirement is applied on an individual borehole or ventilation shaft basis for CMM. If a first productive use rule were instead implemented at a mine level for CMM, Treasury would effectively disqualify some of the best opportunities to install new capture projects at all mines that had formerly operated productive use capture projects but were forced to close and vent to the atmosphere due to economic conditions.

IV. Adopt reasonable waste production anti-abuse rules with examples to mitigate waste causality. The IRS and the Treasury should not "freeze" or disallow CMM waste streams that existed on or before the enactment of the IRA as reported to the GHGRP. Alternatively, the IRS and the Treasury should (i) provide that qualifying sources include mines that had MSHA IDs prior to January 1, 2023, or (ii) follow European and Asian market waste product registration methodologies.

The IRS and the Treasury raise questions around anti-abuse considerations to ensure that projects do not directly or indirectly increase the production of waste simply to obtain the 45V Credit. In that respect, the IRS and the Treasury seek comments on the following comments.

Any Eligibility Limitations on Existing Sources Should be Reasonable and Should Encourage Abatement of Methane Emissions that Align with the U.S. Decarbonization Goals

The IRS and the Treasury asked the public to submit comments on the following question:

"(8) To limit the additional production of waste, should the final regulations limit eligibility to methane sources that existed as of a certain date or waste or waste streams that were produced before a certain date, such as the date that the IRA was enacted? If so, how can that be documented or verified? How should any changes in volumes of waste and waste capacity at existing methane sources be documented and treated for purposes of the section 45V credit? How should additional capture of existing waste or waste streams be documented and treated?"[62]

The final regulations should not limit the eligibility of methane sources that existed as of a certain date. As it applies to fugitive methane sources, such as CMM, mining operations continually expand into new areas and create new sources of CMM within a mine area each year. These expansions are in no way influenced by fugitive methane capture considerations, as the economic decisions of mineral extraction are determined by the markets of the extracted commodity and not by the waste methane that is liberated, as detailed in our response to *Question (7)* below.

Many sources of fugitive methane are emitted at highly variable rates. For CMM, most of the emissions occur just after the borehole (gob well) liberating methane from the mine for safety purposes is installed in conjunction with mining activities. The cavities and fractures formed by the working face of the mine release the methane trapped in the coalbed strata, which is safely directed away from the mining area by gob well. Methane flow rate is very high initially and tapers down over time. Any requirement to document the fugitive emissions from a new source of CMM for the purpose of determining a baseline volume will result in the lion's share of methane venting to atmosphere during the monitoring period prior to the installation of capture equipment. For this reason, fugitive methane mitigation under the 45V Credit or other programs cannot rely on a source-specific analysis to determine what would have occurred in the absence of the capture incentive, since the very measurements necessary for this would be

[62] 88 Fed. Reg. 89, 2020 at 89,239.

prohibitive to methane abatement. These new sources produce 50 percent of their total lifetime volume within the first year of creation. If the IRS and the Treasury limit eligibility only to legacy sources, the most prolific emitters would be disqualified.

Freezing waste streams that were in existence on or before the enactment of the IRA would be virtually impossible due to the lack of monitoring data and broad disagreement amongst public sources as to what emissions exist today. The emissions of over 99 percent of mines in the U.S. are not reported to the EPA. While EPA's GHGRP disclosed CMM emissions of 29.3 million metric tons of CO2e in the U.S. in 2021, it estimates that there is approximately an additional 20-plus million metric tons of CO2e, according to their inventory analysis for that same year (51 million metric tons of CO2e) and acknowledges that abandoned and surface mines are not obligated to report. Separately, the Global Energy Monitor estimates that EPA's GHGRP omitted an additional 53.6 million metric tons of CMM in 2021, for a total of 82 million metric tons Co2e of CMM emissions from active mines.

Disqualifying certain waste methane sources based on an arbitrary date also directly contradicts methane abatement commitments made by the federal government. There is no sound justification for failing to abate a cubic foot of methane merely because it occurred at a source that started after an arbitrary date. It would be extremely challenging to reconcile this causality concept with the first productive use requirements as waste streams are not static and discrete CMM emission sources are not thoroughly reported. Moreover, fugitive methane sources are usually most GHG-intensive at the outset and then emissions steadily decrease each year thereafter. Accordingly, limiting the use of waste methane to pre-existing streams locks in a sub-optimal period of the waste life cycle that would be severely detrimental to potential GHG reduction benefits.

