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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: Comments with respect to proposed regulations implementing Section 45V as amended by the Inflation Reduction Act of 2022 (IRS REG-117631-23)

Dear Deputy Commissioner O'Donnell:

The Inflation Reduction Act of 2022 ("IRA") is the United States Congress's greatest commitment to addressing climate change.[1] It has the opportunity to spur unprecedented investment in energy transition industries and provide many good-paying jobs to Americans. Further, it has the potential to address the Biden administration's methane reduction goals—specifically from the agriculture sector.[2] Amp Americas ("Amp") applauds the U.S. Department of the Treasury's ("Treasury") important work to issue guidance to bring the impact of the IRA to life.

Unfortunately, the proposed regulations issued pursuant to Code[3] Section 45V ("45V") published at 88 Fed. Reg. 89,220 (referred to as "45V Proposed Rule") currently exclude the use of renewable natural gas ("RNG") in hydrogen production other than directly connected landfill RNG. Additionally, the proposed rule contemplates effectively prohibiting RNG by requiring overly strict eligibility criteria which we discuss herein. Without necessary revisions, these limitations will prevent the IRA from achieving its full potential.

The Section 45V hydrogen production tax credit was designed to facilitate America's climate goals and drive the transition to a hydrogen economy. It is a technology neutral, emissions weighted incentive that expressly requires taxpayers to measure emissions using a tool based on the best available science, the U.S. Department of Energy's ("DOE") Argonne National Laboratory Greenhouse gases, Regulated Emissions, and Energy use in Technologies ("Argonne GREET") model. The product of these intentional design features is an incentive that pays for emissions improvements by directing tax incentives to the projects that have the greatest climate impact.

[1] Inflation Reduction Act of 2022 (IRA), H.R. 5376, 117th Cong. (2022).
[2] *Id.* § 13102.
[3] All references to the "Code" herein are to the Internal Revenue Code of 1986, as amended and restated.

To achieve its goals, the 45V rules must drive private capital to invest. This requires predictable rules that are consistent with the statute. Namely, the rules must remain technology neutral and use the Argonne GREET model in substantially the same form as when the law was passed. The rules must also be clear, predictable, and executable by industry practitioners to draw in private investment dollars.

In addition to directing investment in clean hydrogen production, 45V has the potential to drive investment in agricultural emissions reductions via RNG projects. Properly executed, 45V's 10-year crediting period will incentivize hydrogen producers to execute long term, fixed price supply agreements with RNG producers. These agreements will permit RNG developers to develop more projects on increasingly smaller farms, preventing more methane emissions and stimulating significant economic activity in rural America.

To attract the private capital needed to maximize 45V's environmental and economic impact, we respectfully request that Treasury revise several provisions of the 45V Proposed Rule which each individually make the 45V unworkable. Specifically, the 45V Proposed Rule requires revisions to:

- The 45VH2-GREET Model
    - 45VH2-GREET model must include all RNG pathways in the R&D GREET model to be consistent with statute.
    - 45VH2-GREET model must permit hydrogen producers to use feedstock supplier specific emissions values that are calculated using the R&D GREET model.
    - Lifecycle analysis for RNG must include avoided methane emissions.
    - A new Argonne GREET analysis for RNG is not needed each year unless there have been changes to the facility.
- The Three Pillars
    - The First Productive Use concept must be removed or modified to comply with the statutory requirement that pathways measure actual indirect emissions.
    - Temporal requirements for electricity should not be applied to RNG, but rather allow for RNG storage and delivery in accordance with market practices.
    - Deliverability requirements for RNG must permit use of book-and-claim, the same market-based mechanism used in the RFS and state LCFS programs.

1. BACKGROUND

a. Amp Americas

Founded in 2011 and based in Chicago, Illinois, Amp is an American-owned and operated developer, owner, and operator of facilities that convert dairy waste into carbon negative renewable natural gas ("RNG") and electricity. Amp produces RNG that fuels heavy duty truck fleets and hydrogen fuel cell vehicles and electricity that charges electric vehicles. **Amp's facilities both reduce on-farm methane emissions upstream and displace higher emission fuels downstream.** Amp's facilities are a crucial ingredient in the American energy transition and fight against climate change.

