February 26, 2024

VIA ELECTRONIC FILING (www.regulations.gov) (REG-117631-23)

Douglas W. O'Donnell
Deputy Commissioner for Services and Enforcement
CC:PA: LPD:PR (REG–117631-23)
Room 5203
Internal Revenue Service
P.O. Box 7604
Ben Franklin Station
Washington, DC 20044

Re: Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property, Notice of Proposed Rulemaking and Notice of Public Hearing, 88 Fed. Reg. 89,220 (Dec. 26, 2023)

Dear Mr. O'Donnell:

The Coalition for Renewable Natural Gas (RNG Coalition) represents the renewable natural gas (RNG) industry. RNG is derived from biogas that has been captured from organic waste streams—including agricultural wastes, municipal wastewater, and municipal solid waste in landfills—and cleaned and conditioned to achieve quality standards necessary to blend with or substitute for fossil natural gas. Importantly, RNG projects capture and utilize methane—a highly potent greenhouse gas (GHG)—that would otherwise have been emitted into the atmosphere or flared. As recognized by other federal and state agencies, RNG can be used as a feedstock to produce renewable hydrogen, providing another avenue for low-carbon, zero-carbon, and carbon-negative renewable gas in the energy, transportation, and industrial sectors.[1] RNG Coalition is a non-profit association of companies and organizations dedicated to the advancement of RNG as a clean, green, alternative, and domestic energy and fuel resource. Our membership includes companies throughout the value chain of waste feedstock conversion to sustainable end-use applications. As such, RNG Coalition has a direct and strong interest in this rulemaking.

[1] *See, e.g.,* 87 Fed. Reg. 80,582, 80,687 (Dec. 30, 2022) (U.S. Environmental Protection Agency); U.S. Department of Energy (DOE), *U.S. Department of Energy Clean Hydrogen Production Standard (CHPS) Guidance*, at 3 (2023), *available at* https://www.hydrogen.energy.gov/docs/hydrogenprogramlibraries/pdfs/clean-hydrogen-production-standard-guidance.pdf; *see also* S. McNaul, et al., *Hydrogen Shot Technology Assessment: Thermal Conversion Approaches*, National Energy Technology Laboratory, at 35 (2023), available at https://www.netl.doe.gov/projects/files/HydrogenShotTechnologyAssessmentThermalConversionApproachesRevised_120523.pdf (noting RNG blending as pathway to reduce hydrogen GHG emissions).

RNG Coalition has previously submitted comments on Notice 2022-58 regarding Credits for Clean Hydrogen and Clean Fuel Production.[2] We appreciate the opportunity to submit these comments on the proposed rule entitled "Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property," published at 88 Fed. Reg. 89,220 (referred to as "45V Proposed Rule").

The RNG industry appreciates all of the thoughtful work behind the 45V Proposed Rule, especially the recognition that RNG is a viable pathway for clean hydrogen production and that RNG can be available nationwide to meet the needs of clean hydrogen facilities. We applaud the stated intent of providing rules addressing pathways that use RNG for purposes of the Section 45V credit and believe the final rule must facilitate (rather than unduly hinder) the ability to utilize RNG under Section 45V. Our comments establish key priorities based on the industry's unmatched experience in building RNG value chains, and we strived to provide additional information on and present actionable solutions for perceived implementation challenges communicated in the 45V Proposed Rule. In particular, the RNG industry has several focus points with respect to the 45V Proposed Rule as it relates to RNG, which are described as follows.

1. *GREET Model and Determining Emissions Rates:* The RNG industry appreciates the work that Argonne National Laboratory has done to provide a GREET model targeted for the Section 45V tax credit. The RNG industry has long supported use of GREET as a transparent and well-respected lifecycle model that follows the science.

    a. GREET has long recognized the avoided emissions benefits in its lifecycle modeling for RNG where the manure and other wastes would otherwise release GHGs into the atmosphere. The RNG industry would like to thank the Treasury Department for continuing to recognize "system expansion" as one of the best methods to represent the emission rate of RNG. Consistent with this science, in the 45VH2-GREET 2023 model, the lifecycle GHG emissions for landfill gas properly includes avoided emissions. This approach has been used in numerous regulatory programs and follows standards for lifecycle analysis, including finding carbon-negative emissions for RNG from animal manure and other methane-abating sources. The RNG industry supports and agrees that any methodology assessing RNG's lifecycle emissions must measure avoided emissions.

    b. The 45VH2-GREET 2023 model must incorporate additional pathways for RNG to hydrogen beyond landfill gas, including, at a minimum, Biogas from Anaerobic Digestion of Animal Waste, Biogas from Anaerobic Digestion of Wastewater Sludge, and Biogas from Anaerobic Digestion of Municipal Solid Waste (MSW), which can include, e.g., food waste and agricultural waste, to be consistent with the current GREET model as described in the statutory text. These pathways are particularly important to ensure sufficient incentives to utilize RNG to reduce GHG emissions. For example, limitations on incentives to utilize anaerobic digesters at

[2] Comments, dated December 2, 2022 (IRS-2022-0029-0101). These comments are incorporated by reference herein.

dairy farms misses a clear near-term opportunity for methane reduction highlighted by the U.S. Environmental Protection Agency's (EPA) AgStar program for more than twenty years.[3]

c. For hydrogen projects using RNG, the carbon intensity score for all RNG projects, including all feedstock sources, should be optional foreground data in the 45VH2-GREET 2023 model based on the pathways in the current GREET model. The carbon intensity may vary between RNG projects using the same RNG feedstock pathway, and this carbon intensity score can be verified by a third party for accuracy. Alternatively, we recommend various additional modifications to the 45VH2-GREET 2023 model that would include and better reflect the emissions profiles of these pathways.

2. *RNG Tracking:* RNG displaces fossil natural gas in an interconnected natural gas commercial pipeline system[4] and, as such, hydrogen producers using RNG can and should be required to demonstrate ownership of RNG throughout the supply chain. This means ensuring that the volume of RNG purchased and injected into the natural gas commercial pipeline system, which is integrated throughout North America, is the same volume as that withdrawn from that system. The 45V Proposed Rule refers to this protocol as "book and claim" and other programs similarly refer to a "book and claim accounting" system.[5] Where the proposal properly recognizes the appropriateness of "book and claim" systems, the RNG industry should be allowed to rely on the long-standing system that has been used in the industry. The approach to custody transfers has a long history in the natural gas market, and "book and claim" approaches have been used in several regulatory programs without identified cases of fraud or double-counting. These systems have worked successfully to date, and existing frameworks should continue to be available for hydrogen production facilities to show use of RNG as a feedstock or as process energy for electrolysis. Although we do not believe an electronic system is required beyond the third-party gas pipeline metering data, there is an electronic tracking system for RNG that is available today (M-RETS Renewable Thermal Tracking System), which could be available as an option for parties to utilize. Other regulatory programs (e.g., Renewable Fuel Standard) may also

[3] Ermias Kebreab, Ph.D., et al., *Meeting the Call: How California is Pioneering a Pathway to Significant Diary Sector Methane Reduction*, UC Davis Clear Center (2022), *available at* https://clear.ucdavis.edu/sites/g/files/dgvnsk7876/files/inline-files/Meeting-the-Call-California-Pathway-to-Methane-Reduction_0.pdf.

[4] This term is used by EPA in its Renewable Fuel Standard program, where it is defined broadly to mean one or more connected pipelines that transport natural gas that meets all the following: (1) the natural gas originates from multiple parties; (2) the natural gas meets specifications set by the pipeline owner or operator; and (3) the natural gas is delivered to multiple parties in the covered location. 40 C.F.R. §80.2. This includes, but is not limited to, common carrier and municipally owned pipelines, as well as interconnections via pipeline or truck.

[5] "Book and claim" is used in these comments for ease of reference based on the use of this term in the 45V Proposed Rule. There are different terminologies that are often used to describe or in lieu of book and claim systems. It is important to note that, distinct from some "book and claim" systems, such as that used for Renewable Electricity Credits or RECs, the natural gas/RNG industry actually utilizes a "mass balance" approach to tracking custody throughout the system. Whatever it is called, the important point is that RNG tracking establishes a physical nexus between the RNG and hydrogen production, utilizing third-party meters to measure those volumes.

utilize electronic systems that, if applicable to hydrogen, could similarly be used for purposes of Section 45V.

3. *"Induced" Emissions and the "Three Pillars" of Incrementality, Deliverability, and Temporality:* The definition of lifecycle GHG emissions incorporated into Section 45V references inclusion of "*significant* indirect emissions." This means that there should be a causal connection and more than assumptions as to whether certain indirect emissions are to be included with respect to any particular fuel pathway. It has been asserted that "induced grid emissions" may be an appropriate type of "indirect emissions" under this definition for renewable electricity. While the RNG industry understands potential concerns with unintended consequences as a result of increased hydrogen production, it is important to note that the RNG/natural gas market operates very differently than the electricity grid, and there is simply no evidence that has been provided of any "induced" emissions that properly should be included as "significant indirect emissions" in the lifecycle GHG emissions calculations for RNG. In addition to imposing limitations on the indirect emissions that can be included, Section 45V requires the lifecycle emissions rates be determined using GREET. GREET does not include such emissions for RNG pathways. As such, there is no scientific or legal basis to impose incrementality, deliverability, or temporality requirements on RNG to hydrogen in order to account for "induced" emissions.

   a. *Incrementality:* The "first productive use" requirement is not authorized by statute, and would exclude viable RNG projects that could support clean hydrogen production today. The requirement would cause a significant value discrepancy for new RNG projects creating a market distortion, greater risk of stranded RNG for existing projects, added complexity, and higher prices for end-consumers. This is counter to the goals of the IRA. Incrementality restrictions on RNG would also harm investor confidence in developing RNG supply for hydrogen. In addition, requiring the RNG project and the hydrogen production facility to come on-line in the same year (or for the RNG project to come on-line after) is simply unworkable. Incrementality conceptually ignores the fact that RNG projects all face uncertain and volatile markets for their product and, depending on developments in unrelated markets, existing projects may be compelled to commence flaring or venting the methane they currently capture. Participation in the Section 45V program can keep current projects economically viable and operational, thus assuring emission reductions continue. For example, venting may occur at dairy sites where emissions are not currently regulated, which is not a desirable outcome. On the other hand, it is speculative to believe that RNG in existing uses will be diverted for hydrogen production and backfilled with fossil fuels. There is ample development potential for supply to meet growing demand, provided the right incentives are available. In addition, any potential "switching" of RNG use toward clean hydrogen would create a need for more RNG or other biofuels that back-fill in the primary markets

– the federal Renewable Fuel Standard and state Low Carbon Fuel Standards,[6] which establish market-based incentives for increasing use of low-carbon fuels such as RNG. There is no need to create dual classes of facilities (new and old) if aggregate growth occurs in the industry. Nonetheless, to address potential concerns, the Treasury Department could find projects built prior to 2030 meet any such incrementality requirements with a check in 2029 on the market impacts of increased hydrogen production to determine, using real world data, if any such "resource shifting" patterns can be discerned.

b. *Temporality:* The temporal requirements for electricity should logically not be applied to RNG because of the drastic differences between electricity generation and RNG production: (i) wind and solar power generation are intermittent, and RNG production is not, and (ii) there is no substantial storage infrastructure for power, whereas there is extensive storage available for RNG and natural gas. Where fossil natural gas is displaced by RNG that is injected into the same natural gas commercial pipeline system, utilization of current market operations is sufficient to ensure that the volume of RNG made available matches the amount of gas used by the hydrogen producer as feedstock or process energy. Moreover, unlike renewable electricity credits that are subject to different rules by region affecting their value, this is not the case for RNG. Due to the operations of the natural gas market, overly stringent time-matching requirements will likely be impractical if not impossible to achieve, serving to disincentivize RNG use. The industry standard for settled gas transactions is to balance supply and demand on a monthly basis, and hydrogen production is often tracked on a quarterly basis. In addition, unlike electricity, RNG is extensively stored much like a country-sized battery when injected into the pipeline system where it is pressurized and can be withdrawn for use on demand. On occasions where RNG is stored and dispatched in a different month than when injected, records of gas storage can and should be provided.

c. *Deliverability:* Because of the interconnectedness of the natural gas commercial pipeline system, which extends throughout North America, and based on the existing and long-standing system for measuring natural gas transportation and delivery, there is no need to impose regional geographic restrictions for RNG. Natural gas flows in variable quantities between every geographic market in the United States on a daily basis and is balanced across multistate and multiregional pipelines. With the system for balancing volumes injected and withdrawn and the storage capabilities, the entire natural gas commercial pipeline system is the proper geographic scope for the Section 45V tax credit. Any regional limitations on the production and use of RNG would be impractical and not based on physical realities.

[6] California was the first state to establish a low carbon fuel standard. Additional states have followed or are considering similar programs.

4. *Calculation of Clean Hydrogen Production in a Year for Section 45V Credits*: Given the ability to store and deliver RNG within the natural gas commercial pipeline system, and given the scale of hydrogen plants and the quantities of RNG that would be required to reduce the lifecycle GHG emissions rate of all hydrogen produced by a clean hydrogen facility in a year, taxpayers should be permitted to use an accounting period of one month or one quarter to calculate individual lifecycle GHG emissions scores, and add the amounts together to establish the eligibility for Section 45V credits within a year. By using this approach, large hydrogen facilities can be built, and can be "filled up" over time with incremental RNG supply. This will increase the build-out of hydrogen capacities and matching RNG projects, and achieve the intended investment and GHG reduction goals of the Section 45V program.

5. *The Final Rule Should Seek to Incentivize Additional GHG Emissions Reductions, Including Supporting Existing Facilities to Begin Producing Clean Hydrogen:* To support the cost-effective and rapid deployment of clean hydrogen, the Treasury Department should consider how to support facilities moving from using fossil natural gas in the production process to RNG. This will provide much needed emissions reductions sooner, reduce the potential environmental impacts of building new plants, and ultimately keep costs down for end-use consumers.

We believe the Treasury Department must reconsider the issues noted above that the 45V Proposed Rule identifies as anticipated for RNG in order to maximize the environmental and economic benefit of expanded methane capture and RNG production.

* * *

RNG development is critical to achieving the Biden-Harris administration's climate change goals and commitments, such as the 2021 Global Methane Pledge, and its deployment can jumpstart clean hydrogen production. Imposing overly strict requirements would be counter to the goals of the IRA to promote clean hydrogen production and work to reduce GHG emissions today. RNG Coalition's more detailed comments on these issues and additional comments on the 45V Proposed Rule, including responses to questions asked regarding RNG, are attached.

RNG Coalition appreciates the opportunity to provide these comments. Please do not hesitate to contact us if you have any questions.

Respectfully submitted,

Geoffrey Dietz

Geoffrey Dietz
Director, Federal Government Affairs
Coalition for Renewable Natural Gas

The following organizations have endorsed and signed onto the comments of the Coalition for Renewable Natural Gas.

Frank Wolak
President & CEO
Fuel Cell and Hydrogen Energy Association

Martin J. Durbin
President, Global Energy Institute
Senior Vice President, Policy
U.S. Chamber of Commerce

Paul Bleiberg
Executive Vice President, Government Relations
National Milk Producers Federation

Roxana Bekemohammadi
Founder & Executive Director
United States Hydrogen Alliance

Michael Formica
Chief Legal Strategist
Public Policy Office
National Pork Producers Council

COMMENTS OF THE COALITION FOR RENEWABLE NATURAL GAS ON

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 (Dec. 26, 2023)
[REG-117631-23]

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PART I: BACKGROUND

I. RENEWABLE NATURAL GAS MUST BE A KEY PART OF THIS COUNTRY'S EFFORTS TO REDUCE GHG EMISSIONS, ESPECIALLY METHANE.

RNG is an essential tool for addressing methane emissions, and performing against federal and state-level methane abatement goals.

The Inflation Reduction Act of 2022 (IRA) marks "the most significant action Congress has taken on clean energy and climate change in the nation's history."[1] Key parts of the IRA are targeted at promoting investments in clean energy to support a transition to lower-carbon fuels. The IRA is an important tool to help reach this Administration's greenhouse gas (GHG) emissions reductions goals.[2]

One important type of clean energy that promotes the reduction of GHG emissions is RNG. RNG is derived from biogas that "comes from a variety of sources, including municipal solid waste landfills, digesters at water resource recovery facilities (wastewater treatment plants), livestock farms, food production facilities and organic waste management operations."[3] "As organic waste decomposes, it releases a biogas that is 40% to 60% methane (CH_4)."[4] The biogas can be captured and refined to remove contaminants and increase its heat value through a cleaning and conditioning process that produces RNG, which is of pipeline quality and is interchangeable with fossil natural gas. As such, RNG can be used in the same infrastructure and for the same applications as fossil natural gas. In the transportation fuel sector, RNG is currently primarily used in the form of renewable compressed natural gas (CNG) and renewable liquified natural gas (LNG). Because it is interchangeable with fossil natural gas, RNG can also be used in the production of hydrogen as a low-carbon feedstock, as well as a low-carbon power source for electrolytic hydrogen facilities.

Because of its numerous benefits, the U.S. Environmental Protection Agency (EPA) has urged RNG projects where feasible.[5] In particular, RNG reduces GHG emissions stemming from energy consumption and anthropogenic waste, two of the largest sources of GHG emissions in the U.S.[6] "On farms, animal waste is often allowed to decompose in pits or ponds, where it produces

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[1] The White House, *Inflation Reduction Act Guidebook*, https://www.whitehouse.gov/cleanenergy/inflation-reduction-act-guidebook/ (last updated Sept. 21, 2023).

[2] Nothing in the IRA requires actual, specific emissions reductions. This can be compared to the Renewable Fuel Standard (RFS) program, which seeks to increase the use of "renewable fuels" to move away from petroleum through specific volume obligations. The IRA is unlike the California Low Carbon Fuel Standard (LCFS) that requires specific emissions reductions from the transportation fuel sector in California.

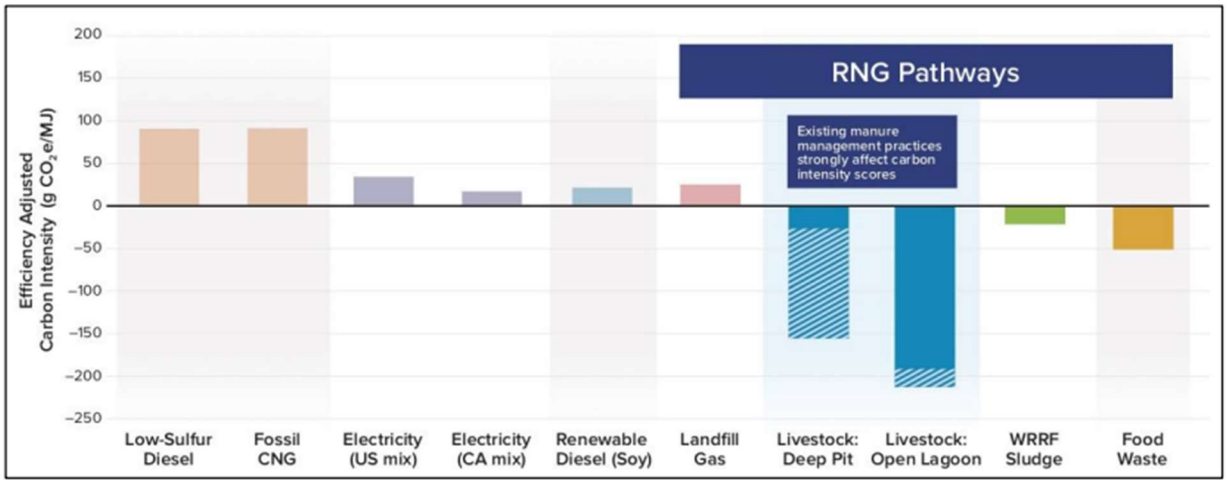
[3] U.S. Environmental Protection Agency (EPA), *Renewable Natural Gas*, https://www.epa.gov/lmop/renewable-natural-gas (last updated on Feb. 12, 2024) ("EPA RNG").

[4] Argonne National Laboratory, *Renewable Natural Gas (RNG) for Transportation* (2021), *available at* https://afdc.energy.gov/files/u/publication/RNG_FAQ_March_2021_FINAL_0.pdf?64c368689c; *see also* EPA RNG, *supra* n.3 ("Raw biogas has a methane content between 45 and 65 percent, depending on the source of the feedstock."). *Cf.* 88 Fed. Reg. at 89,238 n.27 (noting that methane is "principal constituent" of biogas "(50-75 percent)").

[5] EPA, *An Overview of Renewable Natural Gas from Biogas*, at 1 (2020), *available at* https://www.epa.gov/sites/default/files/2020-07/documents/lmop_rng_document.pdf ("EPA RNG Overview").

[6] EPA, *Greenhouse Gas Emissions – Overview of Greenhouse Gases*, https://www.epa.gov/ghgemissions/overview-greenhouse-gases (last updated Feb. 16, 2024).

methane" that is often released to the atmosphere.[7] "At landfills and water resource recovery facilities (WRRFs), biogas is produced from the breakdown of organic waste and typically 'flared' to convert its methane content to CO_2, which reduces (but does not eliminate) its global warming potential."[8] "On a lifecycle basis, RNG can reduce GHG emissions by 95% as compared to diesel, giving it a nearly net zero carbon impact. In cases where biogas would otherwise be released to the atmosphere (e.g., open lagoons), RNG can have a negative carbon impact."[9] This is illustrated in the table comparing carbon intensities of different fuels including RNG from different sources provided below.[10] These carbon intensities are based on results from the GREET model.



Some RNG pathways have very low carbon intensity (CI) scores because they capture emissions that would otherwise be released to the atmosphere. For farms with manure lagoons that currently emit high levels of methane, RNG production can yield negative CI scores. The diagonal-line overlays on bars represent the *range* of carbon intensity scores that can be achieved with corresponding RNG projects. (CA = California; CNG = compressed natural gas; CO_2e = carbon dioxide equivalent; g = gram; MJ = megajoule; RD = renewable diesel; WRRF = water resource recovery facility.) (ANL GREET)

RNG has routinely been identified as among the fuels with the lowest carbon intensity scores. This includes analysis by EPA and the California Air Resources Board (CARB).

RNG can be used to decarbonize hydrogen production, including steam methane reforming (SMR), autothermal reforming (ATR), or pyrolytic pathways. It has been estimated that the total potential of hydrogen from existing sources of RNG to be greater than 4.2 million metric tons per year, from a variety of sources, including landfill gas (2.8 million metric tons (MT)/year), wastewater (600,000 MT/year), animal waste (500,000 MT/year), and industrial and commercial projects (300,000 MT/year).[11] In addition, RNG very uniquely synergizes with carbon capture and storage-enabled gas reformation pathways to meaningfully reduce lifecycle GHG emissions

[7] Argonne National Laboratory, *Renewable Natural Gas for Transportation,* at 1, *supra* n.4.
[8] *Id.*
[9] *Id.*
[10] *Id.* at 3. "Carbon intensity" quantifies GHG emissions of a fuel in grams of CO_2-equivalent per megajoule of energy consumed (CO_2e/MJ).
[11] Anna Simet, *Fueling the Hydrogen Revolution With RNG*, Biomass Magazine, Apr. 13, 2022, https://biomassmagazine.com/articles/fueling-the-hydrogen-revolution-with-rng-18878.

associated with hydrogen production. Crucially, RNG is available today, making it a critical and flexible component in GHG mitigation and the clean energy transition.