As it applies to CMM, if the IRS and the Treasury determine that such a policy is necessary, then CNX proposes two potential solutions: (i) limit qualifying sources to only include mines that had MSHA IDs prior to January 1, 2023, or (ii) follow European and Asian market waste product registration methodologies.

Within European and Asian markets, the ISCC waste product registration methodology addresses the issue of waste causality by requiring the core product manufacturer to provide a signed attestation declaring that the manufacturer considered the fugitive emission as a waste and that it has reached the end of its intended life cycle. Within ISCC, the waste classification requirement may also be addressed using evidence that the core product manufacturer does not use the waste product's value stream to justify their core product business operations. Accordingly, the IRS and the Treasury should encourage methane emission abatement in developing any eligibility limitations on existing sources. Should the IRS and the Treasury determine that a policy is necessary to avoid unnecessary waste generation, then CNX respectfully requests the IRS and the Treasury consider the recommendations made herein.

The 45V Credit Will Not Stimulate Unnecessary Coal Mining Activities

In the preamble of the Proposed Regulations, the IRS and the Treasury asked:

"(7) How can the potential for the generation of additional emissions from the production of additional waste, waste diversion from lower-emitting disposal methods, and changes in waste

management practices be limited through emissions accounting or rules for biogas and RNG use established for purposes of the section 45V credit?"[63]

As applied to fugitive methane, such as CMM, methane liberation to atmosphere is a core MSHA safety requirement.[64] The law was established to mitigate disastrous explosions and fatalities associated with the accumulation of methane during mining. Mine operators are obligated to submit a ventilation plan to MSHA that details how and to what degree methane is liberated to the atmosphere.

Separately, the capture of methane liberated by mining activities is completely independent of the mining operation. Operators of capture projects are often not the mine operators. Incentives for capture and productive use are needed to pay for the infrastructure. Title and ownership of the gas liberated from the coal seam is determined by applicable state law and records of title. The gas estate is an interest that is severable from the coal seam, and the owner of the coal seam may be different from the owner of the methane gas that is liberated from the coal seam. Even if the mine operator did have an interest in the methane, the value of methane incentives pales in comparison to the billions of dollars of investment a coal operator would need to start a new mine, and therefore, it is unreasonable to assume it would be factored into an investment decision.

It should also be noted that CARB released a study[65] in 2014 that concluded incentives for methane abatement would not increase mining activity. The report states that the value of methane abatement incentives, in this case, California compliance offsets, "would represent less than one half of one percent of the value of domestic coal production" from 2014 to 2020. The rate of return on CMM utilization was estimated to be "less than one percent" of mining profits.

CARB found that fugitive methane abatement does not: (i) encourage new mining activities, (ii) incentivize additional coal production in existing mines, (iii) shift production among existing mines, or (iv) impact the price of coal. The lack of a causal relationship between methane abatement and coal production has been borne out since the report's release, as U.S. coal production declined 30 percent from 2014 to 2022[66] while the number of CMM flaring projects utilizing CARB's methane abatement incentives increased from one to 33 over the same timeframe. Despite this large increase in projects, the percentage of CMM volume flared increased from one percent to only three percent[67] over same timeframe. Flaring projects are limited in revenue by California cap-and-trade pricing and can only destroy limited temporary volumes of methane compared to permanent productive use projects that can be incentivized under the 45V Credit.

As the global economy demands more goods, more waste is inherently generated. Establishing a baseline utilizing prior core product generation would ignore the future anticipated growth of the global economy. Differentiating between the correlation versus causation of waste generation and incentives for waste capture would be subjective at best, and certainly cause for future disagreement amongst practitioners and implementers. Accordingly, we kindly ask the IRS and the Treasury to consider the findings by CARB in concluding that the 45V Credit will not cause additional CMM waste generation.