As a pioneer in the dairy RNG industry, Amp registered the first dairy RNG project certified by the U.S. Environmental Protection Agency's Renewable Fuel Standards Program ("RFS") to generate D3 RINs, the first dairy RNG project certified by California's Low Carbon Fuel Standard Program ("LCFS"), as well as the first pathway in California to use dairy RNG to produce hydrogen. Our experience building, operating, and reporting on these assets gives us a unique perspective on the implementation and administration of greenhouse gas ("GHG") emissions-based incentive frameworks.

Amp operates a portfolio of $1 billion of dairy RNG projects and has a pipeline of another $1 billion of projects in Wisconsin, Michigan, Arizona, Georgia, Minnesota, and several other agriculture producing states.

b. Biogas from agricultural activities

In modern, efficient agriculture operations, waste from crop residues and animals emits powerful greenhouse gases, including methane. The Biden administration has stated that reducing "methane emissions from manure storage sources" is a top priority. The USDA's Rural Development program has supported this goal with over $200 million in funding for anaerobic digesters.[4] Digesters process animal manure to capture and prevent methane emissions, improve air quality in rural communities, create valuable products such as sustainable fertilizer, and improve water quality.

Digesters capture biogas that would otherwise become fugitive greenhouse gas emissions. Biogas is made up of methane, carbon dioxide ("CO_2"), hydrogen sulfide, and other constituents. When biogas is processed to remove impurities, it is called RNG which is identical to pipeline quality natural gas. Once biogas is upgraded to RNG, the RNG can be used to produce hydrogen and sustainable aviation fuel among other renewable fuels, as well as displace fossil natural gas in hard to decarbonize industries. Practically speaking, to deliver RNG to productive end-uses, the industry must use pipelines to carry RNG from its source to its end-users.

In 2021, U.S. agricultural activities were responsible for releasing 598.1 million metric tons of carbon dioxide equivalent into the atmosphere.[5] And according to the EPA's 2020 U.S. Greenhouse Gas Emissions and Sinks report, agricultural activities were the largest anthropogenic source of methane emissions in the United States.[6] In 2015, EPA estimated that livestock and poultry manure alone was responsible for approximately 10 percent of annual U.S. methane

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[4] https://www.whitehouse.gov/briefing-room/statements-releases/2022/01/31/fact-sheet-biden-administration-tackles-super-polluting-methane-emissions/

[5] U.S. Dept. of Ag., Report to Congress: A General Assessment of the Role of Agriculture and Forestry in U.S. Carbon Markets, October 2023, available at https://www.usda.gov/sites/default/files/documents/USDA-General-Assessment-of-the-Role-of-Agriculture-and-Forestry-in-US-Carbon-Markets.pdf, p. 7.

[6] *Inventory of U.S. Greenhouse Gas emissions and Sinks 1990-2020*, EPA at ES-13 (2022), https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf.

emissions, the majority from swine and dairy.[7] **These emissions are problematic, but we have the technology and know-how to greatly reduce them now.**

As of January 2023, there were 343 manure-based anaerobic digesters in the United States.[8] In 2022, these projects generated 2.42 million megawatt hours ("MWh") equivalent in energy and saved 10.43 million metric tons of carbon dioxide equivalent.[9] The United States has only scratched the surface of the potential for investment and methane reducing impact from deploying RNG systems to capture emissions at dairy and swine operations. In fact, AgSTAR, an EPA sponsored program that compiles data on biogas recovery systems, estimates that biogas recovery systems are technically feasible at over 8,000 farms.[10]

Our industry has identified a problem, innovated to create a solution, and is now reaching the stage of mass deployment. This mass deployment has the potential to create immediate climate impact. Methane has a global warming potential 84 times greater than CO_2 over a 20-year timeframe.[11] Methane breaks down within 12 years, while CO_2 lasts for 100 years, so reducing methane emissions has an immediate impact on mitigating global climate change.[12]

The 45V Proposed Rule appropriately limits access to the 45V tax credit to only those facilities with extremely low lifecycle emissions. However, in its current form, the 45V Proposed Rule prevents any RNG other than directly connected landfill gas from being used in hydrogen production facilities. Allowing additional types of RNG, in particular RNG from animal waste, wastewater sludge, and MSW, is imperative to unlocking the maximum potential of the 45V tax credit.