RNG Coalition further notes that our members are looking at additional fuel pathways to support clean hydrogen production, including efuels and hydrogen-derived natural gas such as eNG. eNG is created from the production of clean hydrogen (typically produced through electrolysis using solar and wind energy) combined with captured carbon dioxide (CO_2). The Treasury Department should consider inclusion of these innovative fuels or protect against their exclusion through overly burdensome requirements. Like RNG, efuels and e-NG have significant decarbonization benefits and may rely on book-and-claim systems, which should be allowed and not unduly restricted.

II. RNG IS AN IMPORTANT AND EFFECTIVE WASTE MANAGEMENT TOOL TO ADDRESS EMISSIONS FROM NUMEROUS WASTE SITES ACROSS THE UNITED STATES.

Vast RNG development potential is available in the United States today. RNG production is the most climate friendly waste management tool for some of the highest-GHG emitting biomass waste sources.

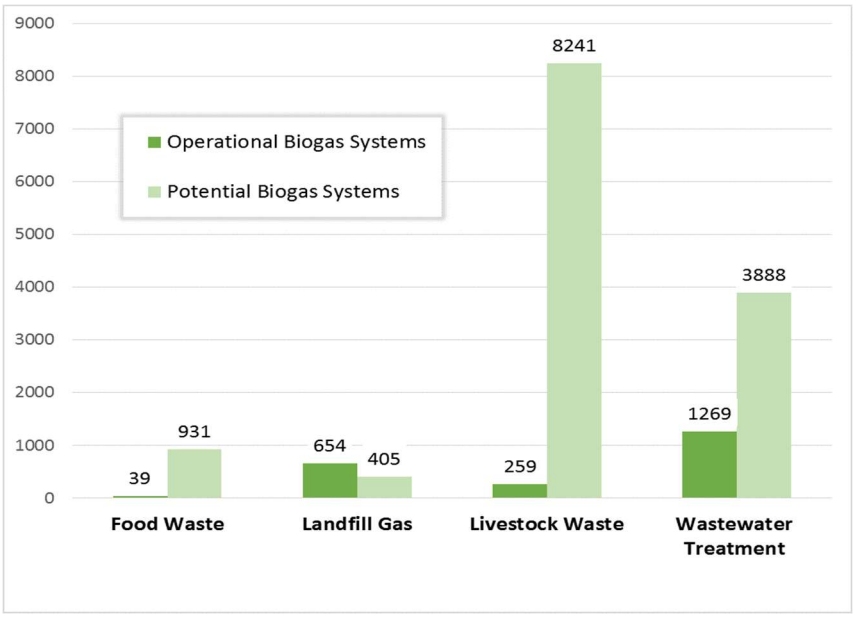
Organic waste is going to continue to exist. It has been estimated that the United States produces more than 70 million tons of organic waste each year.[12] Additionally, the U.S. Department of Energy's (DOE) 2016 Billion-Ton Report[13] base case scenario estimates that 2030 volumes of biomass feedstocks below $60 per ton include: (i) crop residues of 149 million tons per year; (ii) waste resources of 140 million tons per year; and (iii) energy crops of 239 million tons per year. RNG projects can utilize the biogas derived from these wastes to turn methane, which may otherwise enter the atmosphere, into various energy carriers, including hydrogen.

There are thousands of organic wastes sites across the country, with only a very small portion utilizing biogas systems—and an even smaller portion converting that biogas to RNG. As an illustration, the following chart compares operational biogas systems to potential systems in 2017:[14]

[12] Environmental and Energy Study Institute Fact Sheet, *Biogas: Converting Waste to Energy*, Oct. 3, 2017, https://www.eesi.org/papers/view/fact-sheet-biogasconverting-waste-to-energy.

[13] DOE, *2016 Billion-Ton Report: Advancing Domestic Resources for a Thriving Bioeconomy*, at xxii (2016), *available at* https://www.energy.gov/eere/bioenergy/articles/2016-billion-ton-report-advancing-domestic-resources-thriving-bioeconomy.

[14] Environmental and Energy Study Institute Fact Sheet, *Biogas: Converting Waste to Energy*, Oct. 3, 2017, https://www.eesi.org/papers/view/fact-sheet-biogasconverting-waste-to-energy. This table may not reflect all current biogas systems, but it shows the ample breathing room for additional potential projects.



It should be noted that, as of July 2023, EPA has reported that 487 MSW landfills provide landfill gas to one or more energy projects currently in operation, for a total of 532 projects.[15] EPA also estimates that 463 additional "candidate" landfills could "cost-effectively have their methane turned into an energy resource."[16] In addition, many of the existing biogas systems are subject to power purchase agreements that may be expiring, which may result in shutting down those projects.[17] EPA has identified RNG as an available alternative for these projects, depending on gas flows and economics.[18]

The RNG Coalition has initiated a Sustainable Methane Abatement & Recycling Timeline (SMART) that set a goal of capturing and controlling methane from all 43,000 aggregated organic waste sites across North America by 2050, achieving meaningful benchmarks scheduled for 2025, 2030 and 2040. With over 300 RNG projects currently in operation, the first benchmark is to have 500 projects by 2025.[19] This initiative shows that there is interest in significant ongoing investments in RNG. There is ample room for more growth, provided the right incentives are available.

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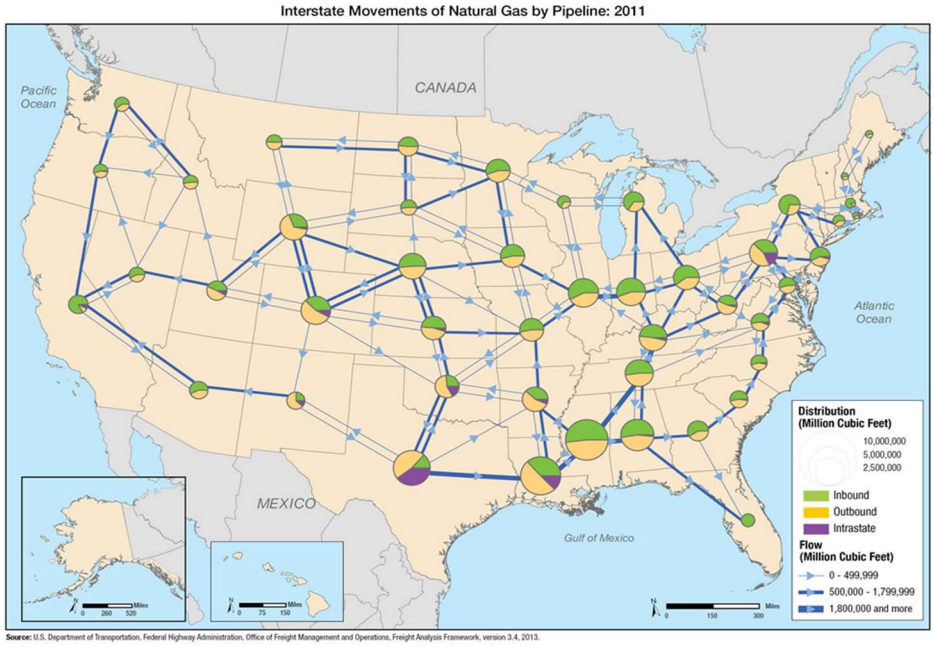
[15] EPA, *Landfill Methane Outreach Program (LMOP): LMOP Landfill and Project Database*, https://www.epa.gov/lmop/lmop-landfill-and-project-database (last updated Aug. 3, 2023).
[16] *Id.*
[17] EPA, *Landfill Methane Outreach Program (LMOP): Toolkit for Expiring Landfill Gas Electricity Power Purchase Agreements*, https://www.epa.gov/lmop/toolkit-expiring-landfill-gas-electricity-power-purchase-agreements (last updated Feb. 14, 2024).
[18] EPA, *Landfill Methane Outreach Program (LMOP): Switch to Renewable Natural Gas*, https://www.epa.gov/lmop/switch-renewable-natural-gas (last updated July 11, 2023).
[19] RNG Coalition, https://www.rngcoalition.com/ (last visited Feb. 25, 2024).

III. BECAUSE IT IS INTERCHANGEABLE WITH FOSSIL NATURAL GAS, RENEWABLE NATURAL GAS CAN BE INJECTED INTO AND WITHDRAWN FROM THE SAME, LONGSTANDING NATURAL GAS COMMERCIAL PIPELINE SYSTEM THAT HAS SERVED THE NATURAL GAS MARKET FOR DECADES.

The natural gas commercial pipeline system,[20] which extends throughout North America, is fully integrated and endowed with significant storage capabilities. Accordingly, natural gas, including RNG, can be transmitted throughout North America, and volumes injected in one location are carefully balanced with volumes withdrawn in another location. In other words, the ownership of volumes (but not the individual molecules) can be tracked throughout the entire system. Storage allows for already existing capacity to meet changes in demand, such as for seasonal weather changes.

Natural gas currently flows fluidly throughout the United States depending on production, weather, LNG export pricing, and natural gas balancing. The vast majority of natural gas pipelines are interconnected, sharing gas flow and balancing, which can be contrasted with the power sector that is grid dependent with limits on wheeling between regions. The map below shows cross-country flows dating back to 2011 illustrating the longstanding interconnectedness of the natural gas commercial pipeline system in the United States.[21]

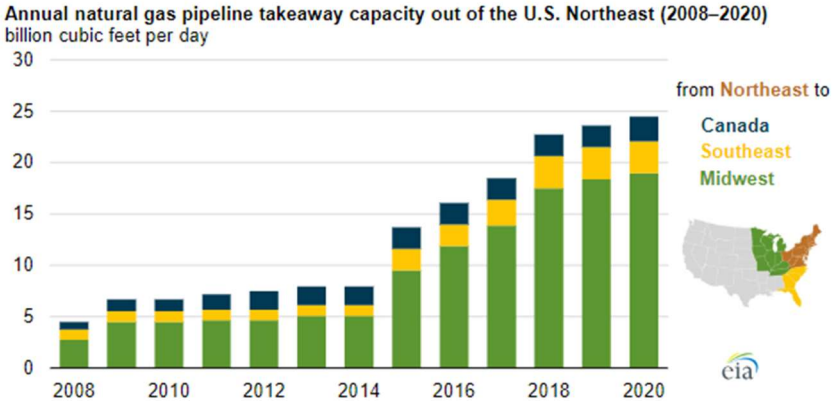


[20] This term is used by EPA in its RFS program, where it is defined broadly to mean one or more connected pipelines that transport natural gas that meets all the following: (1) the natural gas originates from multiple parties; (2) the natural gas meets specifications set by the pipeline owner or operator; and (3) the natural gas is delivered to multiple parties in the covered location. 40 C.F.R. §80.2. This includes, but is not limited to, common carrier and municipally owned pipelines, as well as interconnections via pipeline or truck.

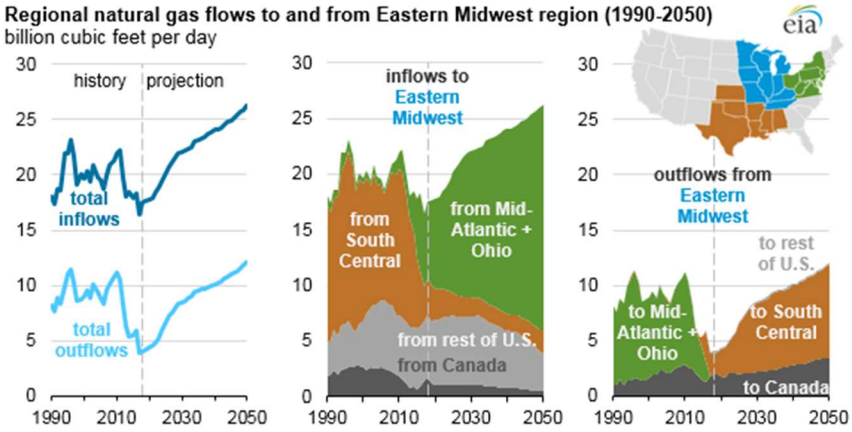
[21] U.S. Department of Transportation Federal Highway Administration, *Interstate Movements of Natural Gas by Pipeline: 2011 Map*, https://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/interstatenatgas2011.htm (last modified Mar. 23, 2020).

For example, natural gas flows from the Northeast to all areas of the United States, from Texas to California, and from the Rockies to California and the Midwest. The entire pipeline system in the United States is interconnected and in some cases is now bidirectionally flowing. Examples are provided below.

Since the development of the Marcellus and Utica formations that cover parts of Kentucky, Maryland, New York, Ohio, Pennsylvania, Virginia and West Virginia, there has been an increase in natural gas flows and pipeline infrastructure from the Mid-Atlantic and Ohio regions to the South Central and West regions as shown in the following table from the U.S. Energy Information Administration (EIA).[22]

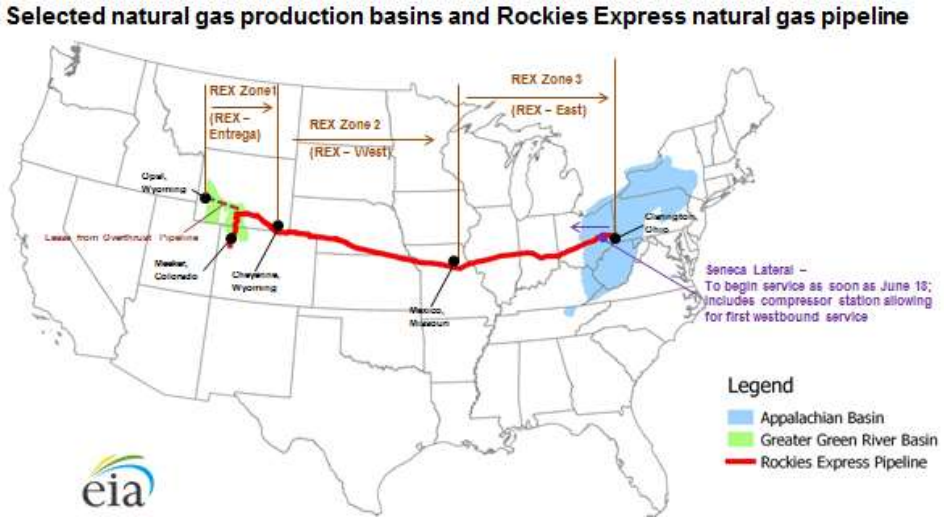


From 2008 to 2018, pipeline capacity out of the Northeast, including the Mid-Atlantic region and Ohio, increased from 5 Bcf/day to 23 Bcf/day of natural gas to accommodate the growth in gas production.[23] EIA has projected continued growth in production from the Marcellus and Utica that will result in even more gas flowing to the Eastern Midwest and ultimately to the South Central region/Gulf Coast.[24]



[22] EIA, *Natural Gas Weekly Update* (for the week ending Sept. 1, 2021), https://www.eia.gov/naturalgas/weekly/archivenew_ngwu/2021/09_02/#itn-tabs-1.
[23] EIA, *Today in Energy: Increases in natural gas production from Appalachia affect natural gas flows*, Mar. 12, 2019, https://www.eia.gov/todayinenergy/detail.php?id=38652.
[24] *Id.*

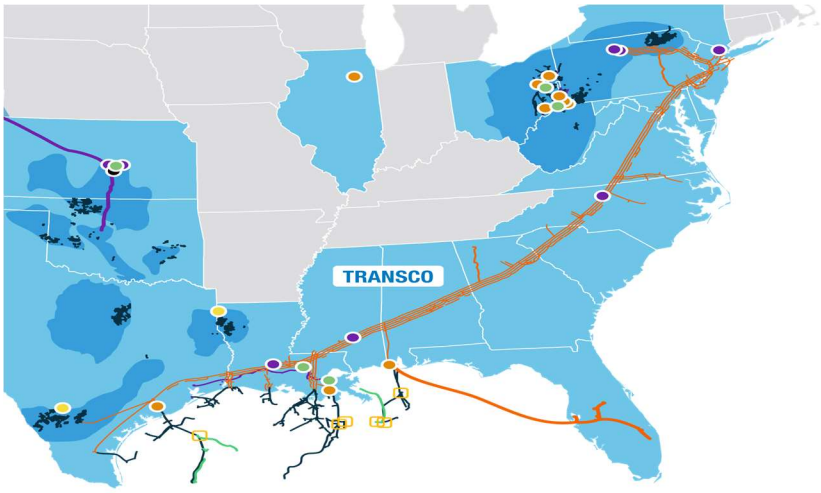
In January 2022, for the first time in its history, the Rocky Mountain Express (REX) natural gas pipeline, which moves bidirectionally from Ohio to Wyoming, had larger gas flows west than east, indicating growth in supply in the eastern U.S. and growth in demand in the western U.S.[25] Ruby Pipeline interconnects with the Rockies Express Pipeline to bring Appalachian natural gas to the west coast.[26]



Source: EIA, *Today in Energy: First westbound natural gas flows begin on Rockies Express Pipeline*, June 18, 2014, https://www.eia.gov/todayinenergy/detail.php?id=16751

In 2018, Transcontinental Gas Pipeline (Transco), which runs from the Northeast to south Texas, received approval from the Federal Energy Regulatory Commission (FERC) to begin construction to allow for bidirectional flow from North to South, where previously it had only flowed from the southern U.S. to northern states.[27] Today, the pipeline transports 15% of the nation's natural gas.[28]

[25] Jon Bowman, *Rex Flows Into the Rockies in January – a Fluke or a Sign of Things to Come?* FACTSET, Feb. 23, 2022, https://insight.factset.com/rex-flows-into-the-rockies-in-january-a-fluke-or-a-sign-of-things-to-come.
[26] Sheetal Nasta, *Ruby, Ruby, When Will You be Mine-Tallgrass Bid Breathes New Purpose into Languishing Ruby Pipeline*, Jan. 8, 2023, https://rbnenergy.com/ruby-ruby-will-you-be-mine-tallgrass-bid-breathes-new-purpose-into-languishing-ruby-pipeline.
[27] Authorization Letter, Transcontinental Gas Pipe Line Company, LLC, FERC Docket No. CP15-138-000, May 15, 2018 (Doc. Accession #2018-0515-3002).
[28] Williams, Operations, https://www.williams.com/pipeline/transco/ (last visited Feb. 25, 2024).

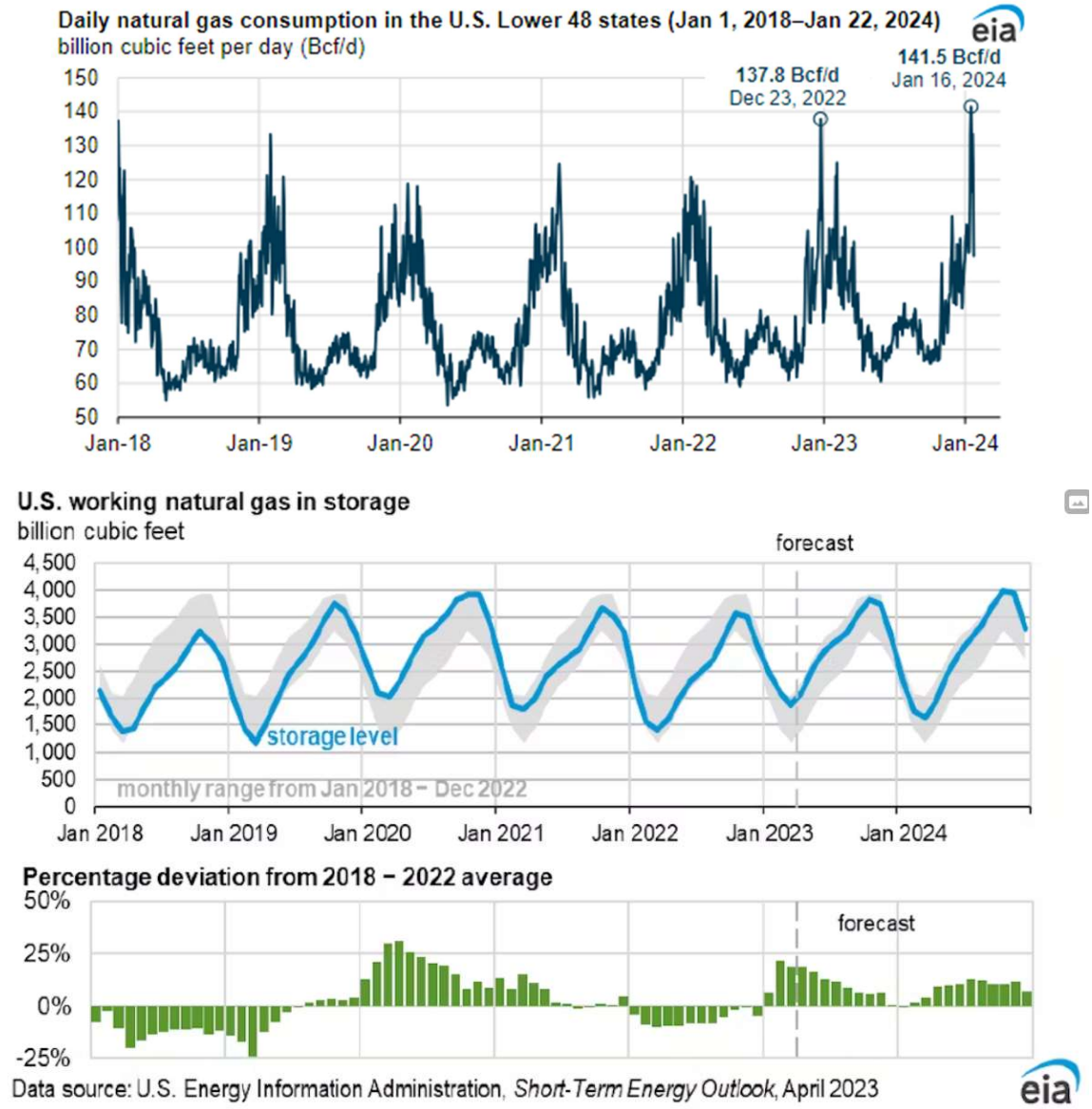


Natural gas has long been distributed through these pipeline systems tracking volumes being injected and withdrawn throughout the entire system. These volumes are carefully tracked, as the pipeline system typically has state and federal oversight and third-party pipelines have metering throughout the system.