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[63] *Id.*
[64] 30 CFR 57.8520.
[65] California Air Resources Board. 2014. The Mine Methane Capture Protocol and Mining Economics.
[66] EIA. 2023. Annual Coal Report. Table 11. https://www.eia.gov/coal/annual/
[67] U.S. EPA. 2024. Underground Coal Mines – Greenhouse Gas Reporting Program (GHGRP). Office of Atmospheric Protection. https://enviro.epa.gov/query-builder/ghg

The IRS and the Treasury Should Encourage Methane Abatement

The IRS and the Treasury sought comments on:

"(6) How can the section 45V regulations reflect and mitigate indirect emissions effects from the diversion of biogas or RNG or fugitive methane from potential future productive uses? What other new uses of biogas or RNG or fugitive methane could be affected in the future if more gas from new capture and productive use of methane from these sources is used in the hydrogen production process?"[68]

Currently, fugitive emissions from places like coal mines are not being captured and utilized. At present, only two percent of the 500-plus active mines in the U.S. are capturing CMM for productive use and only 0.1 percent of the over 30,000 abandoned or closed mines are capturing or destroying methane. In addition, there is currently no federal policy providing any economic justification for fugitive methane emissions capture systems to be deployed.

The 45V Credit's value is unprecedented in its application to the productive use of CMM, as no other federal policy exists today to encourage methane capture. The types of projects that would be developed due to project economics influenced by the 45V Credit are fully additional and would not have been built otherwise, as evidenced by the extremely low adoption amongst current business practices (i.e., less than one percent of mines). For CMM, the 45V Credit is not a bonus; it sends a long-term market signal that fills a fundamental gap in the incentivization of methane abatement.

Existing capture and productive use opportunities are limited to traditional methane burning end-uses, such as electricity generation or home heating. However, CO2 emissions still occur at such traditional methane burning end uses. By sending CMM gas to a hydrogen facility equipped with carbon capture technology, it will be possible to utilize or sequester the CO2 emissions. Use of CMM at hydrogen production facilities will displace future additional traditional natural gas supply development.

While wind and solar generate clean power from inexhaustible resources that may be developed at will, fugitive methane capture actively mitigates GHG impacts that would otherwise occur on their own schedule and scale. Accordingly, the question of "how is the resource getting directed to hydrogen production substituted" is secondary to "what is the GHG impact of inaction and continued lack of abatement?" By failing to send the right growth signal to the low-carbon gas industry due to apprehension of "affecting other new uses," the IRS and the Treasury risk cementing the status quo of continued methane emissions and unrecognized abatement benefits, also leading to an unavailability of fugitive methane resources once "other new uses" would demand it. Therefore, CNX kindly asks that the IRS and the Treasury do not let the concern of "other future uses" impact the ability to abate fugitive methane resources today.

V. Clarify that the R&D GREET Model can be used as evidence when requesting a PER.

The IRS and the Treasury requested comments on the following:

[68] 88 Fed. Reg. 89, 2020 at 89,239.

"(12) What criteria should be used in assessing biogas and RNG-based PERs? What practices should be put in place to reduce the risk of unintended consequences (for example, gaming)? Should conservative default parameters and counterfactuals be used unless proven otherwise by a third party?"[69]

Under section 45V(c)(2)(C), in the case of any hydrogen for which a lifecycle GHG emissions rate has not been determined for purposes of section 45V, a taxpayer producing such hydrogen may file a petition with the Secretary for a determination of the lifecycle GHG emission rate with respect to such hydrogen, which is referred to as a provisional emissions rate ("PER").[70] The IRS and the Treasury's guidance is unclear on whether the R&D GREET Model, as it has broader capabilities to model different feedstocks and technologies, could be used by a hydrogen producer to apply for a PER. Therefore, CNX requests that clear guidance be provided to confirm that a taxpayer may utilize the R&D GREET Model for purposes of requesting a PER. For example, the H2Hubs selected by the DOE have already undergone significant evaluation and have been determined to be worthy of federal funding. However, some H2Hubs may not be able to model their respective lifecycle GHG emission rate under the 45VH2-GREET Model. Accordingly, such H2Hubs should be considered an ideal candidate for a PER determination.[71] While third-party verification is a reasonable separate approach, the R&D GREET Model should provide sufficient evidence of qualification independently. Therefore, the IRS and the Treasury should clarify that the R&D GREET Model can be used as evidence when requesting a PER.