2. CONCERNS WITH THE 45V PROPOSED RULE AS IT RELATES TO RNG

Amp secured the first $400 million of private investment for its project pipeline in the wake of the IRA's passage. However, Amp has been forced to slow progress on these projects due to ongoing policy uncertainty. We are certain that we can accelerate our deployment of capital – both the capital already available to us as well as significantly more – to reduce methane emissions from U.S. agriculture if the Section 45V rules are rapidly fixed according to the following recommendations.

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[7] 2018 AgStar report, p. 5.

[8] *AgSTAR Data and Trends*, EPA (July 7, 2023), https://www.epa.gov/agstar/agstar-data-and-trends (last visited January 13, 2024).

[9] *Id.*

[10] 2018 AgStar report, p. 4.

[11] *Methane and climate change*, International Energy Agency (2021), https://www.iea.org/reports/methane-tracker-2021/methane-and-climate-change.

[12] *Methane and Climate Change*, IEA (2021), https://www.iea.org/reports/methane-tracker-2021/methane-and-climate-change (last visited January 18, 2024).

a. THE 45VH2-GREET MODEL

i. The 45VH2-GREET Model must include all RNG pathways in the R&D GREET model to be consistent with statute.

RNG projects convert methane emissions into productive use and reduce their climate impact by 84x. The methane for RNG comes from waste streams that result from modern American farming that feeds our country and normal daily lives of Americans. While we must strive to improve the way we handle organic waste and reduce our waste, the reality is that as long as we eat, humans and the agricultural activities that feed us will produce waste. We should do all we can to collect methane resulting from our waste, dispose of it in climate friendly ways, and put it to productive use. **Any prohibition on capturing and productively using biomethane from organic waste streams is equivalent to a mandate to emit methane into the atmosphere.** In its current form, the 45V Proposed Rule does exactly this by including only a singular pathway for landfill RNG that is directly connected to a hydrogen facility.

The 45VH2-GREET model must include additional pathways for RNG to hydrogen beyond landfill gas, including, at a minimum all RNG pathways in the R&D GREET model (Biogas from Anaerobic Digestion of Animal Waste, Biogas from Anaerobic Digestion of Wastewater Sludge, and Biogas from Anaerobic Digestion of MSW) to be consistent with 45V statute and legislative intent. A failure to do so is tantamount to overriding Congress' choice to create a technology neutral hydrogen production tax credit, which Treasury does not have authority to do.

By excluding other RNG-based hydrogen pathways, Treasury forces RNG projects to instead file a petition for a determination of the lifecycle GHG emissions in hopes of obtaining 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."[13] With no precedent for PERs, it is unclear whether organic waste streams will qualify for 45V, making their future unpredictable, and future projects not executable. Moreover, even if a PER is obtained, the Proposed Rule makes that process inherently unfinanceable because there is no timeline for approval of PER requests and a PER granted is useless if the 45VH2-GREET model is subsequently updated to include an applicable pathway.

We note that Section 45V requires use of "the most recent" Argonne GREET model or successor model. The Argonne GREET model existing at the time of IRA's passage included various biogas and RNG pathways, including biogas derived from: Animal Waste; Wastewater sludge; MSW (Food Waste); and Landfill Gas. These pathways are also in the most recent R&D GREET model. However, the 45VH2-GREET model only includes landfill gas to RNG pathways. The omission of other RNG pathways contradicts Congress's clear directive to use the existing Argonne GREET

[13] 88 Fed. Reg. at 89,240.

model or a similar one. While the 45VH2-GREET model is targeted to Section 45V, any proper "successor" model should have at least the same scope.

ii. 45VH2-GREET model must permit hydrogen producers to use feedstock supplier specific emissions values that are calculated using the R&D GREET model.