In addition, as part of this system, natural gas may be and is often stored. "It is most commonly held in inventory underground under pressure in three types of facilities. These underground facilities are depleted reservoirs in oil and/or natural gas fields, aquifers, and salt cavern formations."[29] An underground storage reservoir has a deliverability rate, which is based on its capacity to hold natural gas for future use and the rate at which gas inventory can be withdrawn.[30] EIA has estimated about 120 entities that operate nearly 400 active underground storage facilities throughout the United States.[31] "If a storage facility serves interstate commerce, it is subject to the jurisdiction of the Federal Energy Regulatory Commission (FERC); otherwise, it is state-regulated."[32] Many of these natural gas storage facilities are "used almost exclusively to serve third-party customers who can most benefit from the characteristics of these facilities, such as marketers and electricity generators."[33] RNG can and is also stored in these same facilities following pipeline injection. The inventory and use of the gas in these storage facilities are also tracked, and EIA collects and publishes data on working gas storage. The ability to store RNG allows production to match demand that may change across seasons. For example, RNG available in storage could respond to increased demand as a result of cold winters or during hot summers.

[29] EIA, *Natural Gas – The Basics of Underground Natural Gas Storage*, https://www.eia.gov/naturalgas/storage/basics/ (release date Nov. 16, 2015).
[30] *Id.*
[31] *Id.*
[32] *Id.*
[33] *Id.*

Average daily usage of natural gas is well below the average amount of storage, and peak storage use is equal to approximately 1-2 months of national natural gas consumption, as reflected in the following charts.[34]



US working natural gas storage.

Storage capacity is also thousands times larger than current RNG volumes, ensuring more than adequate capacity to store any RNG to match timing of demand for hydrogen production. This large storage capacity and widespread use of storage makes the natural gas commercial pipeline system very different from the electricity grid.

[34] EIA, *U.S. natural gas consumption established a new daily record in January 2024*, Feb. 6, 2024, https://www.eia.gov/todayinenergy/detail.php?id=61383; Conglin Xu, *US natural gas storage 19% above average as of March*, Oil & Gas Journal, Apr. 13, 2023, https://www.ogj.com/general-interest/economics-markets/article/14292370/us-natural-gas-storage-19-above-average-as-of-march.

PART II: COMMENTS ON LIFECYCLE GREENHOUSE GAS EMISSIONS AND RNG-to-HYDROGEN PATHWAYS

Section 45V provides a tax credit to produce qualified clean hydrogen, creating a system of tiers under which the amount of the tax credit varies based on, among other things, the "lifecycle greenhouse-gas-emissions rate" of the production process. Section 45V(c)(1)(A) defines "lifecycle greenhouse gas emissions" as having the same meaning as in 42 U.S.C. §7545(o)(1)(H) of the Clean Air Act, subject to Section 45V(c)(1)(B). The Clean Air Act provides as follows:

> The term "lifecycle greenhouse gas emissions" means the aggregate quantity of greenhouse gas emissions (including direct emissions and ***significant indirect emissions such as significant emissions from land use changes***), as determined by the Administrator, related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential.[35]

It is important to note, however, that Section 45V(c)(1)(B) places boundaries on this definition to "only include emissions ***through the point of production (well-to-gate)***, as determined under the most recent Greenhouse gases, Regulated Emissions, and Energy use in Transportation model (commonly referred to as the 'GREET model') developed by Argonne National Laboratory, or a successor model (as determined by the Secretary)." Section 45V(c)(1)(B) ***requires*** the lifecycle emissions to be determined using GREET. It makes sense to require use of GREET because the concept of using lifecycle GHG emissions modeling for regulatory purposes (versus comparisons and policy determinations) is relatively new, and, depending on how it is conducted and the assumptions and boundaries used, can have significant uncertainty associated with it. GREET addresses this by undergoing continuous updates based on improvements to underlying data and scientific developments. The GREET model is also transparent and well known. The following provides comments on the 45V Proposed Rule regarding use of GREET and lifecycle analysis with respect to RNG-to-hydrogen pathways.

RNG Coalition also provides responses to the specific questions posed by the U.S. Department of Treasury and the Internal Revenue Service (collectively referred to as "Treasury Department") in the 45V Proposed Rule related to these issues in Part IV of these comments.

[35] 42 U.S.C. §7545(o)(1)(H) (emphasis added).

I. ADDITIONAL PATHWAYS BEYOND LANDFILL GAS MUST BE INCORPORATED AS SOON AS POSSIBLE.

RNG Industry Position: Generally speaking, the RNG industry appreciates the work that Argonne National Laboratory has done to provide a GREET model targeted for the 45V tax credit. The 45VH2-GREET 2023 model, however, must incorporate the pathways for RNG to hydrogen that are currently included in the R&D GREET 2023 model beyond landfill gas, including, at a minimum, Biogas from Anaerobic Digestion of Animal Waste, Biogas from Anaerobic Digestion of Wastewater Sludge, Biogas from Anaerobic Digestion of MSW, and RNG-to-hydrogen via electrolysis. This can be done by allowing entry of RNG feedstock supplier specific emission values from the R&D GREET 2023 model into the 45VH2-GREET model.

The Treasury Department has adopted the 45VH2-GREET 2023 model to determine emissions rates for purposes of the Section 45V tax credit. A key area of concern with the proposed 45VH2-GREET 2023 model is the lack of specific accounting for the feedstocks allowed to generate RNG for the production of hydrogen. But the GREET model in use at the time of enactment did include additional pathways for RNG. Also, by excluding RNG-based hydrogen pathways, projects will be required to instead assess the lifecycle emissions through filing a petition for a determination of the lifecycle GHGs through a provisional emissions rate (PER). The 45V Proposed Rule states that the PER process "will not address other hydrogen production pathways using biogas and RNG until after the final regulations are issued."[36] Including other feedstocks such as biogas from the anaerobic digestion of animal waste, wastewater sludge, agricultural waste, and other municipal solid wastes (MSW) will reduce the risk of unintended consequences/errors and improve the review/verification efficiency.

We note that Section 45V requires use of "the most recent" GREET model or successor model. The GREET model existing at the time of IRA's passage is referred to as the "R&D GREET" model, and included various biogas and RNG pathways, which incorporate different types of organic wastes such as urban landscaping waste; animal waste; wastewater biosolids; diverted food waste; and other organic wastes found in landfills. These pathways are in the most recent R&D GREET 2023 model. However, the 45VH2-GREET 2023 model only includes landfill gas to RNG pathways. The omission of other RNG pathways contradicts Congress's clear directive to use the existing GREET model or a similar one. While the 45VH2-GREET 2023 model is targeted to Section 45V, any proper "successor" model should have at least the same scope.

Thus, the RNG industry urges that the 45VH2-GREET 2023 model be modified to allow the user to select, at least, each of the following RNG pathways from R&D GREET 2023 in addition to landfill gas based RNG:

1. Biogas from Anaerobic Digestion of Animal Waste,
2. Biogas from Anaerobic Digestion of Wastewater Sludge,
3. Biogas from Anaerobic Digestion of MSW (which can include different waste types, such as food waste and agricultural waste).

[36] 88 Fed. Reg. at 89,240.

Each of these RNG waste types also should be available in addition to landfill gas for selection from the dropdown of available fuel feedstocks which will serve to ensure the emission reduction benefits of RNG can be recognized in the production of hydrogen. Given the carbon intensity of RNG can vary based on a variety of factors, the RNG industry recommends modifications to the 45VH2-GREET 2023 model are made to allow for location, feedstock, and technology specific sources of RNG. RNG to hydrogen via electrolysis also must be considered.

For example, site-specific energy input parameters (e.g., natural gas and electricity usage) and carbon capture and storage or usage should be considered in assessing emissions rates. RNG projects have unique energy requirements based on the different technologies employed, location of project, heat recovery systems, and other factors. They also have unique treatment of CO_2 emissions. Site-specific quantification of these emissions will incentivize RNG producers to minimize emissions.

We note that the measurement tools and processes are in place to track and record site specific data to calculate emissions reductions. This practice will provide the necessary information that can be used to determine the hydrogen's emissions rate for purposes of the Section 45V tax credit.

To effectuate this, the 45VH2-GREET 2023 model need only allow feedstock supplier specific emission values from the R&D GREET 2023 model to be entered into the 45VH2-GREET 2023 model. Nonetheless, we provide specific recommendations on how the 45VH2-GREET 2023 model can also be modified to incorporate these additional pathways in Appendix A, if the R&D GREET 2023 model numbers are not utilized.

II. WHILE THE RNG PATHWAYS MUST BE EXPANDED, THE ABILITY TO SEEK PROVISIONAL EMISSIONS RATES SHOULD NOT BE LIMITED AND SHOULD PROMOTE ADDITIONAL ACTIONS TO REDUCE GHG EMISSIONS.

RNG Industry Position: While the 45VH2-GREET 2023 model must include additional RNG pathways, as discussed above, the ability to seek individualized emissions rate should not be precluded. The intent of the program is to promote additional GHG emissions reductions, and facilities that implement advanced technologies or more sustainable practices should be able to seek improved emissions rates to seek higher tax credits.

The statute provides that "[i]n the case of *any* hydrogen for which a lifecycle greenhouse gas emissions rate has not been determined for purposes of this section, a taxpayer producing such hydrogen may file a petition with the Secretary for determination of the lifecycle greenhouse gas emissions rate with respect to such hydrogen."[37] "Proposed §1.45V-4I(2)(i) would provide that a taxpayer may not file a petition with the Secretary for a PER unless a lifecycle GHG emissions rate has not been determined under the most recent GREET model ... for hydrogen produced by the taxpayer at a hydrogen production facility."[38] The 45V Proposed Rule would further provide that a hydrogen production pathway not included in the most recent 45VH2-GREET 2023 model means "if either the feedstock used by such facility or the facility's hydrogen production

[37] 26 U.S.C. §45V(c)(2)(C) (emphasis added).
[38] 88 Fed. Reg. at 89,225.

technology is not included in the most recent GREET model."[39] The statute provides for provisional emissions rates for "any" hydrogen, which is expansive.

There should be a process in place to support advancements in technologies and further GHG emissions reductions. For example, an RNG project that adds carbon, capture, and sequestration (CCS) or use technology to their facility should be able to seek a provisional emissions rate if CCS is not included in the model for the pathway. In addition, while we have provided some site-specific modifications that should be made to the model, a facility that may be more efficient than the defaults utilized should be able to see a better emissions rate, which should be clarified in the final rule. In the California LCFS, carbon intensity scores are facility specific. Under the RFS, EPA also has a petition process to obtain a company-specific pathway under the RFS program, including providing for a streamlined approval process for ethanol efficient producers.[40] This can incentivize greater lifecycle GHG emissions reductions. Certain criteria could be developed regarding the ability to seek individualized rates to reduce the potential administrative burdens and regulatory delays.

Additionally, specific guidance on the PER process should include deadlines and measurable processing goals to increase project certainty. Also, the PER process should allow for appeals and transparency in decision making.

III. A NEW GREET ANALYSIS FOR RNG IS NOT NEEDED EACH YEAR UNLESS THERE HAVE BEEN CHANGES TO THE FACILITY.

RNG Industry Position: Certainty is needed to support long-term investments. As such, an RNG project should not be subject to potential annual changes to their emissions rate. The applicable emissions rate the year the facility began supplying the hydrogen producer should remain unless the facility undertakes a material change in operations that may affect that emissions rate.

Proposed 1.45V-4(a) would provide that the amount of the Section 45V credit is to be determined each year.[41] RNG producers typically enter into long-term supply contracts. Some certainty in the emissions rate findings would support these investments, rather than potentially creating uncertainty that a facility may no longer qualify or drop a tier in the tax credit amount. If the facility undertakes a change at its facility that may impact the emissions rate, a new emissions rate could be required.

It should also be noted that, to the extent the regulations incorporate the GREET model, any revisions should be subject to public notice and comment. While we appreciate Argonne National Laboratory's updates to the GREET model, the public has a right to review changes that might materially impact their ability to continue to seek the tax credit.

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[39] *Id.* at 89,225-89,226.

[40] EPA, *How to Prepare an Efficient Producer Petition under the Renewable Fuel Standard Program,* https://www.epa.gov/renewable-fuel-standard-program/how-prepare-efficient-producer-petition-under-renewable-fuel (last updated May 19, 2023).

[41] 88 Fed. Reg. at 89,224-89,225.

IV. CONSIDERATION OF AVOIDED METHANE EMISSIONS IS PROPERLY INCLUDED IN ANY LIFECYCLE ANALYSIS FOR RNG.

RNG Industry Position: The RNG industry has long supported use of GREET as a transparent and well-respected lifecycle model that follows the science. The lifecycle GHG emissions analysis properly includes avoided emissions for RNG projects where the biogas may otherwise have simply been flared or released into the atmosphere. We would like to thank the Treasury Department for continuing to recognize "system expansion" as one of the best methods to recognize methane avoidance benefits of RNG. Importantly, emissions avoidance accounting is crucial for RNG development and failure to recognize avoided emissions could limit or be prohibitive to methane abatement.

As the 45V Proposed Rule recognizes, the statute requires only a "well-to-gate" lifecycle analysis (versus "well-to-wheels" as has been used in transportation fuel programs). It lists the following as elements of such an analysis—(a) emissions associated with feedstock growth, gathering, extraction, processing, and delivery to a hydrogen production facility and (b) emissions associated with the hydrogen production process, including any carbon capture and sequestration operations at the hydrogen facility.[42] For RNG feedstock, the RNG industry believes avoided emissions—most notably avoided methane—is a key component of any lifecycle analysis that must be included when determining emissions associated with feedstock production.

The RNG industry appreciates the Treasury Department's consideration of avoided emissions for RNG pathways, which is included in the 45VH2-GREET 2023 model.[43] While the 45VH2-GREET 2023 model currently only references landfill gas, Argonne National Laboratory's GREET modeling has recognized avoided emissions for other RNG pathways, including, for example, the animal waste RNG pathway.[44] The reference case for waste management leads to methane emissions during manure treatment. When this methane is captured using the anaerobic digestion process to produce RNG, it receives a GHG credit equal to the difference between methane emissions generated in the reference case and from the anaerobic digestion process. This GHG credit is created because of methane emissions being displaced in the alternate anaerobic digestion process. Currently, only a small fraction of methane from animal waste is being captured.[45] For example, based on data from the USDA Census of Agriculture,[46] only 7% of dairy farms with more than one thousand cows are currently capturing RNG, representing enormous potential for additional methane capture. Therefore, we can confidently consider the manure management as the reference case.

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[42] 88 Fed. Reg. at 89,224.

[43] DOE, *Guidelines to Determine Well-to-Gate Greenhouse Gas (GHG) Emissions of Hydrogen Production Pathways using 45VH2-GREET 2023*, at 17 (2023).

[44] *See* Han, J., et al., *Waste-to-Wheel Analysis of Anaerobic-Digestion-Based Renewable Natural Gas Pathways with the GREET Model* (2011), *available at* https://greet.es.anl.gov/publication-waste-to-wheel-analysis.

[45] EPA, *Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022*, at Annex 3, Table A-162 (2024), *available at* https://www.epa.gov/system/files/documents/2024-02/us-ghg-inventory-2024-annex-3-additional-source-or-sink-categories-part-b.pdf.

[46] That data shows 2013 dairy farms with more than one thousand cows with 141 having operational RNG projects. 2022 USDA Census of Agriculture, *available at* https://www.nass.usda.gov/Publications/AgCensus/2022/index.php. There are more than 240 additional RNG projects under construction or in development.

Consistent with GREET, any modeling used for determining lifecycle GHG emissions for pathways involving RNG or biogas should include avoided emissions. RNG is derived from the capture, cleaning, and conditioning of surface-level emissions from organic waste streams. Methane that otherwise would have emitted into the atmosphere is refined into a clean, reliable energy resource. The GREET model has consistently included the quantification of avoided emissions benefits by various fuel pathways, including organic waste derived RNG.[47] Accordingly, modeling of emissions avoidances – also referred to as counterfactual scenario analysis – is a well-established element of life cycle analysis science. This approach is consistent with other domestic and international regulatory programs that consider lifecycle GHG emissions, including California's LCFS and the European Union's Renewable Energy Directive II. The international standard regarding lifecycle assessments, ISO 14044, also sets forth a "reference system" under Section 4.4 Life cycle impact assessment.[48] A reference system is used to illustrate the alternative fate and consequences of different production systems. It is this internationally recognized approach that Argonne National Laboratory's GREET model implements in its careful evaluation of counterfactual scenarios when quantifying the emissions that would have been incurred in the absence of RNG's production from organic waste. Furthermore, the 45VH2-GREET 2023 model rightly uses system expansion to account for co-products, and it would be inconsistent for the Treasury Department to use system expansion for co-product allocation but not for calculating RNG carbon intensity scores.

RNG Coalition, however, acknowledges that methane emissions reductions may, at some point, be required. Avoided methane crediting can consider various current practices (e.g., venting versus flaring) and if such actions are voluntary or due to regulatory requirements. Regulatory requirements may impact the ability to obtain "credit" for avoided methane under a lifecycle emissions analysis.

V. "INDUCED EMISSIONS," AS HAS BEEN CLAIMED, ARE SPECULATIVE AND NOT "SIGNIFICANT" INDIRECT EMISSIONS FOR RNG.

RNG Industry Position: The statute imposes limitations on the indirect emissions that can be included when assessing the lifecycle greenhouse gas emissions for hydrogen. Based on that definition, there is no scientific or legal basis to impose incrementality, deliverability, or temporality requirements on RNG to account for so-called "induced" emissions, as they are not "significant indirect emissions" as defined in the statute.

Section 45V incorporates the definition of lifecycle GHG emissions from the Clean Air Act, which is to include "significant indirect emissions" associated with fuel production. In a December 2023 letter to the Treasury Department, EPA provided some explanation of its interpretation of the Clean Air Act definition of lifecycle GHG emissions as it may relate to electrolytic processes for hydrogen.[49] In that letter, EPA indicated that "based on its precedent in

[47] We note that the GREET model may be conservative in estimating avoided emissions by considering a longer impact rather than the more potent short term impacts of methane emissions.
[48] International Organization for Standardization, ISO 14044:2006, Environmental management - Life cycle assessment – Requirements and guidelines, *available at* https://www.iso.org/standard/38498.html.
[49] EPA Letter to Treasury Department, Dec. 20, 2023, *available at* https://home.treasury.gov/system/files/136/45V-NPRM-EPA-letter.pdf.

the RFS context Treasury may reasonably conclude that induced grid emissions resulting from electrolytic hydrogen production must be considered" in the lifecycle GHG emissions analysis.[50] Induced grid emissions were referred to as "indirect emissions," resulting from "adding new incremental electricity demand to the electric grid" that can result in "either increased generation from existing generators, with associated emissions, or new incremental capacity coming online," which can result in increased systemwide GHG emissions from the electric grid.[51] EPA, however, made clear that "it is not determining here what emissions associated with electrolytic hydrogen constitute 'lifecycle greenhouse-gas emissions.'"[52] It further explained that it has not included induced grid emissions in its analysis under the RFS program due to there being an insufficient analytical tool.[53] Nonetheless, EPA largely assumes, without analysis,[54] that it could be "reasonably determine[d]" that induced grid emissions are "significant."[55] Even if this may or may not be true for electricity, it is not so for RNG.

While Congress required the inclusion of consideration of indirect emissions in the lifecycle analysis, there are clear restrictions on what that includes. First, there must be some causal connection between the increased use of RNG for hydrogen and such emissions increases. It is speculative to believe that RNG used for hydrogen results in some "induced emissions" similar to that referenced for electricity. Unlike electricity, most current RNG participates in the transportation fuel market that is part of the federal RFS program and/or a state LCFS (including those in California, Oregon, and Washington).[56]

> No low-carbon or renewable fuel program currently active in the United States requires that credits be produced only from new facilities built for the purpose of generating credits under the program. However, there is strong evidence that demand for clean resources either driven by procurement mandates or voluntary action leads to resource additions without formal additionality requirements.[57]

Where facilities participating in the RFS must have contracted with the party utilizing the fuel for transportation use, it is more likely that RNG for hydrogen production will be from new facilities. As discussed above, there is ample remaining availability of undeveloped biogas potential in North America. There is simply no evidence to suggest that any increased demand for RNG as a result

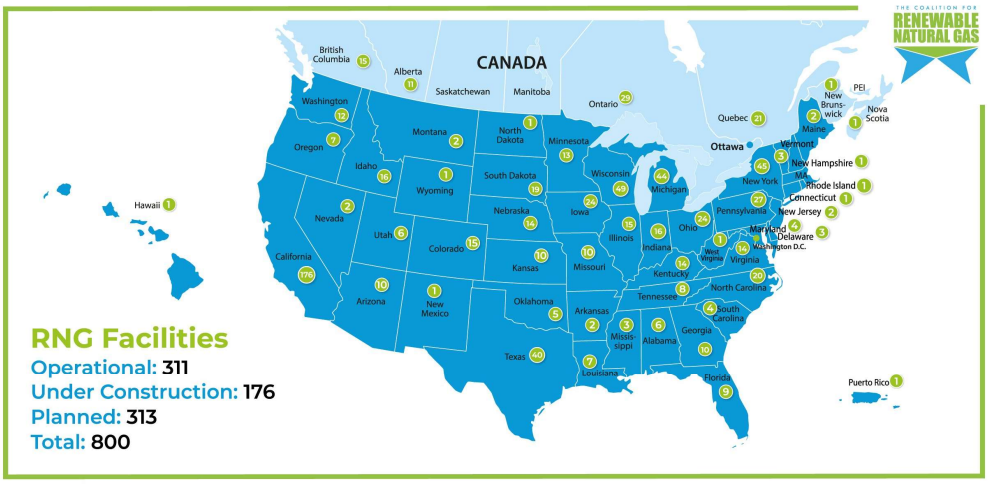
[50] *Id.* at 4.
[51] *Id.*
[52] *Id.*
[53] *Id.*
[54] EPA essentially references the typical reaction of the electric grid to address increased demand and the large amounts of grid electricity required for hydrogen production.
[55] *Id.* at 5.
[56] Additional states have recently passed or are considering similar LCFS programs.
[57] Jeffrey Reed, et al., *Environmental Attribute Credits: Analysis of Program Design Features and Impacts*, The UC Irvine Clean Energy Institute, at 15 (2023), *available at* https://cleanenergy.uci.edu/PDF_White_Papers/Environmental_Attribute_Credits_Analysis_of_Program_Design_Features_and_Impacts_091523.pdf.

of potential increased hydrogen demand as a result of the tax credit will simply result in RNG moving from one market to another, requiring backfilling.

In particular, any premise that diverting RNG from other markets such as current transportation fuel uses to hydrogen as a feedstock will result in increased emissions due to need to use more petroleum diesel or fossil CNG is flawed. First, with respect to total potential, it has been estimated that the total of potential of hydrogen from RNG is greater than 4.2 million metric tons per year, "from a variety of sources, including landfill gas (2.8 million metric tons (MT) year), wastewater (600,000 MT/year), animal waste (500,000 MT/year), and industrial and commercial projects (300,000 MT/year)."[58] This potential could support as many as 11 million fuel cell vehicles, which can go further than gasoline vehicles on less energy.[59] As noted above, the RNG Coalition has estimated approximately 43,000 organic waste sites throughout North America that could potentially produce RNG.