VI. Exclude geographic and temporal matching requirements as such requirements relate to the use of ultra-low carbon natural gas for producing clean hydrogen. Furthermore, adopt verification requirements under the existing RFS and LCFS programs, and permit the use of existing book-and-claim systems, such as M-RETS, for tracking purposes.

Under the Proposed Regulations, the IRS and the Treasury sought comments on the following:

"(9) Are geographic or temporal deliverability requirements needed to reflect and reduce the risk of indirect emissions effects from biogas and RNG or fugitive methane use in the hydrogen production process? If so, what should these requirements be and are electronic tracking systems able to capture these details?"[72]

Geographic Requirements

The U.S. pipeline grid is fully integrated and super-efficient, and unlike the electric transmission grid, it is not segmented by region. Therefore, no geographic restrictions are warranted by the realities of natural gas transmission operations.

Temporal Requirements

Methane has a nearly unlimited storability capacity in today's gas grid due to dedicated storage caverns, line packing, and other means. While there is no physical basis for limiting temporal deliverability, we recognize that reasonable boundaries are warranted for effective implementation of the 45V Credit. Accordingly, we propose that any fugitive methane injected into the pipeline in a calendar year should be

[69] 88 Fed. Reg. 89, 2020 at 89,240.
[70] Code section 45V(c)(2)(C); see also Prop. Treas. Reg. § 1.45V-4(c)(1).
[71] Bipartisan Infrastructure Law, Public Law 117-58 (November 1, 2021).
[72] 88 Fed. Reg. 89, 2020 at 89,239.

freely deliverable on a book-and-claim system to a clean hydrogen production facility in such calendar year and the subsequent calendar year.

Tracking Systems

The IRS and the Treasury should permit taxpayers to self-attest to the origin and single claim on environmental attributes of the RNG and CMM delivered to a hydrogen production facility. If, however, the IRS and the Treasury determine that additional technology platforms are warranted, then the IRS and the Treasury should leverage the various national tracking systems with robust capabilities as such systems would be sufficient for implementing tracking and verification of the requirements under the 45V Credit. For example, Renewable Thermal Credits ("RTCs") are tracked on a streamlined certificate management platform called M-RETS. This third-party platform is custom built for the tracking of pipeline-injected low-carbon gases. M-RETS built its system with the specific intent of providing regulators with a tool for transparent, robust tracking of gas production and deliveries. RTCs effectively create the equivalent of a renewable energy certificate for use in the tracking of low-carbon gases. To gain the ability to generate RTCs, a low-carbon gas facility must validate its key technical and operational information, provide third-party engineering support, and optionally provide emissions lifecycle analysis information. RTCs are required to be generated for 100 percent of a low-carbon gas facility's production, even if such gas is not claimed for a qualifying use, to provide assurance against double-counting.

Each RTC represents one million British thermal units of low-carbon gas and embeds pertinent information, including the origin, production timing, and thermal resource. Program participants demonstrate delivery and use of the low-carbon gas by retiring these identifiable credits, with full visibility to the designated regulatory authority. Thus, RTCs could be efficiently used for the robust tracking of CMM delivered to a hydrogen production facility, and each kilogram of the resulting qualifying clean hydrogen produced would unequivocally tie back to specific generation volumes at RNG or CMM facilities. In summary, the M-RETS' RTC framework is a readily available tool for robust and transparent energy attribute delivery, unifying and streamlining the system of checks and balances described above. Should the IRS and the Treasury decide that self-attestation is insufficient to verify the origin and single claim on the environmental attributes of the RNG and CMM delivered to a hydrogen production facility, then the M-RETS platform offers an alternative solution to ensure tracking requirements are met.

Verification Systems

In the preamble of the Proposed Regulations, the IRS and the Treasury evaluated existing frameworks for the implementation of "book-and-claim" delivery of low-carbon gasses.[73] Specifically, the IRS and the Treasury asserted, "existing tracking and verification systems do not clearly distinguish between inputs, verify or require verification of underlying practices claimed by RNG production sources, require proof of generator interconnection or revenue-quality metering, provide validation of generation methodology, include exclusively United States based-generation, verify generator registration, and tracks the vintage of generator interconnection."