45V must permit use of specific foreground variables to ensure that the R&D GREET model accurately measures emissions of RNG projects. Accurately measuring baseline emissions by selecting a **livestock type** and including **site-specific baseline manure management** variables in the foreground will ensure that the projects that prevent the most methane emissions earn the best score. The best scoring projects will have the best economics. Therefore, capital will flow to projects with the greatest climate impact. Accurately measuring emissions capture efficiency associated with specific **digester types** will ensure that RNG developers use the most effective infrastructure. Accurately measuring **utility energy use and carbon capture** will ensure that RNG developers and operators work to minimize the emissions from utility energy usage, and it will incentivize carbon capture.

Measurement tools and processes are in place today to track and record site-specific data to calculate emissions under the RFS and state LCFS programs. These processes include third party verification, which we support. Using the same tools and processes for purposes of 45V will provide the necessary information to determine a hydrogen pathway's emissions rate for purposes of the 45V tax credit. We provide specific recommendations on how the 45VH2-GREET model can incorporate these additional pathways in Appendix A.

iii. Lifecycle analysis for RNG must include avoided methane emissions.

The 45V Proposed Rule requires "well-to-gate" lifecycle analysis, and for feedstocks used in hydrogen production the statue specifically requires an analysis of emissions associated with feedstock growth, gathering, extraction, processing, and delivery to a hydrogen production facility. RNG is made by capturing methane emissions which would otherwise be emitted to the atmosphere and then refining that methane into a clean renewable energy source. The Argonne GREET model has consistently included avoided methane emissions for various fuel pathways, including RNG as a feedstock to hydrogen.

iv. A new Argonne GREET analysis for RNG is not needed each year unless there have been changes to the facility.

Once the parameters for a project have been established, including manure management systems, feedstock quantity, process and equipment installation, and pipeline interconnection, these factors remain relatively consistent for the life of the project. If project parameters change significantly – for example feedstock quantity increases or decreases, or the project owner installs new process equipment impacting the RNG's emissions – a new Argonne GREET analysis could be appropriate. Absent those changes, the project's score should remain constant.

Stability in the Argonne GREET assessment is important to allow for certainty for the RNG project developer, the hydrogen producer, and their respective investors. If projects are subject to constant

revision of Argonne GREET analyses, contracting will be far more uncertain, leading to higher cost of capital and less climate impact. The GHG emissions score of a hydrogen facility should not change when a new version of the 45VH2 GREET model is published, nor should the GHG emissions score of an RNG facility that supplies that hydrogen facility.

b. THE THREE PILLARS

There is no legal basis to impose incrementality, temporality, or deliverability requirements on RNG to account for indirect (or induced) emissions, and there is no scientific basis to indicate using existing sources of RNG production in hydrogen would create indirect (or induced) emissions.

i. The First Productive Use concept must be removed or modified to comply with the statutory requirement that pathways measure actual indirect emissions.

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 online in the same year (or for the RNG project to come online after) is unworkable and must not be adopted in the final rule. The 45V Proposed Rule must allow all RNG projects to participate irrespective of vintage.

Section 45V(c)(1)(B) requires lifecycle emissions to be determined using the Argonne GREET model. The statutory text does not call for or permit wholesale exclusion of RNG projects based on incrementality criteria. It solely requires measurement of emissions using the most recent Argonne GREET model or a successor. The statute, at most, allows consideration of indirect (or induced) emissions as part of the Argonne GREET model analysis. However, there is no scientific basis to conclude that such emissions will exist in RNG to hydrogen pathways.

Significant indirect (or induced) emissions will not exist in RNG to hydrogen pathways for several reasons.