Even if diversion may occur and backfilling were required, these other mandated programs remain in place and seek to *increase* use of renewable fuels. This requires *renewable* fuels to replace any potentially lost renewable CNG, not fossil natural gas or petroleum diesel fuel. Since RNG is, in fact, the most readily available cellulosic biofuel under the RFS program, comprising over 99% of the cellulosic biofuel supplied under the program in recent years,[60] the more likely scenario is that any displaced RNG to hydrogen production applications would be *backfilled with new RNG production* to ensure the RFS targets and other low carbon fuel requirements are met. As shown in the map below,[61] there are almost 500 RNG projects in various stages of construction and development many of which either committed to use as renewable CNG or are being built based on the economics of a financial model that uses RNG as renewable CNG and allows for the production of RINs and LCFS credits. Indeed, based on RNG Coalition database of RNG projects, it is estimated that in 2025, there will be about 2.4 billion ethanol-equivalent gallons of RNG capacity available for transportation fuel use, which is well above the volume requirements set by EPA for 2025, and upwards of 3.2 billion total, including RNG projects with split or unknown uses.[62] In short, there will remain a market for RNG developers who wish to direct RNG to the existing transportation fuel market, and also ample supply of RNG potentially available to support hydrogen production.

[58] Anna Simet, *Fueling the Hydrogen Revolution With RNG*, Biomass Magazine, Apr. 13, 2022, https://biomassmagazine.com/articles/fueling-the-hydrogen-revolution-with-rng-18878.
[59] *Id.*
[60] 88 Fed. Reg. 44,468, 44,481-44,483 (July 12, 2023).
[61] www.rngcoalition.com (last visited Feb. 25, 2024).
[62] 88 Fed. Reg. at 44,470; *see also* RNG Coalition et al.'s Comments to EPA, at 6-7, Feb. 10, 2023 (www.regulations.gov, EPA-HQ-OAR-2021-0427-0756).



Hydrogen likely will also be used to meet transportation fuel demand, allowing these programs to grow.[63] Moreover, hydrogen provides more miles per energy unit, which provides additional emissions reductions. Further, each unit of production is additional because, without these program incentives, production would more likely shutdown and revert to flaring or venting methane. Even if multiple programs incentivize a facility's products, without a regulatory requirement to prevent methane emissions or prohibition on flaring, each unit is additional in that it helps avoid methane emissions or displaces fossil fuel use.

In short, unlike EPA's determination that it could be "reasonably determined" that induced emissions could be "indirect emissions" caused by the increased use of electricity for hydrogen production, this is not true for RNG for at least three reasons, as follows.

- There remains mandated requirements for the bulk of existing markets that are expected to continue to grow that will need to be met by "renewable fuel," not fossil natural gas or petroleum diesel. Under the federal RFS program, this is likely to be met by more RNG.
- There are more than enough biogas sources to support increased RNG production to meet increasing demand.
- It is speculation, at this point, to assume that there will be induced emissions as a result of any potential diversion of existing RNG uses to hydrogen production, much less that those induced emissions will be equivalent to backfilling with fossil natural gas.

Second, and perhaps more important, to be included in RNG's lifecycle emissions, indirect emissions *must be significant.* Significant means: "having or likely to have influence or effect"; "of a noticeably or measurably large amount"; or "probably caused by something other than mere chance."[64] The inclusion of the term significant has meaning and the importance of a lifecycle analysis means that this is not simply an exercise in imagining what might happen. In short, simply

[63] For example, fuel cell trucks and buses have been identified as an opportunity for early adoption of hydrogen. *See U.S. National Clean Hydrogen Strategy and Roadmap* at 18 (2023), *available at* https://www.hydrogen.energy.gov/docs/hydrogenprogramlibraries/pdfs/us-national-clean-hydrogen-strategy-roadmap.pdf.

[64] https://www.merriam-webster.com/dictionary/significant.

assuming there will be emissions increases is not sufficient to meet this requirement. Indeed, as noted above, EPA explained that it did not include emissions that it could not quantify. For example, it declined to include claimed indirect emissions in the "absence [of] a widely agreed methodology" to calculate them.[65] Further, although objected to by the biofuels industry, EPA underwent substantial peer review analysis and considered the uncertainties before including land use impacts in its modeling back in 2010, which had not been included in GREET. As explained below, getting this wrong can have adverse effects on the exact investment that the IRA was intended to promote. As such, more than mere assumptions must be provided and undergo review before claiming such indirect emissions are present, much less are "significant."

The Treasury Department appears to try to avoid the statutory definition by employing the use of the "three-pillar[s]"—matching geographic use, matching temporally with use, and being generated by new incremental capacity. This it cannot do. EPA claims it "believes it would be reasonable to use three-pillar EACs [(energy attribute certificates)] that meet appropriately stringent criteria *as a methodological proxy in lieu of calculating induced grid emissions as part of a lifecycle greenhouse-gas analysis.*"[66] But, as it may relate to RNG, this determination ignores the express statutory limitation that lifecycle emissions must be based on GREET, which is not found in the Clean Air Act definition and is limited to emissions associated with hydrogen production (i.e., a causal link). It also eliminates any meaning of the term "significant," which should not be simply assumed away. Moreover, natural gas use and distribution is distinct from electricity and, as such, the same requirements may not be appropriate to sufficiently track RNG. These three pillars as they relate to RNG are discussed further below.

[65] 79 Fed. Reg. 14,670, 14,841 (Mar. 26, 2010).
[66] EPA Letter to Treasury Department, at 6 (emphasis added).

PART III: COMMENTS ON POTENTIAL REGULATIONS RELATED TO THE "THREE PILLARS" AS MAY BE RELATED TO RNG

For electricity derived EACs, the 45V Proposed Rule includes certain requirements to address what is referred to as the "three pillars"—incrementality, temporal matching, and deliverability. It further states that conditions it intends to finalize for use of RNG in the production of hydrogen would be "logically consistent but not identical" to the requirements proposed for electricity derived EACs.[67] The Treasury Department recognizes that there are differences between electricity and methane, "including but not limited to the different sources of emissions, markets, available tracking and verification methods, and potential for perverse incentives."[68] We acknowledge that the definition of lifecycle GHG emissions incorporated into Section 45V includes significant indirect emissions. However, direct emissions for RNG are different than those for renewable electricity and potential indirect emissions for RNG-to-hydrogen pathways are vastly different compared with those for electrolytic hydrogen pathways. As discussed in Part II, Section V. above, there is simply no evidence that similar "induced emissions" considered by DOE and EPA for electrolytical hydrogen pathways are present for RNG. Nonetheless, we address these three pillars as they may apply to RNG pathways below.

Importantly, we note that each of the requirements cannot be looked at in isolation. The Treasury Department must take a comprehensive look at the various requirements they propose to assess the impact that it may have on disincentivizing clean hydrogen production using RNG and the potential implications for this Administration's goals of accelerating clean hydrogen production over the next ten years. For example, a requirement for first productive use would be contradictory with a requirement to limit the program to only use pre-existing waste streams. The RNG industry respectfully urges the Treasury Department to carefully consider how the final requirements will act in concert when implemented.

I. INCREMENTALITY: PROTECTING AGAINST BACKFILLING WITH FOSSIL NATURAL GAS DOES NOT REQUIRE ADDITIONAL INCREMENTALITY REQUIREMENTS FOR RNG.

RNG Industry Position: The "first productive use" requirement is not authorized by statute and is overly strict to exclude viable RNG projects that could support clean hydrogen production today. Requiring the RNG project and the hydrogen production facility to come on-line in the same year (or for the RNG project to come on-line after) is simply unworkable and must not be adopted in the final rule.

The 45V Proposed Rule does not appear to define "incrementality." In its whitepaper,[69] the U.S. Department of Energy (DOE) noted that "adding electricity load necessitates increasing electricity supply simultaneously because the power grid must be in continuous balance," asserted that "the impact of added electricity load on this added generation and its resulting GHG emissions can be complex," and determined that electricity that does not meet the incrementality, regionality,

[67] 88 Fed. Reg. at 89,238.
[68] *Id.* We provide a table showing these differences in Appendix B.
[69] DOE, *Assessing Lifecycle Greenhouse Gas Emissions Associated with Electricity Use for the Section 45V Clean Hydrogen Production Tax Credit*, at 3-4 (2023), *available at* https://www.energy.gov/sites/default/files/2023-12/Assessing_Lifecycle_Greenhouse_Gas_Emissions_Associated_with_Electricity_Use_for_the_Section_45V_Clean_Hydrogen_Production_Tax_Credit.pdf.

and temporality criteria and have not otherwise adequately demonstrated low induced emissions will most likely not meet the GHG emissions reduction tiers of the Section 45V program.[70] DOE further found that, when EACs that have attributes that meet these three criteria, "it would be reasonable to treat induced grid GHG emissions as zero and for hydrogen producers to deem their GHG emissions from electricity to be the lifecycle GHG emissions associated with the specific generators from which the EACs were purchased and retired."[71] Incrementality would restrict hydrogen production from "new" electricity sources or certain existing sources, such as increased production.[72] First, the "induced emissions" that are referenced by DOE are not applicable to RNG. Further, the 45V Proposed Rule's anticipated incrementality requirement for RNG—referred to as the first productive use requirement—goes well beyond what was done for electricity, does not accurately reflect the realities of getting facilities up and running, and would undermine the goals of Section 45V.

To address the incrementality "pillar," the Treasury Department indicates it anticipates requiring that "the RNG used during the hydrogen production process must originate from the first productive use of the relevant methane."[73] "For any specific source of biogas, productive use is generally defined as any valuable application of biogas (including to provide heat or cooling, generate electricity, or upgraded to RNG), and specifically excludes venting to the atmosphere or capture and flaring."[74] "First productive use" of the relevant methane is proposed to mean "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."[75] In other words, "biogas 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 biogas-based RNG but would instead receive a value consistent with natural gas* in the determination of the emissions value for that specific hydrogen production pathway."[76] While there is understandably a concern regarding potential impacts on existing markets for RNG of hydrogen production's use of RNG, this proposed first productive use requirement is impractical, and may delay, or worse, prevent the decarbonization efforts sought by the IRA.

Directly applying this incrementality concept to RNG leads to fundamentally flawed decision making. Wind and solar generates clean power from inexhaustible resources that may be developed at will, while RNG actively mitigates GHG impacts that would occur "on its own time and scale" as organic waste breaks down. 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 RNG industry due to apprehension of "affecting other new uses," the Treasury Department risks cementing the status quo of continued methane emissions (or flaring) and unachieved abatement benefits, also leading to an unavailability of fugitive methane resources once "other new uses" would demand it. Indeed, a key goal of the IRA was increased investment and buildout of renewable energy

[70] *Id.*
[71] *Id.* at 3.
[72] *Id.* at 10.
[73] 88 Fed. Reg. at 89,238.
[74] *Id.* at 89,238-89,239.
[75] *Id.* at 89,239.
[76] *Id.* (emphasis added).

resources. To realize the full potential of this goal, rules should be written in a way that allows the market to decide the efficient flow of resources, particularly for nascent markets like clean hydrogen. So long as it is "clean hydrogen," the Treasury Department should not pick "winners" and "losers" by placing overly burdensome and strict requirements.

While the RNG industry does not dispute that incentives to capture fugitive emissions and to promote *additional* RNG projects are appropriate goals, Congress sought to promote clean hydrogen, and the first productive use requirement does not meet those goals. Worse, it potentially punishes early actors who acted first to reduce these harmful emissions, potentially forcing them to return to less environmentally beneficial practices if they cannot produce hydrogen or serve other end markets. With the addition of RNG projects, the biogas facility has the incentive to *reduce* fugitive emissions as the gas is monetized. Other fugitive emissions are already considered in the GREET model, and those emissions are generally outside the control of the RNG (or hydrogen) producer (e.g., pipeline emissions). There is no way to further incentivize reduced fugitive emissions from these non-RNG-specific sources through the tax credit for hydrogen. Indeed, while we believe the market can resolve these issues, there are better means to minimize leakage and to ensure existing emission reduction programs remain robust.

A. The Contemplated "First Productive Use" Requirement for RNG Would Undermine the Goals of the Statute.

The first productive use requirement outlined in the 45V Proposed Rule will restrict investment in RNG projects that prevent GHG emissions and hydrogen production that displaces fossil natural gas in hard to abate industrial applications. Rather than make a readily available feedstock available to produce clean hydrogen, the first productive use requirement would cause a significant value discrepancy for new RNG projects creating a market distortion, greater risk of stranded gas for existing projects, added complexity, and higher prices for end-consumers. This would disincentivize, and even prevent, use of RNG to produce hydrogen and is counter to the goals of the IRA, including the goal to reduce GHG emissions through the rapid deployment of clean hydrogen. There should be no restrictions on RNG to ensure investor confidence in developing RNG supply.

1. A "first productive use" requirement would forego readily available feedstock for the deployment of clean hydrogen today.

The proposed restriction appears to misunderstand the available uses of biogas and raises many questions as to how it might apply. The proposal references different types of "productive uses" of biogas, even though only RNG will be used for hydrogen production. Without cleaning and conditioning to RNG, biogas is typically limited to on-site uses, which can continue to be met even if an RNG project is added to the site. Even if some treatment occurs for the biogas to be a medium-BTU fuel, the uses remain limited to local or regional power. It is also unclear how the "specific source of biogas" is defined. A landfill, for example, can have a biogas-to-electricity project and an RNG project, each with their own collection system and with different end users. This first productive use requirement would disincentivize adding an RNG project even though the cleaning and conditioning process removes contaminants, and RNG is a high-BTU fuel that provides more energy. In other words, this provision would support continuing less

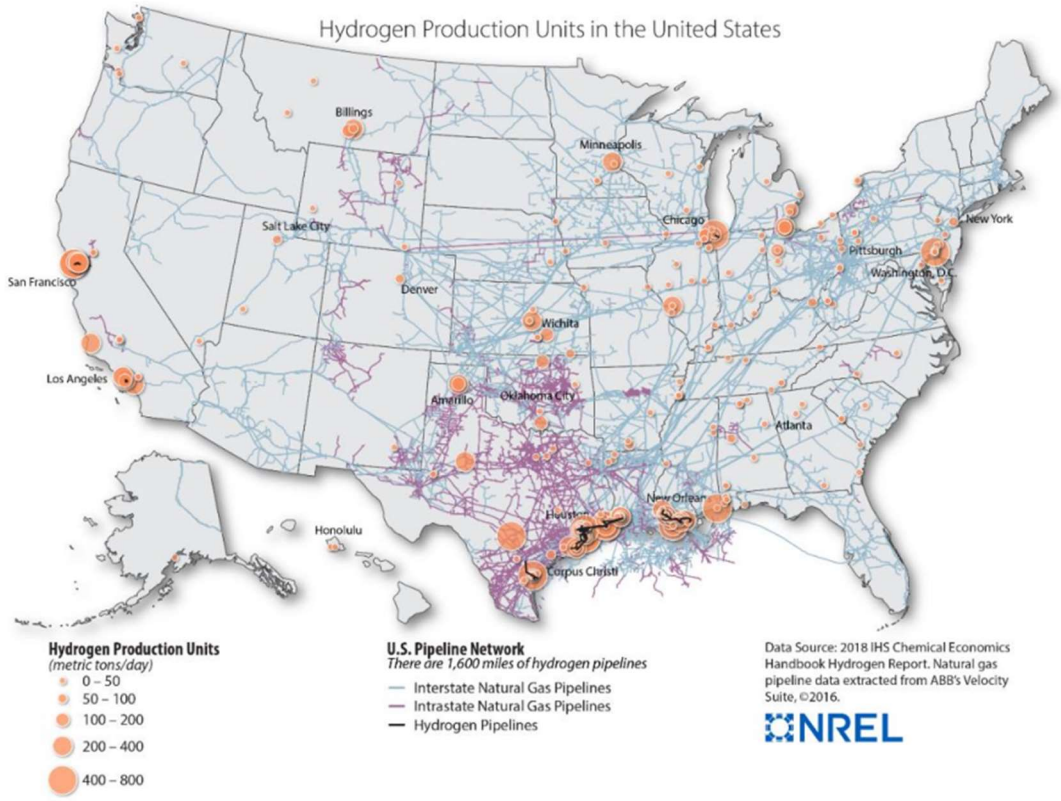
environmentally beneficial projects based on an unproven and unexplained concern regarding backfilling with fossil natural gas.

Looking to the biogas facility also ignores that there may be various reasons an existing biogas facility switches "productive uses." Including, but not limited to, the expiration of a power purchase agreement. As explained above, the alternative to RNG to continue to productively use the biogas is to return to flaring or venting of methane, if there are no economic incentives to continue with the electricity project. The GHG emissions reductions being sought would be lost. Similarly, for RNG projects, unlike some other renewable energy technologies (e.g., solar and wind), there are significant ongoing costs that must be covered to ensure continued operation and associated GHG emissions reductions. If those projects cannot cover their operating expenses, they revert to flaring or venting of methane. RNG projects exist to efficiently abate methane emissions by capturing the emissions and converting them for beneficial use. This process costs additional money for every additional unit of methane abatement and conversion into RNG. If an RNG project loses its eligibility to generate sufficient value for preventing methane emissions (for example, because it fails a poorly constructed additionality test) the facility will not be able to continue operating.

As explained above, there is no evidence provided that similar concerns as expressed with respect to electricity for hydrogen production are present for RNG. In particular, where the statute expressly requires that GREET be used to determine lifecycle analysis, there is no basis to apply an emissions rate that is not based on the actual feedstock used by the hydrogen facility. There certainly is no basis to apply a value consistent with natural gas, which would likely only support use of fossil natural gas for hydrogen simply because the biogas may have had a "productive use" prior to being used for RNG. This is also not consistent with the purposes of hydrogen hubs to ensure diverse feedstocks and to facilitate hydrogen production.

Further, the successful buildout of clean hydrogen in the United States will require flexibility, particularly in regard to feedstock procurement. RNG is a readily available feedstock in the United States—it can be easily delivered via existing natural gas infrastructure to hydrogen projects (as shown in the map of Hydrogen Production Units in the United States below)[77] and registries (both compliance and voluntary) already exist to track RNG and ensure no double counting. The first productive use requirement for RNG places unnecessary restrictions on the ability to ensure available feedstock to produce clean hydrogen, which is counter to the purposes of Section 45V. This is particularly troubling in light of the lack of any evidentiary support provided for such a requirement and the failure to consider the potential adverse implications for RNG and hydrogen investments.

[77] U.S. National Clean Hydrogen Strategy and Roadmap at 43 (2023), *available at* https://www.hydrogen.energy.gov/docs/hydrogenprogramlibraries/pdfs/us-national-clean-hydrogen-strategy-roadmap.pdf.



2. Imposing undue restrictions on RNG likely will increase GHG emissions rather than avoid so-called "induced emissions."

The purpose of IRA is to reduce systemwide emissions, and Section 45V has the potential to do so by incentivizing the production and use of clean hydrogen. If Section 45V is successful, clean hydrogen will reduce emissions largely by replacing natural gas as a source of energy in many hard to abate sectors. Section 45V does not call for or permit wholesale disqualification of a feedstock source from eligibility for clean hydrogen production based on indirect emissions. Instead, it requires measurement of significant indirect emissions using the most recent GREET model. We believe the 45V Proposed Rule provides no scientific basis for finding induced emissions, the statute, at most, allows consideration of "induced emissions" as part of the GREET model analysis. In addition, we believe excluding RNG projects from the hydrogen markets could, in fact, increase emissions, which is counter to the goals of the statute.

RNG production from existing RNG projects today prevents methane emissions (or flaring) from waste sources that would otherwise occur without the RNG project. RNG is primarily used downstream to displace petroleum diesel fuel or fossil natural gas. RNG both prevents methane emissions upstream and displaces higher emissions activities downstream. Changing the downstream end use for RNG does not diminish the emissions that RNG prevents upstream. However, excluding RNG projects from markets will increase methane emissions and changing the end use is likely to reduce systemwide emissions.

First, excluding RNG from potential additional markets would allow methane emissions to go unabated, resulting in *additional* emissions compared to allowing these markets. A fundamental difference between RNG and solar and wind or other biofuels is that RNG is produced from waste. RNG is derived from biogas, a waste product that consists primarily of methane, a highly potent climate pollutant. RNG projects address waste sites that are already in place where RNG projects prevent methane emissions from those sites to be flared or vent into the atmosphere. Managing waste is expensive and solutions that reduce methane emissions like RNG are scarce. Without new market opportunities like Section 45V, the volume of uncontrolled biogas will continue to exceed the demand for RNG, and methane emissions will continue.

Second, RNG used in hydrogen applications reduces systemwide emissions. Hydrogen, as an end use for RNG, is uniquely capable of reducing downstream and systemwide emissions. It may not be feasible for some combustion units to capture emissions. Large methane reforming hydrogen facilities are unique in that they can aggregate very large volumes of RNG. In addition, their facilities are more likely to be of sufficient scale to be able to deploy technology and use existing infrastructure to capture and sequester carbon emissions associated with production.

Negative net indirect emissions from diverting RNG from combustion end uses to hydrogen are a distinctly different outcome than the claimed indirect emissions that may occur in electrolytic hydrogen. This is because hydrogen can, and is intended to, replace its natural gas feedstock in legacy natural gas and petroleum diesel end use applications. This is not true for electrolytic hydrogen and electricity (electrolytic hydrogen is not intended to replace grid electricity as an energy source).

Even if it could be proven that induced emissions associated with RNG use for hydrogen production would occur, in the most conservative scenario, the logical equivalent to designing EAC requirements for electricity that exclude pathways that will not qualify for Section 45V emissions rates would be to add an indirect emissions factor to an RNG emissions rate, not to treat any facility that cannot meet a first productive use requirement as natural gas as indicated in the proposal.

B. The Requirement that First Productive Use Occur Within the Same Taxable Year or After the Hydrogen Facility is Placed into Service is Unworkable.

There also is no statutory basis to require that the first productive use occur in the same taxable year as (or after) the hydrogen production facility is placed into service. The first productive use requirement, especially if coupled with a limitation on eligible waste sources, is overly restrictive and will preclude decarbonization of gas-to-hydrogen, as well as methane abatement at scale. The RNG industry strongly opposes this measure in the form it was proposed.

As an initial matter, the 45V Proposed Rule does not explain the differences between the anticipated first productive use requirement for RNG compared to the 36-month lookback for electricity. The IRA, as written, does not make any distinction in the treatment of hydrogen production technologies that achieve the required GHG emissions reductions to obtain a Section 45V tax credit. We find it difficult to reconcile the same requirement (time of first production for

purposes of incrementality determination, in this case) applying differently based on the hydrogen value chain's technology mix.