We highlight that while "tracking and verification" are deeply connected functions, they are not identical and the methods of addressing each requirement may be quite distinct. "Tracking" may be done manually (i.e., through maintaining a "paper trail" of inventories and transactions) or through an automated system, such as the M-RETS RTC program outlined above. Tracking is primarily aimed at

[73] *Id.*

providing assurance against double-counting, mischaracterization of the delivered commodity, such as claiming a different vintage, and the satisfaction of any applicable deliverability requirements. Automated systems have the distinct advantage of easing transactions and facilitating a review of the audit trail through a unified data organization system. Importantly, we view the relevance of tracking solutions to be in the robust monitoring of transactions between verified facilities, but not the auditing of the facilities themselves.

"Verification" of the facilities that capture and process fugitive methane, on the other hand, is a process with necessarily manual elements to be conducted by a qualified third-party professional. We believe that most of the perceived challenges communicated by the IRS and the Treasury pertain to verification functions. Luckily, there are several federal and state-level programs with deep implementation experience in the U.S. that have readily available regulatory frameworks and verifier accreditation systems for the necessary verification steps, such as the RFS and California's LCFS program. As also shown by the Treasury's proposed measure of recognizing verification bodies under the CARB and associated LCFS program as "qualified verifiers" for verifying the amount of qualified clean hydrogen claimed under the 45V Credit, these competencies are available and most RNG producers leverage these tools today due to their RFS and LCFS program participation and could be implemented readily into the 45V Credit. In addition, the verification steps to be performed for fugitive methane facilities are substantially similar to those of RNG, so we do not anticipate any challenges in applying the existing RFS and LCFS frameworks to CMM.

To summarize, we request that the IRS and the Treasury adopt the regulatory frameworks under the RFS or the LCFS program for establishing verification requirements under the 45V Credit and allow low-carbon gas production facilities that have passed these audit requirements to use existing tracking solutions such as M-RETS RTC to deliver gas to hydrogen producers via "book and claim." By coupling facility verification performed by an LCFS or RFS-accredited verifier with systems that track this verified information through the value chain, all challenges described by the IRS and the Treasury are reliably addressed using solutions that exist today. Furthermore, the use of a book-and-claim system avoids requiring an unnecessary duplicative set of dedicated gas pipeline infrastructure from gas source to gas consumer to be installed.

VII. Implement the functionalities of the R&D GREET Model into the 45VH2-GREET Model, which will allow proper accounting of various process emissions, such as methane leakage.

The IRS and the Treasury requested comments on:

"(10) How should variation in methane leakage across the existing natural gas pipeline system be taken into account in estimating the emissions from the transportation of RNG or fugitive methane or establishing rules for RNG or fugitive methane use? How should methane leakage rates be estimated based on factors such as the location where RNG or fugitive methane is injected and withdrawn, the distance between the locations where RNG or fugitive methane is injected and withdrawn, season of year, age of pipelines, or other factors? Are data or analysis available to support this?"[74]

The R&D GREET Model properly addresses various process emissions and lifecycle GHG emissions associated with the transportation of RNG and CMM, and therefore, CNX recommends that the IRS and

[74] 88 Fed. Reg. 89, 2020 at 89,239 and 240.

the Treasury incorporate the functionalities of the R&D GREET Model into the 45VH2-GREET Model to allow for the proper accounting of such emissions.

Conclusion

The congressional intent of section 45V was to incentivize the production and use of clean hydrogen, while reducing emissions and creating jobs, especially in areas that have been most impacted by the evolving energy landscape. Appalachian hydrogen production checks every one of those boxes and the section 45V guidance should promote fair and reasonable guidance and encourage emissions reductions while simultaneously increasing the production of clean hydrogen in the Appalachian region.

The Appalachian region has an abundance of low CI feedstocks, the technology to utilize those feedstocks, and a motivated, best-in-class labor force that can kickstart the hydrogen economy by using the available resources in this region. If implemented correctly, we can help solve a significant climate issue while stimulating the economy and creating jobs, catalyzing a new middle class in the Appalachian region, and sustaining it for decades to come.

CNX appreciates the opportunity to provide comments under REG-117631-23 regarding section 45V, credit for clean hydrogen production, with the goal of promoting investments in clean energy across the United States. We respectfully urge the IRS and the Treasury to consider the recommendations made herein and provide additional clarity through forthcoming regulations and other guidance implementing the provisions under section 45V.

Sincerely,

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