(1) **Current RNG production that is repurposed to hydrogen will be backfilled with RNG.** Nearly all livestock RNG currently serves compliance markets that will continue to require RNG to meet compliance obligations. History has proven this to be true:

> 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.[14]

[14] 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*

(2) **There is more than enough biogas to serve demand. Biogas is a recurring waste product.** The RNG industry has a readily available solution for minimizing the climate impact of this waste and we are only scratching the surface of preventable emissions.[15]

(3) **Concluding that there will be indirect (or induced) emissions for RNG to hydrogen pathways is speculative and does not meet the definition of "significant" required by statute.** In a letter to Treasury on December 20, 2023, the EPA urged Treasury to consider the "real world emissions consequence of increased production of renewable fuels"[16] when evaluating 45V pathways. If existing RNG producers redirect RNG currently serving transportation markets to hydrogen production, the most likely outcome is that RNG production will increase to continue to supply renewable fuel demand in existing compliance markets. The other outcome that may occur during a 45V crediting period is that CNG trucking operations transition to hydrogen fuel cell electric trucking operations as hydrogen emerges as a fueling solution. DOE identified fuel cell trucks and buses as an opportunity for early adoption of hydrogen in its U.S. National Clean Hydrogen Strategy and Roadmap.[17]

There is significant risk that excluding RNG from markets will increase methane emissions. RNG is derived from biogas, a waste product that consists primarily of methane, a highly potent climate pollutant. Managing waste is expensive and solutions that reduce methane emissions like RNG are scarce. There is much more biogas than RNG demand. Increasing RNG demand by creating new market opportunities will result in more captured biogas. Without new markets for RNG like hydrogen producers, the volume of uncontrolled biogas will continue to exceed the demand for RNG and methane emissions will continue unabated. Even worse, if 45V successfully catalyzes hydrogen as a mobility solution that outcompetes CNG, then CNG demand for RNG will decline. If this happens, RNG projects without access to hydrogen producers via 45V will shut down and farms will revert to emitting methane directly into the atmosphere.

ii. Temporal requirements for electricity should not be applied to RNG, but rather allow for RNG storage and delivery in accordance with market practices.

The temporal requirements for electricity do not apply to RNG because the North American natural gas pipeline system is an integrated system with significant storage capacity. RNG can be stored indefinitely and delivered to hydrogen facilities as it is required. Natural gas operators track injections and withdrawals from storage facilities, allowing for monthly balancing of supply and

https://cleanenergy.uci.edu/PDF_White_Papers/Environmental_Attribute_Credits_Analysis_of_Program_Design_Features_and_Impacts_091523.pdf.

[15] 2018 AgStar report, p. 4.

[16] EPA Letter to Treasury Department, Dec. 20, 2023

[17] U.S. Dept. of Energy, U.S. National Clean Hydrogen Strategy and Roadmap, p18, June 2023

demand. These practices are commonly used in the natural gas industry to prepare for seasonal increases in demand (e.g. winter).

If time matching is required in the final rule, then it should be monthly. Production and consumption of natural gas has been denominated and settled on a monthly basis for many years. The marketplace over many years has determined that this is an accurate and effective period of time to conduct business that has not warranted a change in either direction. For example, monthly utility bills are used to reconcile RNG production with RNG consumption. 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.

Lastly, hydrogen producers should be permitted to match their production with RNG produced or withdrawn from storage during at least a hydrogen production month. The physical nature of RNG combined with ample natural gas storage infrastructure enables this commonplace practice.

iii. Deliverability requirements for RNG must permit use of book-and-claim, the same market-based mechanism used in the RFS and state LCFS programs.

Because of the interconnectivity of the North American natural gas pipeline system there is no need to impose regional geographic restrictions for RNG. The entire North American natural gas pipeline system is the proper geographic scope for the 45V tax credit.

Establishing the entire natural gas 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 RNG projects in a rational way. RNG is overwhelmingly delivered by pipeline to its end-markets. A direct deliverability requirement that limits use of RNG distributed in the natural gas pipeline system would preclude most RNG-to-hydrogen projects from access to the tax credit, thus constraining both RNG and hydrogen project development throughout the country.