While any incrementality requirement appears inconsistent with the statute, whether to apply a "logically consistent" application of incrementality between technologies in our opinion should be based on the capital expenditure-operational expenditure (CAPEX-OPEX) profile of the investments necessary to implement the hydrogen production value chain. Renewable electricity production in most cases has a relatively higher CAPEX investment needs compared to its OPEX requirements. The proportions in the case of RNG are quite the opposite–while significant upfront investment is of course necessary, "keeping the doors of an RNG facility open" entails a proportionally higher ongoing outlay on staffing, process energy procurement, logistics of feedstock procurement and digester cleanouts, maintenance, and replacement of rapidly amortizing assets such as compressors, etc. The following table provides EPA's estimates of capital and operating costs for an RNG project at a landfill.[78]

Table 4-10. RNG Project Components — Estimated Cost Summary[8]

Component	Typical Capital Costs*	Typical Annual O&M Costs*
Gas compression and treatment	$6,200 to $8,300/scfm	$1,200 to $1,400/scfm
Gas pipeline and interconnection	$600,000 for pipelines < 1 mile or $1,000,000/mile for => 1 mile $400,000 for interconnect	

scfm: standard cubic feet per minute
*2020 dollars, O&M costs in first year of operation (2021). Ranges compare a 1,000-scfm to 6,000-scfm system. Economies of scale are achieved for gas compression and treatment at larger flow rates. O&M costs include an annual fee of $2.50 per MMBtu for pipeline injection (this fee may vary by utility) and periodic testing of the RNG to demonstrate it meets utility gas specifications.

We believe that once a solar or wind renewable electricity production asset is built, it generally faces less challenges for ongoing operations that might lead to a premature retirement of the asset. On the other hand, RNG projects, which have significant ongoing operations costs that would continue to ensure ongoing methane abatement, typically face more uncertainty, particularly related to potential policy changes. This makes such projects more vulnerable to being retired, potentially leading to stranded projects and, since the waste streams are still present, lost methane abatement. As such, RNG project retirements could lead to induced GHG emissions increases because the abandoned production of the low-carbon power source needs to be backfilled, with potentially higher carbon sources. Accordingly, extending a longer "lookback period" to RNG production sources for program adoption purposes has lower potential for causing induced emissions than the same "lookback period" for electricity production sources, since RNG projects have a higher risk of getting abandoned than electricity production facilities.

Hydrogen production in many cases—especially when coupled with CCS—will benefit from scale and vicinity of hydrogen demand (this is also very appropriately reflected in DoE's hydrogen hub program). RNG production, on the other hand, is necessarily distributed in nature,

[78] EPA, *LFG Energy Project Development Handbook*, at 4-8 (2024), *available at* https://www.epa.gov/system/files/documents/2021-07/pdh_chapter4.pdf.

because it has to follow the availability of organic waste feedstock. Accordingly, a single major hydrogen production facility may need to aggregate several (as many as twenty) RNG projects to match their gaseous feedstock needs. The challenges associated with successfully timing start of production, at the necessary volumes, of multiple RNG projects with the calendar year of the hydrogen plant's online date are hard to overstate. Hydrogen producers need more flexibility to robustly structure their RNG procurement mix.

The construction timeline for an RNG project is 18-36 months, while hydrogen facilities could take 36-48 months. Several unexpected, localized or macro events, could delay a hydrogen project from meeting its expected online date, nullifying its ability to achieve the hydrogen production tax credit if it planned to use RNG. A likely scenario of a severe weather event which could delay the hydrogen production facility's online date. Implementing this "taxation year" restriction could prevent an otherwise qualified hydrogen production facility from qualifying for the Section 45V hydrogen tax credit is nonsensical, and unnecessarily increases the financing risk of the hydrogen and RNG projects.

The limitation would also create problems for projects seeking financing. Securing a long-term offtake agreement is one of the most desirable ways to secure financing for an RNG project. The first productive use requirement makes this very challenging, if not impossible. The financing parties for the hydrogen projects will require a fixed price for the RNG. To provide this to a hydrogen producer, this "taxation year" requirement means that the RNG supplier would have to choose between one of two options.

1) Wait approximately 18-30 months to time the RNG project online date with the hydrogen facility online date. In doing this, the RNG producer will be required to take on cost escalation risk for the period between signing the definitive long-term contract for RNG sales, and the RNG project's construction start date since suppliers and labor contracts cannot be secured 18-30 months in advance of being needed.

2) Build the RNG project, and let it sit idle until the hydrogen production facility comes online. This would unnecessarily increase the operation risk of the RNG project to sit idle, impacting its future ability to operate most effectively and deliver the desired effect in reducing methane emissions.

Neither of these options is feasible for the RNG project and both are counterproductive to the environmental goal of reducing methane emissions as soon as practicable.

Disqualifying existing RNG projects from Section 45V pathways will effectively trap RNG in end uses that combust methane without carbon capture equipment. It will also eliminate the possibility of establishing RNG to clean hydrogen pathways because matching the startup timing of adequate RNG projects to supply a single hydrogen facility will be impossible to execute. Treasury Department guidance that protects existing sources of combustion emissions at the expense of clean hydrogen production and prevention of methane emissions does not advance the objective to increase clean hydrogen production in light of its "potential to help address the climate

crisis, enhance energy security and resilience, and create economic value."[79] Indeed, this Administration found, with respect to clean hydrogen production, "[a]cceleration is key to meeting our climate goals."[80] To ensure that Section 45V is implemented in compliance with the statute and this Administration's goals, the Treasury Department should permit all RNG projects to be eligible sources of feedstock for clean hydrogen pathways.

C. Although the RNG Industry Opposes the First Productive Use Requirement and There is No Science to Support an "Incrementality" Requirement, the RNG Industry Nonetheless Provides Some Recommendations to Give Additional Assurances Against Unintended Consequences.

1. The Treasury Department should wait until at least 2030 before determining if "Induced Emissions" for RNG may be appropriate to include in any lifecycle analysis.

As discussed above in Part I, Section II, there is simply no basis for imposing any "incrementality" requirements on the RNG industry. Nonetheless, recognizing the concerns of the Treasury Department regarding unintended increases in GHG emissions, the RNG Industry recommends that the Treasury Department conduct a 5-year "check-in" in 2029. This aligns with timing prior to which addressable biogas availability and RNG projects in the industry's project pipeline will ensure that any movement of RNG from one end use to another end use will be backfilled with new RNG production. It also provides the DOE with more time to see how the market actually operates and allow for continuing policy changes to take shape,[81] as the RNG industry is really in its beginning stages as far as reaching its potential supply.

This could allow existing facilities that have achieved commercial operation prior to 2030 to qualify as "incremental" or "additional" facilities for all purposes of the Section 45V credit. If there is evidence in 2029 that show induced emissions may be occurring as a result of hydrogen production and the 45VH2-GREET 2023 model can quantify it, the agency could then specify that following December 31, 2029, RNG projects must be subject to an adjustment in the carbon intensity score of the RNG produced, if any significant indirect emissions have been demonstrated to exist. For the reasons described above, it is our conclusion based on evidence that any indirect emissions factor based on induced emissions is likely to be zero and may even be a negative number.

2. The "first productive use" requirement should not tie an RNG producer to a particular hydrogen production facility.

The RNG industry is also concerned with potential limitations on RNG continuing to be available as a feedstock for hydrogen production even if it could meet the first productive use

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[79] U.S. National Clean Hydrogen Strategy and Roadmap at 1 (2023), *available at* https://www.hydrogen.energy.gov/docs/hydrogenprogramlibraries/pdfs/us-national-clean-hydrogen-strategy-roadmap.pdf.

[80] *Id.* at 5.

[81] As noted above, other states have recently passed and are considering LCFS programs beyond California, which is considering policy changes to its program that might impact the market for RNG in California.

requirement as proposed. Once an RNG source is accepted as meeting a first productive use requirement under the program, it should stay in and not be bound to the hydrogen producer to which it first delivered RNG. Otherwise, a situation could be created where RNG projects developed for participation in the Section 45V program would be fully dependent on the hydrogen producer that they are initially contracted with, posing substantial risk that is going to be prohibitive to investments into methane abatement. If a hydrogen producer chooses or is forced to (e.g., because of bankruptcy of the hydrogen producer, through no fault of the RNG producers) discontinue RNG procurement, the RNG project could get stranded. Similarly, hydrogen producers leveraging RNG for decarbonization must ensure that the discontinuation or unplanned outage of any individual RNG source in their procurement portfolio does not create an outsized risk to their hydrogen product's eligibility for Section 45V incentives. Defining incrementality on an RNG source-basis (i.e. allowing RNG to be directed to different hydrogen producers with different online dates) also ensures that there is higher liquidity of eligible RNG supply available to hydrogen producers looking to cover unfilled RNG procurement needs.

For program implementation purposes, an RNG source may be awarded an "Incremental" qualification during its first successful third-party verification under the Section 45V program. This could be done by a CARB-accredited verifier, EPA-approved Quality Assurance Program auditor, or other party as may be approved by the Treasury Department. This "Incremental" qualifier could be tagged on an MMBtu-basis in the tracking system used for demonstrating delivery to ensure clear and robust claims by any hydrogen producer leveraging the RNG. Any hydrogen producer using RNG that is tagged as "Incremental" would receive the full, unadjusted emissions reductions benefit of the RNG feedstock.

3. The final rule should ensure modifications and upgrades to facilities are recognized as first productive use.

Biogas processing facilities which have existing conditioning and cleaning infrastructure built out may make the decision to construct new waste digesters, cover additional manure lagoons, or invest into procurement infrastructure from additional waste sources. Any of these enhancements to methane abatement require significant infrastructure investments into methane capture and collection capabilities and are thus distinct financial decisions on the part of the facility owner. We request that Treasury Department ensure in the final regulatory language that, if a first productive use requirement is included in the final rule, the determination is performed on the level that the appropriate investment decision is made, per newly added waste source–regardless of whether the additional biogas volumes are processed for pipeline injection in an existing facility.

Similarly, in alignment with the analogous provisions for electricity production sources, existing RNG projects that make significant infrastructure investments that directly or indirectly reduce GHG emissions (e.g., carbon capture and storage units) should satisfy the first productive use requirement.

The 45V Proposed Rule recognizes "uprated production" for electricity, and a similar approach could be taken for RNG. Facilities should be able to seek credit for upgrades that enable reductions in CO_2 emissions per kg of clean hydrogen as well as ones that enable more RNG production. Facilities producing RNG that invest in technologies to enhance their carbon reduction

capacity—for instance, through adding CCS systems—are effectively increasing their contribution to the IRA's goal of reducing emissions of hydrogen production. Such investments are equally valuable to the purposes of the IRA as investments in increasing energy production capacity and should be acknowledged as such. This could be accomplished by also providing for a similar "uprated production capacity" process for RNG to cover increases in carbon reduction capacity that would encompass improvements that boost annual energy output that shows emissions reductions compared to a baseline emissions reduction for the natural gas supply being displaced by the RNG, thereby recognizing a broader range of enhancements that contribute to emission reduction goals.

4. The final rule should provide for potential retirements and conversion of facilities.

In the past decades, biogas-to-electricity facilities were primarily built in the United States based on a demand for renewable electricity to meet state-level Renewable Portfolio Standard obligations. Today, in most cases other resources such as solar and wind are more cost-effective and are prioritized for the decarbonization of electricity. Many biogas-to-power facilities have Power Purchase Agreements (PPA) rolling off their 10 and 20-year period. In many cases, these facilities would be unable to secure a new PPA at a sufficient price point, leading to retirements and a decline in beneficial use of biogas. Where the Renewable Portfolio Standard remains binding, the biogas-to-power facilities would be replaced by some other type of renewable electricity. Accordingly, the Treasury Department should remove electricity production from the criteria of first productive use and allow biogas sources newly converted to RNG pipeline injection from prior electricity generation to be eligible without any induced emissions penalty.

II. TEMPORALITY: IT IS UNNECESSARY TO IMPOSE TIME-MATCHING REQUIREMENTS FOR RNG, AS RNG PROCUREMENT IS ALREADY TRACKED ON A PERIODIC BASIS.

RNG Industry Position: Due to the operations of the natural gas market, where fossil natural gas is displaced by RNG injected into the same natural gas commercial pipeline system, time-matching requirements are not necessary for RNG.

Once injected into the natural gas commercial pipeline system, low-carbon gasses are freely storable and transmittable. As described above, the natural gas commercial pipeline system has significant storage capabilities and is able to track injections and withdrawals from those storage facilities. While time matching is not necessary, a program's implementation may require reasonable boundaries. Even there, any MMBtu that is pipeline injected in calendar year "A" should be freely deliverable in calendar years "A" and "A+1." Moreover, the industry has long operated on reporting of injections and withdrawals from third-party pipeline measurements. Tight time-matching requirements are simply not necessary.

In addition, strict time matching requirements would be unworkable for RNG. In particular, hourly time matching does not apply to the delivery of RNG. Hourly matching is discussed regarding electricity transmission, which can be constrained by geography and the locations of power plants and population centers. These and other policy reasons have led to regional markets with different rules. In particular, unlike RNG, credits issued in different electricity programs,

which are typically based on regional electricity grids, are typically issued by each state with different values and rules. Temporality rules have been created to account for these values, which can be significantly different. In contrast, RNG is actually purchased by the hydrogen producer (not solely credits) and the primary markets are already North American wide. Under the RFS, for example, the credits or Renewable Identification Numbers (RINs) are nationally applicable (including some imports from Canada), and the values do not differ based on the applicable state of origin. Unlike electricity, once natural gas is in the natural gas commercial pipeline system, it is a homogeneous product that can be stored or transported anywhere in the system.

Production and consumption of natural gas has been denominated and reconciled on a monthly basis using utility invoices and point of sale data for many years. The marketplace has signaled that this is an accurate and effective period of time to conduct business and has not warranted a change in either direction. For example, a monthly natural gas utility bill is incorruptible; an RNG producer seeking to fraudulently inflate RNG production volumes would cause the utility to pay for more gas than what was metered, which would never happen.

We further note that hydrogen use in current GHG reduction programs takes place on a quarterly basis as hydrogen does not currently participate in the RFS program. As such, a quarterly accounting period could align more closely with current compliance procedures. Moreover, hydrogen producers should be permitted to balance their hydrogen production with RNG utilized on a quarterly basis. Current GHG reduction programs allow for quarterly balancing between production and utilization across multiple calendar quarters rather than discrete time matching within the reporting time period. The physical nature of RNG combined with ample natural gas storage infrastructure enables this commonplace practice.

Therefore, RNG production, RNG consumption and hydrogen use are all measured and verified at different points in time. A time matching requirement is unnecessary and unduly burdensome for RNG as RNG is continuously monitored and substantiated through various agencies and temporal matching does not exist or make sense for RNG outside of existing policies.

In addition to the standard balancing of supply and demand in the natural gas industry, RNG can be stored over long periods of time, which, unlike electricity, allows the RNG industry to respond to increased demand at different times of the year (e.g., cold winters or hot summers). Excess RNG storage also allows for consumers of RNG to maintain steady state consumption during periods of planned and unplanned downtime at RNG production facilities. The natural gas commercial pipeline system, which extends throughout North America, includes natural gas storage facilities today (no incremental infrastructure is needed) and the concept of storing RNG for use at a later date is a concept that is permitted by the RNG procurement programs today.

Thus, hydrogen producers can (and do) track their RNG procurement and match it to their hydrogen production over a periodic basis with the ability to draw from previously stored RNG. The data can still credibly track, trace, and substantiate consumer use of natural gas to ensure consumption is not double claimed.

III. DELIVERABILITY: THE NATURAL GAS COMMERCIAL PIPELINE SYSTEM IS INTEGRATED ACROSS NORTH AMERICA AND ANY DELIVERABILITY REQUIREMENT CAN BE MET USING THE LONG-STANDING DELIVERY RULES FOR NATURAL GAS.

RNG Industry Position: Because of the interconnectivity of the natural gas commercial pipeline system, which extends throughout North America, and based on the delivery tracking systems long established, there is no need to impose regional geographic restrictions for RNG. The entire North American natural gas commercial pipeline system is the proper geographic scope for the 45V tax credit.

Geographic restrictions narrower than the natural gas commercial pipeline system, which extends throughout North America, on RNG are not necessary and may impose impractical restrictions, impacting the long-standing flow of natural gas throughout the United States. As noted above, a key benefit of RNG for accelerated deployment of clean hydrogen is that it can be distributed across the country in existing infrastructure. It is not possible to physically segregate delivery of RNG once it is intermingled with fossil gas in the pipeline system and geographic limitations are therefore unnecessary and arbitrary. Until RNG volumes achieve more of a critical mass, with broad adoption displacing a significant share of fossil gas, RNG producers cannot change physical flow of the gas system significantly.

Imposing narrower geographic restrictions could adversely impact supply. Establishing the entire natural gas commercial pipeline system as the "geographic" scope for RNG will allow diverse downstream customers to create an aggregate demand that can be served by all RNG suppliers, regardless of geographic location, and thereby send a stronger market signal across the supply chain to all potential project developers to build the RNG resource in a rational way—starting with the most cost-effective projects.[82] Any narrower geographic constraints would require RNG developers to try to change the dispatch of the gas system. This may result in redundant pipeline infrastructure or even increased trucking of RNG, and in many cases will prove to be cost-prohibitive. Imposing strict regionality requirements, then, runs counter to the roadmap for promoting GHG emissions reductions through production of clean hydrogen, particularly through the use of hydrogen hubs that are likely going to include reliance on pipeline distribution.

A. The Natural Gas Commercial Pipeline System is Different than the Electric Grid.

Hydrogen projects (and hubs) are going to require large quantities of RNG to produce the expected volumes of hydrogen. A deliverability requirement that prohibits or severely limits use of RNG distributed in the natural gas commercial pipeline system would preclude most RNG-to-hydrogen projects from access to the tax credit, thus constraining RNG project development throughout the country and increasing the level of investment required to accelerate deployment of clean hydrogen. RNG sources, including the captured emissions produced from landfills and animal waste, are geographically dispersed. RNG also differs fundamentally from other commodities that may be delivered through book and claim systems (e.g., renewable electricity) in that RNG can be distributed through the natural gas commercial pipeline system, which is fully

[82] Moving gas unnecessarily requires additional energy and emissions from compression stations and potential methane leakage.

interconnected across the U.S. and is endowed with substantial existing storage capabilities. Emissions avoidance via displacement of fossil natural gas with RNG in the pipeline system has value irrespective of where the displacement occurs and where the RNG is produced. Use of RNG through the pipeline system is an effective tool for decarbonizing emissions throughout the distribution chain including the end use applications where the product is delivered.

B. Utilizing Existing Frameworks to Track RNG through the Natural Gas Commercial Pipeline System is Appropriate.

The 45V Proposed Rule states that the Treasury Department and IRS are considering providing rules to address whether or how "book-and-claim systems" with sufficient tracking and verification mechanisms may be used to attribute the environmental benefits of RNG or fugitive methane to hydrogen producers in the final regulations.[83] The Treasury Department should permit flexible use of these types of book and claim systems under Section 45V, consistent with Congressional intent. Ensuring RNG through the natural gas commercial pipeline system will be vital to support deployment of clean hydrogen. Efficiencies of scale are inherent to centralized hydrogen production, just as decentralization is inherent to RNG development due to the necessity to co-locate with sources of waste biomass. Since hydrogen is often consumed near its production source, and the infrastructure for hydrogen transportation is insignificant when compared to the existing natural gas infrastructure, hydrogen production facilities cannot often be located near RNG projects. A key benefit of RNG for accelerated deployment of clean hydrogen is that it can be distributed across the country in existing infrastructure. For any meaningful opportunity to decarbonize hydrogen production through RNG procurement, hydrogen producers must be able to aggregate RNG projects across the pipeline grid. Leveraging existing pipeline infrastructure also best facilitates system-wide emissions reduction efforts, consistent with the IRA intent to promote clean energy investment across all U.S. jurisdictions.

Chain-of-custody systems (also has been referred to as guarantee of origin) have been often referred to generally as "book and claim."[84] We note, however, that the natural gas market actually uses a "mass balance" approach to delivery and tracking the chain of custody.[85] Importantly, mass balance differs from "book and claim" systems that have often been criticized, such as those for Renewable Electricity Credits or RECs, in that it requires demonstrated physical connectivity between the production and consumption site of the energy product. RNG sources, including the locations of the captured emissions produced from landfills and animal waste, are geographically dispersed, and the ability to deliver and use the RNG in other regions is an asset. As such, RNG also differs from other commodities that may be delivered through book and claim systems (e.g., renewable electricity) in that RNG can be distributed physically through the natural gas commercial pipeline system, which is integrated across the U.S. and is endowed with substantial existing storage capabilities. Volumes of RNG injected are compared (through documentation that is often controlled and reviewed by independent third parties) to volumes of natural gas withdrawn

[83] 88 Fed. Reg. at 89,240.

[84] "Book and claim" is used in these comments for ease of reference based on the use of this term in the 45V Proposed Rule.

[85] A mass balance approach allows for the mixing of RNG with fossil natural gas in the pipeline system. A mass balance approach is common for products and commodities where segregation of the materials is very difficult or impossible to achieve, such as in the natural gas commercial pipeline system. It is distinguishable from a traditional "book-and-claim" approach that relies on "credits" that represent the sustainability claims.

by the party using the gas on the interconnected system. In other words, unlike RECs, where the electricity can be produced in a completely different region of the country on a completely different grid (without geographic restrictions), the RNG is injected into the same pipeline system from which the natural gas is withdrawn, displacing the same volume of fossil natural gas. It is simply that the particular molecule of RNG cannot be tracked through the pipeline system, requiring some type of book and claim system. The practice in the industry is to balance the volumes being injected and withdrawn from the natural gas commercial pipeline system. Since RNG can both be stored and injected into existing infrastructure, hydrogen producers should be allowed to utilize RNG they purchase that is injected into the natural gas commercial pipeline system to determine their emissions rate and, thereby, the proper level of tax credit under Section 45V.

This system used for RNG is not a new concept and is employed with strict recordkeeping requirements across U.S. and international jurisdictions. Similar flexible book-and-claim systems are used in nearly all North American renewable gas procurement programs, most notably reflected in EPA's RFS, and in LCFS programs in California, Oregon, and British Columbia, as well as Canada at the federal level. Some form of book and claim also underlies Renewable Gas or Clean Heat Standard policies in California, Colorado, Minnesota, New Hampshire, Oregon, British Columbia, and Quebec. In EPA's December 20, 2023 letter, EPA explained why and how deliverability of RNG transported via commercial natural gas pipelines can be tracked without requiring any geographic limitations on the use of RNG beyond being part of the same pipeline system (which can crisscross the entire country):

> Similarly, the EPA's regulations under the RFS program governing the use of renewable natural gas to produce renewable fuel are designed to, *inter alia*, demonstrate deliverability of renewable natural gas transported via commercial pipeline. These regulations require a contractual pathway between renewable natural gas providers and users. They also require that a volume of renewable natural gas claimed for use to produce renewable fuel must be placed into and withdrawn from a commercial pipeline in a manner consistent with that volume actually being used by the downstream renewable fuel producer. That is, the renewable natural-gas injection point must be physically connected to and upstream of the withdrawal point and the volume(s) injected must be equal to or larger than the volume(s) withdrawn; additionally, the injection must occur before the associated withdrawal.[86]

As an example, California regulations for the LCFS refer to a book and claim system for RNG that includes facility registration, custody verification and tracking, matching of injected and withdrawn volumes, and supply-chain wide verification. The CARB regulations for LCFS has rigorous requirements along the entire custody chain of the gas. The end-user would be able to access carbon intensity score, which is driven by information/data on energy use for biogas capture, digester efficiency, efficiency of the upgrader facility, potential pipeline methane leakage etc. Not only is this information/data required, but the buyer of the RNG is very much incentivized to consider it given the implications for the carbon intensity score of the RNG to support their

[86] EPA Letter to Treasury Department, at 5-6.

emissions rate. It is also standard industry practice in voluntary markets under which our industry operates that this information is commonly attached to EACs that are exchanged.

There are means for tracking RNG electronically. RNG Coalition is well-acquainted with various mature and well-developed solutions to ensure the GHG emission reduction benefits of RNG, as well as robust accounting of pipeline injected RNG quantities to prevent fraud and "double-counting." These are readily available for implementation under the Section 45V credit. Because the tax credit does not identify any specific end use for hydrogen, we note, in particular, that the M-RETS RTC program does, in fact, track RNG. This system could easily be used as a model to provide electronic tracking for purposes of the Section 45V tax credit. EPA has also revised tracking of RNG under the RFS program, which will be fully incorporated into its electronic EPA-Moderated Transaction System (or EMTS) in 2025.

In discussing "[e]xisting tracking and verification systems" for RNG, the 45V Proposed Rule appears to conflate tracking and verification processes.[87] While "tracking and verification" are deeply connected functions, they are not identical and the methods of addressing them may be quite distinct. "Tracking" may be done manually (e.g., through maintaining a "paper trail" of inventories and transactions) or through an automated "registry" system that organizes this information (such as the M-RETS RTC program) and is primarily aimed at providing assurance against double-counting, mischaracterization of the delivered commodity (such as claiming a different vintage), and confirming deliverability. Tracking, then, provides for the robust monitoring of transactions between verified facilities, but not the auditing of the facilities themselves. "Verification" of RNG projects, on the other hand, is a process with necessarily manual elements, to be conducted by a qualified third-party professional. We believe that most perceived challenges identified in the 45V Proposed Rule relate to verification functions. Luckily, there are several federal and state-level programs with deep implementation experience in the United States that have readily available regulatory frameworks and verifier accreditation systems for the necessary verification steps – such as the federal RFS and California's LCFS. Indeed, the 45V Proposed Rule recognizes verification bodies under the California LCFS program as "qualified verifiers" for verifying the amount of qualified clean hydrogen claimed under the Section 45V program. In short, these competencies are available today, are mostly already leveraged by RNG producers due to their RFS and LCFS program participation and could be implemented readily in the Section 45V program. Thus, we request that the Treasury Department allow the use of the regulatory frameworks under RFS or the LCFS program for establishing verification requirements under the Section 45V program. 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 45V Proposed Rule are reliably addressed using solutions that exist today.

More information regarding tracking systems is provided in response to the Treasury Department's specific questions in Part IV of these comments.

[87] 88 Fed. Reg. at 89,240.

PART IV: RESPONSES TO SPECIFIC QUESTIONS POSED IN THE 45V PROPOSED RULE REGARDING RNG

RNG Coalition provides its responses to the specific questions on which the Treasury Department and the IRS have requested comments.

Question 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?***

Response to Question #1:

Please see Appendix C for a list of data sources and studies related to RNG projects.

Question 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?***

Response to Question #2:

We incorporate by reference the discussion in Part II, Section V, and Part III, Section I above regarding the misplaced concerns with respect to indirect emission effects from hydrogen production using biogas and RNG.

The Treasury Department appears to be asking this question under the premise that incentivizing the production of RNG for hydrogen production will lead to an increase in emissions in other sectors (i.e., RNG used for hydrogen use causes a CNG truck to fill up with fossil natural gas). This premise is false because the growth in RNG has been significantly the result of a regulatory incentive program that has supported RNG expansion, acknowledging and allowing RNG to be introduced into commercial distribution pipelines to displace fossil fuel. For example, low-carbon fuel programs will continue to need to be met by low-carbon fuels, renewable power programs by renewable power, and, where there is ample potential supply of RNG to meet growing demand, the opening of a hydrogen market should incentivize additional RNG production, not a return to fossil fuels.

Hydrogen produced using RNG (e.g., through SMR) does not similarly result in increased emissions as it switches end use. This is due to the fact the emission benefits occur when fugitive methane is captured at the source (dairy digester, WWTP, landfill, etc.) and injected into the common-carrier pipeline for any potential end use. Given that the methane is immediately captured/avoided at the source, all RNG that is introduced to the pipeline displaces the equivalent volume needed to be derived from fossil fuels regardless of whether that RNG is directed to hydrogen, non-hydrogen transportation, power production, or another market. This is distinguishable from other renewable energy sources. For example, most low-GHG electricity generation technologies "merely" produce power with low emissions. In other words, RNG both

prevents methane emissions upstream and displaces higher emissions activities downstream. Changing the downstream end use for RNG does not diminish the emissions that RNG prevents upstream. However, excluding RNG projects from markets will increase methane emissions and changing the end use is likely to reduce systemwide emissions.

Furthermore, creating the opportunity to use RNG in the Section 45V program will enable participation in an additional market which will drive further GHG emissions reductions, as RNG will be brought on to serve this new market. More demand for RNG projects will drive more RNG feedstock sources economical to develop, allowing the capture of more methane that would otherwise be emitted to the atmosphere. Limiting the access to markets is what will drive indirect emission effects as projects may revert to conventional waste management practices or not be built at all for lack of sufficient markets, particularly for dairies where methane capture is not regulated. An analysis of California's climate change mitigation efforts found that, to meet their GHG emissions reduction goals, "[m]aintaining markets for renewable energy produced from captured dairy biomethane to ensure continued digester development and beneficial use will also be necessary."[88] While most RNG is going to the transportation fuel market today, the need to haul goods in the U.S. will continue to grow and a diversity of clean fuels is needed to meet this growing need, which can include clean hydrogen.[89] There is ample potential supply of RNG, and limiting the use of RNG for hydrogen production—when it is available today—will restrict the ability of the Administration to meet its clean hydrogen production goals. It also will prevent the market to work to allow more efficient uses.

To mitigate concerns around indirect emissions, the Treasury Department should recognize the industry standard practice for tracking RNG which serves to directly link a volume of fuel produced to a single end-use, to ensure against double counting of emissions reductions. The addition of hydrogen as a primary end-use will only incentivize further development of RNG projects to serve the growing need of methane reductions.

We refer the Treasury Department to the Response to Question #3 for a discussion on how taxpayers can verify the chain of custody accounting referenced above.

Question 3: ***How broadly available and reliable are existing electronic tracking systems for RNG certificates in book and claim systems? What developments may be required, if any, before such systems are appropriate for use with RNG certificates used to claim the section 45V credit?***

Response to Question #3:

RNG Coalition acknowledges and appreciates that the Treasury Department has recognized that "book and claim systems" are appropriate for purposes of determining the eligibility of

[88] Ermias Kebreab, et al., *Meeting the Call: How California is Pioneering a Pathway to Significant Dairy Sector Methane Reduction*, at 5 (2022), *available at* https://clear.ucdavis.edu/sites/g/files/dgvnsk7876/files/inline-files/Meeting-the-Call-California-Pathway-to-Methane-Reduction_0.pdf.

[89] EPA, *Why Freight Matters to Supply Chain Sustainability*, https://www.epa.gov/smartway/why-freight-matters-supply-chain-sustainability ("Projections are that by 2025, as international commerce increases and supply chains become more global and complex, shipments of U.S. goods will grow another 23.5 percent, and by 2040, a total of 45 percent.") (last updated May 31, 2023).

hydrogen production for the Section 45V tax credit. However, the 45V Proposed Rule states that "[t]racking and verification mechanisms for RNG ... specific to the needs of the section 45V credit are not yet available, and existing systems have limited capabilities for tracking and verifying RNG pathways, especially in the part of the production process before the methane has been reformed to RNG."[90] It further states that:

> 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 track the vintage of generator interconnection.[91]

We believe these statements do not accurately reflect how RNG is tracked and verified today and may misunderstand the available, well-functioning frameworks that currently underly the RNG industry.

As noted above, RNG is distributed through the natural gas commercial pipeline system, which has long used a type of book and claim system to account for volumes being distributed throughout the interconnected infrastructure (referred to as "mass balance"). This differs from conventional "book and claim" systems where there is free trading of credits representing the commodity separate from the underlying commodity itself and a party in one location can take advantage of emissions reductions in another location, but does not use the product that is the source of the emissions reductions (e.g., an offset). Here, the hydrogen producer—the end user of the RNG—is purchasing the RNG that is injected into the pipeline system that displaces the same volume of fossil natural gas they would have otherwise procured. The hydrogen producer's gas needs are fulfilled from the same pipeline system, although the exact molecules used by the end user may not be the exact molecules injected by the RNG producer. The amount of RNG purchased for hydrogen production will drive the amount of RNG produced and injected into the system, resulting in a greater reduction in GHG emissions.

The RNG industry agrees that a book and claim system is appropriate and needed for the clean hydrogen facility to establish that it is purchasing RNG as feedstock (or as an energy source) in order to determine the appropriate lifecycle GHG emissions rate (or carbon intensity score) for that facility. However, the RNG industry supports using a framework that is aligned with existing programs which have successfully supported the deployment and use of renewable natural gas in North America. RNG is traded across the United States under the EPA RFS and California LCFS program rules to ensure that any RNG claimed as transportation fuel has been reconciled for accuracy and to avoid double counting. Under these systems, the volumes of biogas processed by the RNG project (confirmed by monitoring by the RNG project), the volume of the RNG injected into the pipeline (confirmed by a third-party pipeline operator), and the volume of gas withdrawn for use at the hydrogen plant can all be traced (confirmed by a third-party pipeline operator). Contracts typically call for the information needed for the purchaser to ensure that the RNG

[90] 88 Fed. Reg. at 89,240.
[91] *Id.*

received meets the customer's requirements (e.g., is compliant with the RFS program's eligibility requirements). Despite being subject to attest engagements and third party verification through EPA's Quality Assurance Program (as well as by California LCFS verifiers),[92] there has been no reported fraud under these systems, and there is sufficient oversight to protect against double counting. These same verifiers under these programs could also be used to provide additional oversight over the information being provided to the hydrogen producer.

In short, the digital infrastructure designed to support RNG tracking across North America already exists and is ready to be paired with hydrogen production under Section 45V as envisioned by the Treasury Department, per the following:

> For purposes of the section 45V credit, hydrogen producers using RNG or fugitive methane would be required to acquire and retire corresponding attribute certificates through a book-and-claim system that can verify in an electronic tracking system that all applicable requirements are met.[93]

Most RNG by volume in North America is claimed under the RFS[94] and LCFS,[95] which have functioned successfully to date. Because appropriate book and claim systems and tracking RNG already exists today, there should not be a requirement to create a new system that would be limited to and mandatory for RNG used in the Section 45V program. Registries require significant resources and extended deployment time, which would limit or unduly delay the hydrogen industry if a single new system was required.

RNG Coalition notes, however, that there is a current electronic system that can track the specific requirements for Section 45V compliance. An electronic system, however, should be available as an option, not as a requirement, particularly for RNG producers and consumers that may participate in voluntary markets rather than the RFS or the California LCFS. Whichever system is used, taxpayers can provide the requisite information, which can be verified.

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[92] Proposed §1.45V-5(h) defines what entities can be a "qualified verifier," which, includes, among others, a verification body under the California LCFS. 88 Fed. Reg. at 89,235. Parties that utilize a Quality Assurance Provider, which must register with EPA, should also be allowed to use those same entities for purposes of the Section 45V tax credit.

[93] 88 Fed. Reg. at 89,239.

[94] The RFS program does track RIN generation electronically through the EPA Moderated Transaction System (EMTS). Although the RNG industry has urged it to do so and petitions have been pending for years, EPA has not yet approved any hydrogen pathways. Upon approval of such pathways, RIN generation and retirement reports could be utilized. By January 1, 2025, EMTS will track pipeline injections of RNG intended for transportation fuel use. The credits generated and tracked in the EMTS are based on the strict reconciliation and chain-of-custody documentation, as well as annual attestations. Most, if not all, RNG currently under the RFS program also undergoes third-party verification by a Quality Assurance Provider pursuant to an EPA-approved plan. The necessity of automated tracking of additional items should not be required, provision of additional information by the taxpayer that would be subject to verification should be adequate.

[95] CARB operates a reporting system online called the LCFS Reporting Tool (LRT). Fuel imported or produced in California is reported in this system using quarterly reports. All parties using the system must reconcile the reports for fuel exchanged and all parties are subject to recordkeeping requirements. All fuel reported must have a valid fuel pathway with an associated carbon intensity score that is verified on an annual basis. As with the RFS, all of this reporting is based on strict chain-of-custody documentation for RNG-to-CNG and RNG-to-hydrogen crediting, which is also audited annually.

M-RETS (formerly known as the Midwestern Renewable Energy Tracking System. https://www.mrets.org/) is the electronic certificate tracking system in place that already tracks RNG. M-RETS or an analogous electronic tracking system can also be available for use, which would address concerns related to double counting, ensure transparency in volume origination, and allow integration with other regional programs and markets. M-RETS, for example, currently serves various markets, including Oregon's Clean Fuel Program,[96] utility procurement of RNG in Oregon,[97] California's renewable gas standard,[98] Washington's Clean Fuel Standard,[99] and those who voluntarily purchase renewable gas to meet sustainability goals outside of compliance programs. M-RETS currently includes data points that distinguish between inputs (including account, project, feedstock, and full or partial lifecycle carbon intensity); require proof of generator interconnection or revenue-quality metering; verify generator registration; and track vintage which can be leveraged when updating the system to meet the final 45V requirements. Parties that participate in these programs should be able to use the same tracking systems for purposes of Section 45V. More information on M-RETS is provided in Appendix D.

There is no need to require electronic registration for RNG as a feedstock for hydrogen production. However, to allow its use, language similar to that provided in Proposed § 1.45V–4(d)(2)(v) to define the term "qualified EAC registry or accounting system" could also serve as a basis for providing guidance for an electronic RNG tracking system that may be utilized. While M-RETS is currently the only system that tracks RNG, and, at a minimum, should be included as a viable option for tracking and verification, we expect the number of available RNG tracking systems to grow over time in a manner that mirrors growth in renewable power as Section 45V and other programs are implemented. As such, general criteria as to what these systems should include to be allowed to verify RNG for purposes of hydrogen production should be provided in the final rule.

In sum, the Treasury Department should allow any tracking system that meets the functional regulatory needs of the program to ensure competition and continued innovation. We agree that chain of custody documentation or an electronic tracking system must be used to verify the amount of RNG claimed to ensure that all volumes represented are accurate. As such, Treasury should require sufficient reconciliation between parties and systems to mitigate the potential for double counting. Moreover, any verification processes should leverage current expertise from the verification process in the California LCFS and the Quality Assurance Program under the RFS.

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[96] Oregon Department of Environmental Quality, Clean Fuels Program Expansion 2022 - Filing 2 (Permanent Administrative Order), Pages 35 and 55. https://www.oregon.gov/deq/rulemaking/Documents/DEQ17-2022.pdf.

[97] Oregon Public Utility Commission, Order No. 20-227, OAR §860-150-0050, *available at* https://apps.puc.state.or.us/orders/2020ords/20-227.pdf.

[98] California Public Utilities (CPUC), Decision Implementing Senate Bill 1440 Biomethane Procurement Program, at 50, *available at* https://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M454/K335/454335009.PDF.

[99] WAC 173-424-420.

Question 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?***

Response to Question #4:

We incorporate by reference the discussion in Part III, Section I above regarding incrementality. As explained, the first productive use concept as it is contemplated in the proposed rule oversteps the Treasury Department's authority, improperly excluding eligible RNG projects. There is no evidence that RNG-to-hydrogen pathways will result in the induced emissions that appear to underly the first productive use requirement and such emissions are not included in the GREET model, which is the only basis allowed for assessing lifecycle emissions.

Conversely, disqualifying RNG from eligibility under Section 45V will perversely increase systemwide emissions, forego opportunities for methane emission reductions, and constrain hydrogen production and use in hard to abate sectors, in direct opposition to the IRA's goals.

Thus, compliance can be shown by confirming purchase of RNG and withdrawal of gas from the same pipeline system. The RNG industry has established chain of custody best practices to document and substantiate RNG production and avoid double-counting. The environmental attributes are carried forward to its end use through the following commercial agreements, attestations, and reconciliation activities:

- Agreement and attestations for biogas and attributes with company owning asset
- Agreement and attestations for biogas cleaning and conditioning and equipment operation
- Unredacted records for biomethane amount injected
- Agreement and attestations with local utility or pipeline authority for biomethane injection
- Records needed to substantiate hydrogen production

The above agreements and commercial activities are reviewed and audited annually by both the RFS and California LCFS programs today.

The "first productive use" requirement discussed within the preamble of the 45V Proposed Rule would cause a significant value discrepancy for new RNG projects creating a market distortion, greater risk of stranded RNG for existing projects, added complexity, and higher prices for end-consumers. There should be no restrictions on RNG to ensure investor confidence in developing RNG supply. A "new" RNG project also should not be penalized if it directs its production from one hydrogen production facility to another, which might be built at a later date.

The RNG industry will incrementally grow with use of RNG to produce clean hydrogen under Section 45V. Even if there is removal from the current transportation fuel market, RNG has been operating under the RFS program and, even if there was shifting from CNG/LNG under that

program to hydrogen production, any "backfilling" would have to be done by cellulosic biofuels or advanced biofuels to meet the volume obligations under that program. Also, if hydrogen is used in the RFS program for fuel cell vehicles (FCVs), there is more displacement of fossil fuel because of the efficiency of FCVs compared to vehicles using internal combustion engines.

Question 5. What are the emissions associated with different methods of transporting RNG or fugitive methane to hydrogen producers (for example, vehicular transport, pipeline)?

Response to Question #5:

The primary method of transporting RNG or fugitive methane to any end-user, including hydrogen producers, is through the natural gas commercial pipeline system, which extends throughout North America. A smaller number of projects, which do not have access to a utility interconnect onsite, will typically use vehicular transport to deliver the RNG to an interconnect location into the natural gas commercial pipeline system. The R&D GREET 2023 model accounts for transportation and distribution emissions for all RNG feedstock types in the CNG and LNG pathways. Emissions associated with transportation and distribution for all RNG feedstocks are 331 gCO2e/MMBtu. Once RNG is in the natural gas commercial pipeline system, the emissions are the same as for natural gas, and therefore, the R&D GREET 2023 model already accounts for them (e.g., Animal Waste to off-site CNG can be found in RNG tab cell AF206:AF266). The R&D GREET 2023 model has a default distance of 750 miles (T&D tab cell CG112) for natural gas to refueling station that is used in the RNG calculations to account for transportation and distribution emissions. We would support the existing R&D GREET 2023 model calculations and background data to be used for delivery of RNG to a hydrogen producer.

The emissions associated with RNG transport from vehicular transportation are insignificant (e.g., less than 1 gCO2e/MJ) when compared to the total carbon intensity of an RNG or fugitive methane project. For projects that do have vehicular transportation, the emissions can be calculated in the same method as described above, with an average vehicle mileage (e.g., 30 miles one way) used to calculate the emissions. Similar calculations are in R&D GREET 2023 model for LPG transportation by truck as well as for animal waste transport by truck. A project could calculate a site-specific emissions value to be entered and verified, but given the small overall impact on carbon intensity, a simple toggle for trucking projects could be added to allow for a conservative adjustment to the emissions rate. We would propose to use these or even more conservative estimates to provide comfort to the Treasury Department that fugitive methane emissions are appropriately accounted for.

Question 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?

Response to Question #6:

The premise of this question seems flawed, and we are not aware of any guaranteed "future productive uses" that deliver any real value to RNG projects today. The RNG industry believes that there is a much greater risk of continued emissions by prohibiting RNG-to-hydrogen pathways than by incentivizing them. Section 45V was intended to incentivize production and use of clean hydrogen to reduce systemwide emissions. Similarly, RNG projects exist to capture and convert methane emissions for productive use. Marrying these two objectives will maximize emissions reduction and is consistent with this Administration's goals to reduce methane emissions and promote clean hydrogen production.

As explained in Part II, Section V above, which is incorporated by reference, the Section 45V statutory text defines lifecycle GHG emissions as having the same meaning as in the Clean Air Act, subject to well-to-gate measurement in the most recent GREET model. This definition of lifecycle GHG emissions does not permit evaluation of indirect emissions from changes in end uses for fuels. Indeed, EPA has acknowledged that there are no methodologies to quantify potential emissions associated with the diversion of biofuels for potential future productive uses. However, if the Treasury Department is seeking to minimize the worst potential adverse effects from implementing Section 45V, the overly restrictive first productive use is inappropriate. Indeed, such requirement would not serve to maximize emissions reductions, but could eliminate available low-emission hydrogen feedstocks.

RNG projects prevent methane from venting into the atmosphere. Limiting market opportunities for such facilities means foregoing opportunities to prevent methane emissions or forcing the facilities to revert to venting methane directly into the atmosphere. It is effectively requiring waste handlers to emit methane. As also explained above, Section 45V incentivizes clean hydrogen production and use so that hydrogen can replace natural gas as an energy source in hard to abate sectors. As noted above, *supra* n.63, heavy duty trucking has been identified as one of these applications for hydrogen, and it is a primary market for RNG today. Market demand is not always static, and it cannot be assumed that existing markets will remain at the same level. This is of particular importance for RNG projects because, if existing uses are, instead, reduced or disappear, the RNG project that collected and upgraded that methane will revert to venting methane into the atmosphere (or flaring). Diversity of markets, then, supports continued methane emissions abatement, and the clean hydrogen market should not be unduly limited before it even gets off the ground.

Section 45V's intent was to create technology agnostic incentive for production and use of clean hydrogen to minimize systemwide emissions. Rather than protecting current or theoretical

future uses of RNG that entail end use combustion, the Treasury Department should issue guidance that minimizes systemwide emissions by incentivizing RNG to hydrogen pathways.

Question 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?***

Response to Question #7:

The RNG industry is confident that the Section 45V credit will not incentivize the generation of additional emissions and, consequently, that no additional measures beyond the existing accounting frameworks are warranted.

There is no evidence that people will create additional waste in order to generate more RNG that could benefit from market-based incentives. There have also not been any documented cases of biogas or RNG production driving the production of additional waste or the fraudulent claiming of non-waste commodities as waste streams under either the RFS or the California LCFS programs. The safeguards against perverse incentives in the biogas and RNG industry are hard-wired into life-cycle analysis models: if a waste stream would be disposed of through lower-emitting means in the counterfactual scenario, these indirect emissions would be applied to the carbon intensity of the RNG, making it unviable for the creation of qualified clean hydrogen under the Section 45V program.

We highlight that the approach referred to above (counterfactual scenario analysis – that is answering the question of what would have happened to the waste stream in the absence of RNG production) is used in the 45VH2-GREET 2023 model published alongside the proposed regulations. In the current version of 45VH2-GREET 2023, the counterfactual scenario of landfill gas-based RNG production is the capture and flaring of biogas. Accordingly, landfill gas receives a "flaring credit" for the flaring emissions avoided through RNG production – however, any increase in emissions through RNG production are also recognized in lifecycle analysis, for example by taking into account the difference in destruction efficiency between destruction devices in the counterfactual scenario (flares) and the project scenario (e.g., combustion in CNG vehicle).

The Treasury Department refers to "waste diversion from lower-emitting disposal methods" in their question. While we appreciate the prudent theoretical analysis (which is already part of lifecycle modeling, as described above), we are not aware of any waste disposal methods deployable at scale that fit this description. Waste biomass naturally decomposes and even in the best case emits carbon dioxide (or in many cases more potent GHG gases such as methane and nitrogen oxides). Capturing the methane stream and putting it to beneficial use through its conversion to carbon dioxide is not outperformed by any other commercially feasible, large-scale waste management method. When finalizing measures based on this consideration, we request that Treasury Department keep in mind that RNG production happens only from degradable biomass – accordingly, waste management options such as reuse or recycling do not apply to the waste

streams directed to RNG (and in many cases, RNG production is coupled with the production of useful co-products such as digestate pertinent to fertilizer applications).

Specific to manure wastes, RNG production does *not* incentivize additional manure production or increasing herd size. There has been no empirical evidence to support the "perverse incentive" claims that underly comments that continue to be made by uninformed anti-dairy voices on this topic. Dairy RNG, at current transportation market prices, generates only a small fraction of the gross revenue that is created by milk-sales. What is more, only a small share of that revenue goes to the farmer—the majority will be distributed to cover the costs of the digester developers, the gas marketer, the credit broker, end users (e.g., fleets adopting clean vehicles), the investors, and the banks. Meaning that the farmer does not make enough additional revenue from RNG to justify increasing herd size. Dairy farmers are in the business of milk production and not RNG production. RNG production at farms is usually handled by third-party project developers who constitute a large share of RNG Coalition's membership. These firms take substantial financial risk on these projects, historically because of explicit direction to do so from EPA and related agencies (see direct quote from EPA in Response to Question #8 below).

In addition to the lifecycle analysis-based checks and balances mentioned above, RNG value chains also have economic parameters that counteract any potential incentives for the generation of additional waste. For example, the waste source typically pays a weight-based tipping fee to the RNG project for the service of disposing of their waste. In these cases, the waste becomes a cost point and not a revenue driver to the waste source, meaning that they are financially incentivized to produce less, not more, waste.

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?***

Response to Question #8:

The RNG industry does not believe that the final regulation should contain a limitation on the eligibility of qualifying methane sources. It is also difficult to reconcile the concept of perverse incentives with the first productive use requirements.

The final regulation should not limit eligibility to qualifying methane or waste sources that existed of a certain date. First, the statutory text in Section 45V does not permit this. Second, RNG is produced by cleaning and conditioning (or upgrading) biogas from organic waste streams, such as food waste. These waste streams will continue to exist. Any prohibition on capturing and productively using biomethane from these waste streams is equivalent to a mandate to emit methane into the atmosphere

Freezing waste streams at pre-IRA levels would be virtually impossible due to a lack of monitoring data and the fact that waste streams are not static. Population increases drive total consumption of food, headcounts of farms fluctuate, and the organics collected at materials recovery systems (MRFs) change in quantity over time. Trying to define "pre-existing" waste quantities is very challenging and would end up being arbitrary. It also directly contradicts methane abatement commitments made by the federal government. There is no good justification for not abating a cubic foot of methane because it occurred at a greenfield farm/facility that started in or after 2024.

Any such provision would also hardwire the program to incentivize inefficiency given the methane abatement development potential between waste sources is not equal. On the one hand, IRS intends to disqualify any low-carbon gas infrastructure built prior to the hydrogen facility, and this provision would limit 45V-facing methane abatement buildout to pre-existing waste sources. Since biogas and RNG development (like any other investment decision) tends to prioritize lower-hanging fruits, the program would effectively force developers to allocate investments to waste streams with a higher $/tCH4 abated cost profile since the more efficient development opportunities from pre-existing waste streams were already acted upon.

If existing RNG projects are disqualified from Section 45V feedstock eligibility, one of the most perverse outcomes would be an increase in methane emissions. As noted above, there is ample potential supply of RNG. Diversifying markets is a benefit, not a detriment and ensures these projects can come to fruition and can stay in operation in the long term, avoiding a return to flaring or venting directly to the atmosphere in the event of market fluctuations.

We observe that the Treasury Department's requests for comment regarding RNG questions numbered (7) and (8) regarding how to evaluate potential effects of RNG production on waste streams are analogous with some recent stakeholder debates centered around the potential effect on the centralization of farms and that recognizing the science-based methane avoidance benefits of manure-derived RNG could be perceived as skewing the value drivers of dairy and swine operations. Many of these debates take place in connection with California's LCFS program, which has demonstrated how the recognition of avoided emissions can catalyze large-scale methane abatement at farms. For further discussion on the unsupported claims that have been raised on this issue, see Response to Question #7 above.

Recently, EPA faced similar arguments with respect claims that incentives for biogas-derived fuels under the RFS program promoted use of concentrated animal feeding operations. EPA found:

> The RFS may, along with the CARB LCFS and other programs, incentivize the use of digesters at concentrated animal feeding operations (CAFOs) for the utilization of renewable biofuels, ***however, it does not drive the proliferation of CAFOs.*** The use of manure management systems such as digesters can be a useful tool in nutrient management, if utilized properly. Water quality issues on animal farms often stem from runoff that is high in phosphorus and nitrogen due to manure. Digesters allow for the collection of manure

> and concentration of this nutrient-rich runoff into a single effluent stream, making it easily treatable. However, some farms may not utilize this secondary treatment technology. This decision-making is largely based on state and local regulations.[100] ...
>
> Commenters provided little substantive evidence to support their belief that the RFS program is driving consolidation or expansion of large animal feeding operations, or that the proposed volumes were likely to do so. While it is clear that larger facilities are of the size and scale required to economically support processing biogas into RNG and establishing a pipeline interconnect, this does not mean that the RFS program is a driver of the expansion of large scale animal agriculture that has taken place in the U.S. There are a host of other factors much more likely to dictate facility sizing.[101]

As EPA found, no link between the centralization and growth of farms has been established to date. Detailed reviews of the farming industry data and their potential connection with RNG value recognition also were unable to identify any connection between RNG production and changes in farming buildout or operations, although industry trends of centralization and efficiency improvements have been present over the past 30 years.[102]

Several producer members of the RNG Coalition work closely with swine and dairy farmers and can attest to their farmer partners' commitment to sustainability and improvement of waste management practices. However, this direct experience shows that decisions around development and operations in the dairy and swine sectors are firmly driven by strategic intent to maximize current and future value in the meat and milk markets while maintaining strong environmental stewardship – but not by the intent of increasing RNG value or incurring additional waste production.

While the EPA's Greenhouse Gas Reporting Program (GHGRP) is a valuable tool for tracking the country's emissions based on data reported by industry, its incomplete coverage of RNG waste streams makes it inappropriate to apply to a waste source eligibility determination. For example, the GHGRP relies on reporting through voluntary programs such as AgSTAR and the Landfill Methane Outreach Program (LMOP) that acknowledge that their databases are not exhaustive and may not include data for every anaerobic digester.

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[100] EPA, *Renewable Fuel Standard (RFS) Program: Standards for 2023-2025 and Other Changes: Response to Comments*, at 206 (2023), *available at* https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017OKN.pdf.

[101] *Id.* at 386.

[102] *See, e.g.,* Ermias Kebreab, Ph.D., et al., *How California is Pioneering a Pathway to Significant Diary Sector Methane Reduction*, UC Davis Clear Center, at 14 (2022), *available at* https://clear.ucdavis.edu/sites/g/files/dgvnsk7876/files/inline-files/Meeting-the-Call-California-Pathway-to-Methane-Reduction_0.pdf; William Hohenstein, USDA Office of the Chief Economist, *Dairy production and manure management trends in the United States*, CARB Workshop Presentation, Mar. 29, 2022, *available at* https://ww2.arb.ca.gov/sites/default/files/2022-04/dairy-ws-session-2-USDA.pdf. We have also attached to these comments a letter from RNG Coalition to EPA regarding claims that biogas projects somehow promote concentrated animal feeding operations, which, as noted above, EPA agreed was not occurring.

Question 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?

Response to Question #9:

We incorporate by reference the discussion in Part III, Sections II and III above regarding geographic and temporal deliverability requirements.

Natural gas markets are different from electricity markets by nature of the natural gas commercial pipeline system. The natural gas commercial pipeline system enables injected physical molecules to be accounted for and tied to equivalent molecules that can be dispensed elsewhere in the network carrying associated environmental attributes with assurance.

Under the RFS program, monthly reconciliations take place today and enable substantiation of actual end-use of the RNG and its environmental attributes. Under the California LCFS, reconciliation occurs quarterly. The natural gas commercial pipeline system is resilient to temporal changes due to a number of industry safeguards and real-time monitoring of gas supply, which is heavily scrutinized by the EPA and CARB today.

The natural gas commercial pipeline system operates on a displacement basis, where all injections are balanced with consumption and storage. Physical volumes do not necessarily move – they balance. The temporal or geographic restrictions are not experienced in the commerce of natural gas.

Another fundamental difference compared to electricity is methane's unlimited storability, which is solved in today's natural gas commercial pipeline system through dedicated storage caverns, line packing and other means. While there is no physical basis or justification for limiting temporal deliverability, we recognize that reasonable boundaries are warranted for program implementation. Any RNG that is pipeline injected and then stored in calendar year "A" should be freely deliverable in calendar years "A" and "A+1."

Question 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?

Response to Question #10:

As described in the Response to Question #5 above, there are R&D GREET 2023 model assumptions for methane leakage in existing natural gas pipelines that are already counted (e.g.,

transportation and distribution emissions), and we propose to continue to use existing R&D GREET 2023 model emissions for RNG or fugitive methane as the default. As pipeline data is outside the RNG or fugitive methane producer and hydrogen developer control, the U.S. average is appropriate to use.

Question 11: What counterfactual assumptions and data should be used to assess 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?

Response to Question #11:

As discussed in Part II, Section I, the 45VH2-GREET 2023 model must incorporate different types of RNG projects, not just landfill gas, as it currently does. These pathways should include, at a minimum, biogas from the anaerobic digestion of animal waste, wastewater sludge, and municipal solid waste (MSW). For hydrogen projects using RNG, the carbon intensity score for all RNG projects, including all feedstock sources, should be optional foreground data in the 45VH2-GREET 2023 model. This should be done by having a site-specific carbon intensity score for RNG calculated using the R&D GREET 2023 model that can be entered into the 45VH2-GREET 2023 model. The carbon intensity may vary between RNG projects using the same RNG feedstock pathway, and this carbon intensity score can be verified by a third party for accuracy. The R&D GREET 2023 model already has additional pathways for RNG.

However, the 45VH2-GREET 2023 model also could be adjusted to add the same pathways, as noted in Part II, Section I. In such a case, the counterfactual assumptions are provided below for RNG projects, as well as for each feedstock:

1. Counterfactuals for All RNG Projects

Energy inputs (e.g., natural gas and electricity usage) and carbon capture counterfactuals should be incorporated into the 45VH2-GREET 2023 model for all RNG projects. Every RNG project is unique and developers who strive to reduce a facility's energy intensity or reduce carbon emissions should be able to account for it in the carbon intensity. We would support the same input system that exists in the 45VH2-GREET 2023 calculator for the hydrogen producer.

2. Counterfactual for Biogas from Anaerobic Digestion of Animal Waste

For biogas produced from livestock manure, the counterfactual should be that methane would continue venting from manure handling facilities until such time as that venting is no longer permissible by law or regulation. This counterfactual is similar to the landfill gas industry, where once regulations are in place that require landfill gas to be captured and destroyed, then the counterfactual becomes flaring.

The counterfactual for dairies can vary drastically from one dairy to the next and venting from a lagoon is very much an appropriate assumption. The question is not whether all gas is vented, but how the fraction of manure is managed aerobically vs anaerobically. When dairy RNG

is selected, the site-specific percentage of each baseline manure management system should be entered in the R&D GREET 2023 model. Enabling the fraction of the manure management of these pre-project practices allows for the correct counterfactuals to be entered into the R&D GREET 2023 model manure management categories (waste tab rows 739 and 740) manure management practices (e.g., anaerobic lagoon, solid storage, pasture, etc.). This method will accurately quantify baseline emission that are prevented by the project.

3. Counterfactual for Biogas from Anaerobic Digestion of Wastewater Sludge

The R&D GREET 2023 model provides a reasonable baseline assumption that a digester would be present onsite and the biogas would be flared or consumed onsite. This baseline assumption for all wastewater sludge projects would be used to quantify the avoided emissions. The model does include editable fields for digester type and holding/storage duration of digested and dewatered solids, but since it can be assumed that these values would be the same in the baseline, or counterfactual case, and the project case, there is no need to allow these values or items to be editable and just maintain the R&D GREET 2023 Model baseline assumptions for all cases.

4. Counterfactual for Biogas from Anaerobic Digestion of MSW

The counterfactual of avoided venting/fugitive emissions at landfills from organics diversion is incorporated into the GREET model. The venting/fugitive methane emissions occur without regulations requiring diversion or an economic incentive to cause the diversion. For purposes of calculating the emissions rate for RNG from MSW digesters, the 45VH2-GREET 2023 model must utilize the correct and latest scientific data from EPA showing the national average landfill methane capture rate for food waste is 39%.[103] No national regulation banning organic waste in landfills exists, and additionally the actual national average of landfill methane release should be utilized for scientific accuracy and incentivizing national policy to reduce organic waste in landfills over time.

Additional Suggested Modifications to 45VH2-GREET Model

Similar to what currently exists in the 45VH2-GREET 2023 model, the production of RNG requires its own energy input parameters (e.g., natural gas and electricity usage) for site-specific energy usage. RNG projects will have unique energy requirements based on the different technologies employed, location of project, heat recovery systems, and other factors that need to be accounted for. Site specific parameters will incentivize efficient engineering and operations. These site specific parameters can be verified based on engineering load design or actual energy usage.

Another consideration for an improvement to the 45VH2-GREET 2023 model is to allow for RNG blending to be assessed over a period of time shorter than one year. The proposed rule

[103] "An estimated 61 percent of methane generated by landfilled food waste avoids collection by landfill gas collection systems and becomes fugitive emissions (i.e., is released to the atmosphere)." EPA, *Quantifying Methane Emissions from Landfilled Food Waste*, at 9 (2023), *available at* https://www.epa.gov/system/files/documents/2023-10/food-waste-landfill-methane-10-8-23-final_508-compliant.pdf.

provides that, to claim a Section 45V credit, a taxpayer must determine the lifecycle GHG emissions rate for all hydrogen produced at a qualified clean hydrogen production facility during the taxable year. This requires that there be a single GHG emissions rate calculated for an entire year of production. The Treasury Department should consider permitting taxpayers to conduct assessments of the lifecycle GHG emissions rate for hydrogen produced using smaller periods of time than an entire year (for instance monthly or quarterly). Given the threshold nature of the Section 45V credits, if there is a facility disruption, supply disruption, or other operating reason that interferes with the production of clean hydrogen meeting a certain GHG emissions threshold, taxpayers should not be penalized for valid production of clean hydrogen in other periods of a year.

Another modification we believe is necessary in the 45VH2-GREET 2023 model is to allow the user to input RNG from multiple sources. Steam Methane Reforming (SMR) units and other hydrogen facilities require significant amounts of methane and may need to contract multiple sources of gas feedstock to ensure hydrogen can be produced at the lowest levels of carbon emission per kg. Hydrogen producers must be able to aggregate RNG production facilities across the pipeline grid. The Treasury Department should allow hydrogen producers with the ability to include various RNG sources, each with different lifecycle emission profiles, and factor into the modeling of their hydrogen products aggregated emissions. As stated above, to the extent that a blend of RNG with varying carbon intensities can be accommodated within the 45VH2-GREET 2023 model, fewer projects will require a filing following the PER process.

Question 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?

The suggestions provided in the Response to Question #11 and Appendix A address how the 45VH2-GREET 2023 model should be modified to recognize the site-specific factors which drive the avoided methane value and accurate carbon intensity accounting. Allowing these site specific RNG carbon intensity scores as calculated in R&D GREET 2023 model or allowing these specific site modifications in the 45VH2-GREET 2023 model will reduce the need for project to seek PERs, reducing the burden placed on the Federal Government, which will allow clean hydrogen project development to occur faster without sacrificing quality or risking additional gaming. We recommend that these site-specific inputs be verified by a third-party, a practice that is already common in our industry.

In addition, RNG-based PERs should be considered for RNG facilities that submit third-party validated claims to material improvements to site-specific emissions based on site-specific engineering, technology, or equipment improvements. Emissions weighted incentives like Section 45V will drive emission reducing innovation across the hydrogen supply chain. As such innovation becomes commercially viable and common in the industry, they should be incorporated into the most recent 45VH2-GREET 2023 model.

PART V: COMMENTS ON OTHER RULES APPLICABLE TO HYDROGEN FACILITIES

I. TREASURY DEPARTMENT SHOULD INCENTIVIZE EXISTING FACILITIES TO MAKE MODIFICATIONS TO PRODUCE CLEAN (OR LOWER CARBON) HYDROGEN.

Rather than impose overly stringent requirements for RNG use in the production of clean hydrogen, the final rule should consider how to support actions that will provide further GHG emissions reductions, consistent with the statutory language and intent. To support the rapid deployment of clean hydrogen, considering how to support facilities moving from using fossil natural gas in the production process to RNG. This will provide much needed emissions reductions sooner and reduce the potential environmental impacts of building new plants.

A. The 80/20 Rule

In the 45V Proposed Rule, the Section 45V credit allows for an existing clean hydrogen production facility to establish a new placed-in-service date for purposes of Section 45V, even though the facility contains some used property. It would, however, limit application of a new placed-in-service date only for facilities that meet the IRS "80/20 Rule," meaning that it qualifies only if the retrofitted energy property is not more than 20% of the facility's total fair market value.[104] The 80/20 Rule is a very high (and expensive) bar to meet so in practice this would exclude many existing hydrogen facilities and thus not create any incremental demand for RNG until new facilities are brought online, the majority of which would not be until the 2027-2028 time period. When you couple this with "first productive use" concept, the end result will not further Congressional intent of any near-term decarbonization as all RNG projects either in operation or in development would not be eligible to source RNG as a feedstock qualifying for the Section 45V credit. For example, we propose that, if an existing ATR/SMR switches from fossil natural gas to new or recently constructed RNG, this should allow for such hydrogen facility to be considered as a new plant under the 80/20 Rule to alleviate the need for companies to rebuild existing hydrogen plants and accelerate decarbonization efforts.

B. Switching from Fossil Natural Gas to Renewable Natural Gas

The 45V Proposed Rule recognizes that modifications of an existing facility to produce clean hydrogen may qualify for the production tax credit under certain circumstances.[105] However, it also states that "[c]hanging fuel inputs to the hydrogen production process, such as switching from conventional natural gas to renewable natural gas, would not qualify as a facility modification for purposes of proposed §1.45V-6(a)(2)."[106] Fuel switching from fossil natural gas to RNG, however, should be an important pathway for decarbonizing existing sources of hydrogen production, providing cost-effective GHG emissions reductions today. This can be especially important for existing hydrogen facilities where carbon capture investments are not economically

[104] 88 Fed. Reg. at 89,235-89,236.
[105] *Id*. at 89,235.
[106] *Id.*

feasible. While RNG can be used in the same applications as fossil natural gas, fuel switching should be considered a modification "to produce qualified clean hydrogen."

Thus, the final rule should clarify that the acquisition of new feedstocks necessary to produce qualified clean hydrogen at a previously nonconforming facility may give rise to a new qualified facility under Section 45V, whether the feedstock expenditure is chargeable to capital. At a minimum, the Treasury Department should adopt a rule to allow a taxpayer's capital expenditures on newly constructed RNG systems that supply a hydrogen production facility to qualify as a modification to the hydrogen production facility. This capital investment will be significant as it typically takes more than one biogas facility to allow an existing hydrogen plant facility to qualify as a clean hydrogen facility. Investment in a new RNG-production facility that is dedicated (whether through direct connection or via dedicated supply agreements) to an existing hydrogen-production facility to be an eligible modification for qualified clean-hydrogen facility. The Treasury Department should clarify that placing in service of such RNG project, which requires capital expenditures, should meet the statutory requirements for modifications.

One possible way to encourage these GHG emissions reductions is to clarify what is a qualified clean hydrogen production facility. Section 45V(c)(2)-(3) provides that a "qualified clean hydrogen production facility" is a facility that produces hydrogen with a lifecycle GHG emissions rate of not greater than 4 kg CO2e/kg of hydrogen, where such hydrogen is produced in the U.S., in the ordinary business of the taxpayer, for sale or use, and where the production and sale or use of such hydrogen is verified by an unrelated party. The production of qualified clean hydrogen prior to January 1, 2023 was impossible as no hydrogen could or would have been verified by a third party as qualified clean hydrogen prior to such date since section 45V was not effective until January 1, 2023. Thus, under the statute, no hydrogen facility properly can be treated as having been placed in service as a "qualified clean hydrogen production facility" before 2023.

The final rule should provide that the earliest a qualified clean hydrogen production facility can be treated as having been originally placed in service is January 1, 2023, to be consistent with the statute. This rule also is consistent with the policy objectives of the IRA in incentivizing taxpayers to reduce GHG emissions. This requested clarification would incentivize hydrogen facilities using natural gas prior to 2023 that resulted in hydrogen with a higher carbon intensity to switch to an RNG fuel source to produce qualified clean hydrogen.

This request is consistent with the modification rule under Section 45V(d)(4) which allows a later placed in service date for a hydrogen facility originally placed in service prior to 2023 where there are amounts paid or incurred with respect to such modification that are properly chargeable to capital account of the taxpayer. For example, where a taxpayer makes capital improvements to use a different fuel source for hydrogen production, the modification rule would apply and the placed in service date of that pre-2023 hydrogen facility for purposes of Section 45V may be later than January 1, 2023 – i.e., the data such modifications are undertaken. Further, this request is also consistent with the "80/20 Rule" that allows new (i.e., post-2022) hydrogen facilities to receive a new placed in service date where the fair market value of the "new" facility contains no more than 20% of "existing" property. Absent this requested clarification, Section 45V will fail to incentivize the use of cleaner fuels, such as RNG, at an existing, high carbon intensity hydrogen facility.

C. Calculation of Clean Hydrogen Production in a Year for Section 45V Credits

The Treasury Department should permit the calculation of the GHG emissions rate of a clean hydrogen facility on a monthly basis. The proposed method of calculating a single GHG emissions rate for all hydrogen produced in each calendar year is an impediment to adoption of clean hydrogen production technology, particularly with large natural gas fired hydrogen plants planning to substitute with RNG. As noted, there is a tremendous opportunity for RNG to displace the use of fossil natural gas in clean hydrogen facilities and to advance decarbonization of hydrogen across America. However, the scale of hydrogen facilities is large compared to RNG facilities, and significant numbers of RNG facilities would be required to support development and expanded decarbonization of existing hydrogen facilities. The time it would take to amass a supply of RNG to fully serve a hydrogen facility could take many years, and in combination with any additionality restrictions, the once-per-year calculation will likely inhibit investment in hydrogen facilities, inhibit investment in low carbon RNG supply, and deter adoption of the lowest emissions hydrogen production.

Hydrogen facilities using natural gas as a feedstock should be able to store and release purchased eligible RNG, calculate a GHG emissions rate for all hydrogen produced in an individual month of production, and apply the corresponding Section 45V credit value for such month. This will provide greater incentive for the construction of hydrogen facilities, increase the production of the cleanest hydrogen, drive the adoption of RNG facilities including RNG facilities with CCS and carbon negative sources, and provide a continuous path for the deepest levels of decarbonization.

II. THE SECTION 45V TAX CREDIT CANNOT AND SHOULD NOT PRECLUDE PARTICIPATION IN OTHER FEDERAL, STATE, OR LOCAL INCENTIVE PROGRAMS.

The 45V Proposed Rule states: "In all cases, attribute certificates would need to document the RNG or fugitive methane procurement for qualified clean hydrogen production claims and that the environmental attributes of the RNG or fugitive methane being used are not sold to other parties or used for compliance with other policies or programs."[107] While we understand limiting the sale or use of the same *volume* of RNG to other parties beyond the tax payer (i.e., hydrogen facility purchasing the RNG as feedstock or as energy source), we do not believe it is the intent of the Section 45V program to limit or preclude RNG from participation in other federal, state, or local programs that may also seek to achieve environmental benefits.

Indeed, the statute includes no such prohibition, despite the fact that Congress is well aware of other incentive programs.[108] In particular, a hydrogen facility utilizing RNG to produce clean hydrogen as defined in Section 45V program should be eligible to claim the resulting Section 45V tax credit, and not be barred or limited from participating in the federal RFS or a state LCFS

[107] *Id.* at 89,239.

[108] Agencies have "no constitutional or common law existence or authority, but only those authorities conferred upon it by Congress. 'It is axiomatic that an administrative agency's power to promulgate legislative regulations is limited to the authority delegated by Congress.'" *Michigan v. EPA*, 268 F.3d 1075, 1081 (D.C. Cir. 2001) (quoting *Bowen v. Georgetown Univ. Hosp.*, 488 U.S. 204, 208 (1988)); *see also Sierra Club v. EPA*, 705 F.3d 458, 469 (D.C. Cir. 2013) ("Because the statute leaves no room for exemptions, such as those at issue, granting the permitting authorities discretion to apply the exemption is beyond the EPA's statutory authority.").

program, if the RNG-derived hydrogen is being used as a transportation fuel or to make a transportation fuel (e.g. SAF, marine fuel, or other fuel) used in the contiguous U.S. and/or the applicable state (e.g., California), respectively. These programs, in particular, seek to incentivize the infrastructure necessary to increase the use of biofuels in the transportation fuel markets. The RFS program, like Section 45V, seeks to promote lower carbon fuel, but does not impose specific emissions reductions. Instead, the tax credit and these other programs are different incentive structures, even though they both seek to obtain environmental benefits, including, but not limited to, GHG emissions reductions. These programs should work together. EPA, for example, has long recognized that other federal and state tax incentives *support* the RFS program by promoting production and use.[109] And, biofuels, including renewable CNG/LNG, typically participate in both programs, so long as they can meet the eligibility requirements of those programs. Moreover, Congress indicated that it intended credits in other regulatory programs (e.g., RINs) to be considered in lifecycle analysis, which would not make sense if participation in these other programs could also not occur when the hydrogen producer seeks a tax credit.[110] The final rule should clarify this statement and make clear that participation in other federal, state and local programs does not impact the ability to receive a production tax credits under Section 45V. Moreover, the regulations should allow, if available, the taxpayer to utilize the same tracking system used for these other programs, such as California LCFS. To prevent double counting, IRS should adopt a requirement that all the environmental attributes associated with the RNG are being used only in association with the one reported withdrawal of gas, and with no other gas. Any environmental attributes of the RNG (including EACs generated) should be claimed and retired only once, and used for no other purpose, except for demonstrating compliance with programs that relate to the ultimate use of such clean hydrogen derived from RNG.

[109] *See, e.g.,* 77 Fed. Reg. 59,458, 59,467 (Sept. 27, 2012); 88 Fed. Reg. at 44,473.
[110] 168 Cong. Rec. S4165, S4165-S4166 (Aug. 6, 2022).

Appendix A
Recommendations for Additional RNG-to-Hydrogen Pathways in the 45VH2-GREET 2023 Model

For hydrogen projects using RNG, the carbon intensity score for all RNG projects, including all feedstock sources, should be optional foreground data in the 45VH2-GREET 2023 model. The carbon intensity may vary between RNG projects using the same RNG feedstock pathway, and this carbon intensity score can be verified by a third party for accuracy. The following provides our recommendations for how the 45VH2-GREET 2023 model can readily incorporate additional RNG-to-hydrogen pathways or the R&D GREET 2023 model to calculate site specific carbon intensity scores to enter into the 45VH2-GREET 2023 model.

A. Biogas from Anaerobic Digestion of Animal Waste

1. Livestock Type

The carbon intensity of an animal waste RNG project will vary based on the type of livestock the waste is collected from and the baseline treatment of that waste (see section 1.b below). A selection based on the share of livestock in a project should be integrated into the modifications. A "drop down" that includes the GREET model parameters that currently exist for animal waste in the Argonne National Laboratory R&D GREET 2023 model in RNG tab cells D29:J30 (e.g., dairy cows, swine, etc.) should be included.

2. Site-Specific Baseline Manure Management

For determining the appropriate counterfactual scenario for RNG derived from animal waste, it is important to consider the end fate of manure in the absence of an anaerobic digester. Currently the R&D GREET 2023 model recognizes the state-specific default manure management practices based on where the anaerobic digester is located. However, these default percentages reflect averages across each state and do not provide an accurate reflection of practices that occur at individual farms. As a result, we believe the 45VH2-GREET 2023 worksheet should calculate the avoided emissions associated from anerobic digestion and the associated RNG project using site-specific baseline manure management practices. The worksheet should have a menu that enables the user to identify what fraction of the manure was handled using each of these pre-project practices. The worksheet would allow the user to select from the existing R&D GREET 2023 model manure management categories (waste tab rows 739 and 740) manure management practices (e.g., anaerobic lagoon, solid storage, pasture, etc.) and enter the percentage of manure directed to each manure management practice. As each RNG project's emissions reduction benefit will vary significantly based on the pre-existing manure management practices, it is crucial to have this drop-down selection to accurately calculate the carbon intensity.

In situations where the livestock operation is new, and no pre-existing practices exist, then the applicant should provide documentation as to the prevailing manure management practices for new livestock operations in the region and use those practices as the project baseline. In situations where the livestock operation is unable to document pre-project manure handling practices, then

the 45VH2-GREET 2023 model should apply default based on existing practices in the state where the project is located.

3. Type of digester

The R&D GREET 2023 model provides four digester technology options: Covered Lagoon, Complete Mix, Horizontal Plug Flow, and Mixed Plug Flow, each with different assumptions with respect to biogas yield, leakage rates, energy consumption, etc. The user of the 45VH2-GREET 2023 model should select the digester technology which corresponds to the digester from which the RNG is sourced similar to the dropdown selection in cell E39 in the R&D GREET 2023 model.

B. Biogas from Anaerobic Digestion of Wastewater Sludge

The R&D GREET 2023 model provides a reasonable baseline assumption that a digester would be present onsite and the biogas would be flared or consumed onsite. This baseline assumption for all wastewater sludge projects would be used to quantify the avoided emissions. The model does include editable fields for digester type and holding/storage duration of digested and dewatered solids, but since it can be assumed that these values would be the same in the baseline, or counterfactual case, and the project case, there is no need to allow these values or items to be editable and just maintain the R&D GREET 2023 Model baseline assumptions for all cases.

C. Biogas from Anaerobic Digestion of MSW

The combination of waste type and baseline management practices are the main items when determining the avoided emissions associated with anaerobic digestion of MSW. The following two section identify the values and items that should be editable to the user, while the remaining items in the R&D GREET 2023 model should be set and remain at U.S. Average.

1. Waste Type

The R&D GREET 2023 model allows the user to select from a long list of potential waste types to select when modeling RNG from MSW, or utilize the U.S. Average. This pathway in the R&D GREET 2023 model includes a variety of wastes, including food waste and agricultural waste. Within the 45VH2-GREET 2023 model, the user should have the option of selecting the U.S. Average default within the R&D GREET 2023 model or a user defined selection of the fraction of feedstock between (1) food waste, (2) green waste/yard waste and (3) mixed MSW, totaling 100%.

2. Landfill / Baseline Practice

The R&D GREET 2023 model allows the user to select the U.S. Average or user defined baseline management practice of waste between – landfilling, incineration, composting, and anaerobic digestion. Within the 45VH2-GREET 2023 model, the user should have the option of selecting the U.S. Average default or a user defined selection of the baseline practices for each

feedstock. The remaining selectable items around landfilling (e.g. climate, gas treatment, etc. in Section d.1 Landfilling in the "Waste" Section of the R&D GREET 2023 model) should be set at U.S. Average and not be editable to the user.

D. Utility Energy Use and Emissions Capture for All RNG Projects

The 45VH2-GREET 2023 model should quantify emissions for site-specific energy input parameters (e.g., natural gas and electricity usage) and carbon capture and storage or usage. RNG projects have unique energy requirements based on the different technologies employed, location of project, heat recovery systems, and other factors. They also have unique treatment of CO_2 emissions. Site-specific quantification of these emissions will incentivize RNG producers to minimize emissions. These emissions can be verified based on engineering design or actual energy usage.

E. RNG-to-Hydrogen Via Electrolysis

Another important consideration for modification of the 45VH2-GREET 2023 model is to include RNG as a pathway for hydrogen production via electrolysis. Biogas from an anaerobic digester that is cleaned and conditioned to RNG can be used by an electricity generator located at an electrolytic hydrogen production plant. That generator can use RNG in lieu of fossil natural gas which is then used to produce electricity to produce hydrogen via electrolysis. Alternatively, an animal manure digester can produce electricity at a co-located generator and export negative carbon electricity to the grid. Those negative-carbon intensity Renewable Energy Certificates (RECs) can then be procured by the electrolytic hydrogen facility to lower the carbon intensity of the hydrogen, and achieve greater carbon reductions per kg of hydrogen produced.

Appendix B
Comparison of Renewable Electricity and RNG

Characteristics	Green Power (solar and/or wind)	RNG
Cost Structure and Availability		
Cost relative to the fossil equivalent energy commodity	Lower than fossil fuel	Higher than fossil fuel
Current share of the respective energy market	About 13% of electricity	Less than 1% of natural gas
Cost to convert to hydrogen	High (relative)	Low (relative)
Potential for Clean Hydrogen Production		
Potential for clean hydrogen production	High	High
Generation Characteristics		
Intermittency of energy generation	High decree of intermittency, and induced Solar – generation only when the sun shines Wind – no production in low wind conditions	RNG – generally steady production, considered "base load"
Storage and Dispatchability		
Storage	Electricity grid systems do not have substantial storage. Electricity generation must be modulated to meet demand.	Gas systems have substantial seasonal storage and a high degree of flexibility. NG and RNG can be physically stored to levelized production.
Back-up capacity	There is an active market for capacity to ensure grid stability. When demand needs to be "back-filled" due to intermittency of renewables, power is provided by fossil-fuel fired peaker plants leading to "induced emissions"	Gas storage is part of the system physical balancing, so storage provides the system levelling.
Grid System Balancing, Capacity and Administration		
Management of grid balancing and capacity	There are six regional reliability entities managing their respective grid regions to ensure reliability. U.S. Grid Regions | US EPA. With renewable power comprising and increasing share, constraints in network distribution can occur	The NG system is nationally balanced through a network of interconnected pipelines and storage facilities. Gas movements are not administered by regional authorities. RNG is a small part of the total; constraints rarely occur.
Authorities managing data for trading of renewable energy	Authorities trading RECs are regionally divided among 10 tracking systems Renewable Energy Tracking Systems | US EPA .	The US EPA administers the national RFS system. California administers the LCFS system. Both RNG from across the country using balances of injections and withdrawals. M-RETS has a registry for RTCs.

Appendix C
Response to Question 1 – List of Data Sources and Studies Regarding RNG

The following is a list of data sources and studies regarding renewable natural gas production and lifecycle analysis. We would be pleased to provide additional information as may be requested.

U.S. Department of Energy

- Argonne National Laboratory, *Renewable Natural Gas Database*, *available at* https://www.anl.gov/esia/reference/renewable-natural-gas-database. Argonne maintains a database of renewable natural gas transportation projects that are currently in operation or under construction. It was last updated in January 2022.
- Sarah E. Baker, et al., *Getting to Neutral: Options for Negative Carbon Emissions in California*, Lawrence Livermore National Laboratory (2020), *available at* https://static1.squarespace.com/static/53a09c47e4b050b5ad5bf4f5/t/6333503384ff43492cf30872/1664307260145/Livermore+getting_to_neutral+2020.pdf (generally regarding hydrogen greenhouse gas emissions)
- National Renewable Energy Laboratory, *Biogas and Hydrogen Systems Market Assessment* (2016), *available at* https://www.nrel.gov/docs/fy16osti/63596.pdf (generally provides overview of RNG to hydrogen market)

U.S. Environmental Protection Agency

- Regulation of Fuels and Fuel Additives: RFS Pathways II, and Technical Amendments to the RFS Standards and E15 Misfueling Mitigation Requirements, 79 Fed. Reg. 42,128 (July 18, 2014): Provides information on EPA's lifecycle analysis for CNG/LNG to qualify as cellulosic biofuel. Additional information on the assumptions used is available in the EPA Memorandum, Support for Classification of Biofuel Produced from Waste Derived Biogas as Cellulosic Biofuel and Summary of Lifecycle Analysis Assumptions and Calculations for Biofuel Produced from Waste Derived Biogas (July 1, 2014) (www.regulations.gov, EPA-HQ-OAR-2012-0401-0243)
- EPA, *AgSTAR – Livestock Anaerobic Digester Database*, https://www.epa.gov/agstar/livestock-anaerobic-digester-database (last updated Aug. 13, 2023): The Livestock Anaerobic Digester Database provides information on anaerobic digester projects on livestock farms in the United States.
- EPA, *Landfill Methane Outreach Program (LMOP) - Landfill Gas Energy Project Data*, https://www.epa.gov/lmop/landfill-gas-energy-project-data (last updated Aug. 3, 2023): The LMOP Landfill and Landfill gas Energy Project Database contains landfill gas energy project information.
- EPA, *Landfill Methane Outreach Program (LMOP) - List of Publications Related to Landfill Gas and Waste Management,* https://www.epa.gov/lmop/list-publications-related-landfill-gas-and-waste-management (last updated on Jan. 24, 2024)
- EPA, *Landfill Methane Outreach Program (LMOP) - Renewable Natural Gas*, https://www.epa.gov/lmop/renewable-natural-gas (last updated Aug. 3, 2023): Provides background on RNG, including an RNGG Project Map that shows operational RNG projects in the United States based on LMOP and AgSTAR databases and technical resources.

- EPA, *RINs Generated Transactions-Generation Summary Report*, https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rins-generated-transactions: EPA Generation Summary Tables report Renewable Identification Number (RIN) and ethanol equivalent gallons of renewable compressed natural gas (CNG) and renewable liquified natural gas (LNG) generated under the Renewable Fuel Standard Program. As the vast majority of RNG (although not all) goes to the transportation fuel market as CNG and LNG, this database provides information regarding production and use of RNG in the United States. RNG was approved to generate cellulosic biofuel RINs (D3) in 2014, making data from years 2015-present the most relevant. Renewable CNG and LNG can also generate advanced biofuel RINs (D5), but the vast majority of RINs are for cellulosic biofuel. EPA updates its RIN generation data monthly.

Other Data Sources and Peer Reviewed Studies on RNG Markets and Tracking Systems

- Anew, *North American Renewable Natural Gas Market Evaluation* (2022), *available at* https://www.rds.oeb.ca/CMWebDrawer/Record/759815/File/document (pdf pages 290-352)
- Christina Antonini, et al., *Hydrogen production from natural gas and biomethane with carbon capture and storage – A techno-environmental analysis*, Sustainable Energy Fuels, 2020, 4, 2967.
- Boston Consulting Group, *Is Renewable Natural Gas Poised for Future Growth or Doomed to Decline?* (2023), *available at* https://web-assets.bcg.com/14/3a/46fb25224f599e5c2908f1b9edb7/us-rng-article-v16.pdf
- Jason Clay, Ph.D., *An Environmental and Economic Path Toward Net Zero Dairy Farm Emissions*, The Markets Institute at World Wildlife Fund (2021), *available at* https://static1.squarespace.com/static/53a09c47e4b050b5ad5bf4f5/t/63334e0989784e4438d9bc00/1664306703170/WWF_Net_Zero_Dairy_Business_Case_v10+2021.pdf (discussing emissions reductions at dairy farms including use of anaerobic digestors)
- European Biogas Association whitepaper published April 19, 2023 – Section 4.3 Reviewed methane emissions originating form anaerobic digestion plants, *available at* https://www.europeanbiogas.eu/wp-content/uploads/2023/04/Design-build-and-monitor-biogas-and-biomethane-plants-to-slash-methane-emissions.pdf
- European Biogas Association, et al., *Renewable Gas Tracking Systems* (2023). https://static1.squarespace.com/static/53a09c47e4b050b5ad5bf4f5/t/6565f9e1ab4ae045ef2b69fb/1701181923045/20231123+-+Joint+Paper+on+RG+Tracking+Systems+-+Final.pdf
- ICF, *Michigan Renewable Natural Gas Study*, submitted to Michigan Public Service Commission (2022), *available at* https://www.michigan.gov/mpsc/-/media/Project/Websites/mpsc/workgroups/RenewableNaturalGas/MI-RNG-Study-Final-Report-9-23-22.pdf
- International Energy Agency, *Renewables 2023 – Analysis and forecast to 2028* (2023), *available at* https://iea.blob.core.windows.net/assets/96d66a8b-d502-476b-ba94-54ffda84cf72/Renewables_2023.pdf. See special section on biogas and biomethane on pages 131-141.
- McKinsey & Co., *Renewable natural gas: A Swiss army knife for US decarbonization?*, Nov. 21, 2023, https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/renewable-natural-gas-a-swiss-army-knife-for-us-decarbonization

- Jeffrey Reed, et al., *Environmental Attribute Credits: Analysis of Program Design Features and Impacts*, The UC Irvine Clean Energy Institute (2023), *available at* https://cleanenergy.uci.edu/PDF_White_Papers/Environmental_Attribute_Credits_Analysis_of_Program_Design_Features_and_Impacts_091523.pdf

Appendix D
Response to Question 3 – Additional Information Regarding Electronic Tracking

More information on the M-RETS electronic tracking system as it applies to RNG is provided below.

The M-RETS tracking system currently serves several existing compliance and voluntary markets. M-RETS, and systems like M-RETS, are experienced working with state and federal regulators to ensure that their product meets or exceeds the requirements laid out in statute or rules. In the case of M-RETS, a not-for-profit 501(c)(4) that also owns and manages its own platform, a Board of Directors that includes state regulators and stakeholders help facilitate the process through both corporate oversight as well as oversight over the Operating Procedures.[117] The Operating Procedures are a public document which serve as the foundation for the software as well as govern the administrative functions required.

The foundation of this system includes data points which distinguish between inputs (including account, project, feedstock, and full or partial lifecycle carbon intensity); require proof of generator interconnection or revenue-quality metering; verify generator registration; and track vintage. The Operating Procedures, in Section 4.3.1 require the System Administrator verify all data submitted to M-RETS before generator approval and certificate issuance. If Treasury would like M-RETS or any other registry to change or update their verification procedures and/or the data verified prior to certificate issuance, this rulemaking would be an ideal location for that. For example, in the existing registration process M-RETS requires every generator to submit an engineering report signed by a licensed engineer in the state or province where the generator is located attesting to all of the information submitted to M-RETS regarding the operations of the facility. This includes data points like feedstock inputs (and under 4.3.4 in the case of multi-feedstock generators for example anaerobic co-digestion a project must submit engineering documentation supporting the ability to use different feedstocks and only if it is possible to determine the gas output per feedstock which then must be reported in the correct proportions each month).

Under 4.4.2 M-RETS requires the use of a revenue quality meter, including verification of this. M-RETS does leave open the possibility to register without one, however, as in the REC system the Operating Procedures require this to be clearly noted on all public reports and/or the actual certificate.

While M-RETS will track generation across North America, the state or province are always listed on both the certificate. Section 4.5.2 includes the information listed on certificates, which can be updated at the request of regulators and/or market participants. These fields currently are:

[117] The M-RETS Renewable Thermal Tracking System Operating Procedures document is available at https://www.mrets.org/wp-content/uploads/2021/06/M-RETS-Thermal-Tracking-System-6-2021.pdf.

a. Serial Number(s)
b. Account
c. ID
d. Generator Feedstock Type
e. Generator Resource Type
f. Vintage Date
g. Location
h. Quantity (in Dth)
i. Eligibilities (if applicable)
j. Carbon Intensity (if applicable)

Within the above fields, other data may exist as part of the certificate. For example, M-RETS lists the version of the lifecycle analysis model used to provide the carbon intensity (e.g., the version of GREET).

M-RETS requires generator applications to provide the commenced operation date, which should be consistent with generator interconnection and this data lives as part of the generator data in the registry. M-RETS verifies this information with the supporting documentation. While this data does not currently live on the certificate, that is another data point that M-RETS or another approved registry could easily include.

A benefit of an electronic registry platform is that it can support the demands—including conflicting demands of different programs—without complicating the experience for the user and regulators. For example, one state compliance program may allow for the use of revenue quality meters while another does not. An electronic registry can then decide the best way to control for that difference. In this example, the registry can require a generator to show proof of a revenue quality meter and include that as a data point on the certificate itself, and/or as an eligibility flag that represents the use of and verification by the System Administrator of the use of a revenue quality meter, and/or create a separate eligibility flag for the specific program and require as a precondition to receiving that eligibility a verification process that the generator in fact uses a revenue quality meter.

Rule 4.3.1 suggests that generator applicants provide an interconnection agreement, however, that is not a requirement at this time. M-RETS could easily make this a requirement at the request of the Treasury Department as in most circumstances the System Administrator will ask for it whenever it is not included in the application.

The M-RETS system itself is not a third-party verifier and, similar to other systems of tracking, would rely on third-party auditors to verify underlying practices claimed by RNG production sources and to validate generation methodology. Furthermore, that M-RETS has capability to track non-US-based generation should not be viewed as a double-counting risk given existing verification practices. That M-RETS itself is not a verifier should not be characterized as a lack of capability on the part of existing electronic tracking for RNG.