Today, volumes of RNG injected are matched (through documentation that is reviewed by independent third parties) to volumes of natural gas withdrawn by the party using the gas on the interconnected system. In other words, unlike RECs, where it may not be physically possible for electricity produced in one region of the country to be used at a hydrogen production facility in another region, all RNG is injected into the same pipeline system from which all natural gas is withdrawn. Thus, any RNG injected onto that pipeline displaces the same volume of fossil-based natural gas.

While the chain of custody accounting system has been referred to as "book-and-claim,"[18] the natural gas market actually uses a displacement method, also referred to as a "mass-balance"

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

approach to delivery and tracking the chain of custody. Importantly, mass-balance differs from book-and-claim in that it requires demonstrated physical connectivity between the production and consumption site of the energy product.[19]

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 crisscrosses 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.[20]

We have systems in place today that allow the market to accurately track natural gas flows from point to point across the continent. Maintaining the status quo of custody tracking for natural gas is the most effective way to promote clear, predictable, and executable requirements so that collectively we can reduce methane emissions.

This is particularly important given the proliferation of programs aimed at incentivizing low carbon fuel production. EPA has spent decades developing methods that are dominant in this field. Deviating from these methods in another federal program – whether 45V or the 45Z Clean Fuel Production Credit – will only delay the clean fuel transition that Congress clearly wants to happen.

3. RESPONSES TO SPECIFIC QUESTIONS POSED IN THE 45V PROPOSED RULE

Amp supports and incorporates by reference the comments submitted by Coalition for Renewable Natural Gas ("RNG Coalition"). Please refer to the RNG Coalition letter for our comments on the questions posed by Treasury in the 45V Proposed Rule.

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[19] 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 distribution system. It is distinguishable from a traditional "book-and-claim" approach that relies on "credits" that represent the sustainability claims.

[20] EPA Letter to Treasury Department, Dec. 20, 2023

4. CONCLUSION

Congress and President Biden worked together to enact the IRA to address climate change, facilitate the American energy transition, and invest in American jobs. The limitations imposed by the 45V Proposed Rule make these goals unachievable in many ways. We kindly urge Treasury to reconsider its position on these matters and revise the 45V Proposed Rule quickly so that crucial investment can be made before we slide from opportunity into regret.

Grant Zimmerman

Chief Executive Officer

Amp Americas II, LLC

Appendix A

Recommendations for Additional RNG-to-Hydrogen Pathways in 45VH2-GREET Model

The 45VH2-GREET model must permit hydrogen producers to use feedstock supplier specific emissions values that are calculated using the R&D GREET model. For RNG to hydrogen pathways, we recommend that the 45VH2-GREET model incorporate R&D GREET modifications to the following key variables described below. These variables should be treated as foreground variables.

A. Biogas from Anaerobic Digestion of Animal Waste

1. Livestock Type

The lifecycle GHG emissions from 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 A.2 below). A selection based on the share of livestock in a project should be integrated into the modifications. A "drop down" that includes the Argonne GREET model parameters that currently exist for animal waste in the Argonne National Laboratory ("ANL") 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.

Consequently, the 45VH2-GREET 2023 model should calculate the avoided emissions associated from anerobic digestion and the associated RNG project using site-specific baseline manure management practices. The 45VH2-GREET 2023 model 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 45VH2-GREET 2023 model 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 lifecycle GHG emissions.

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 a 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 of the RNG tab in the R&D GREET 2023 model.

B. Other Biogas Pathways

Amp supports and incorporates by reference the comments submitted by Coalition for Renewable Natural Gas ("RNG Coalition") for treatment of other biogas pathways in 45VH2-GREET.

C. All Biogas from Anaerobic Digestion Pathways

1. Utility energy use and emissions capture

45V H2-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.

2. RNG-to-Hydrogen Via Electrolysis

Another important consideration for modification of the 45VH2-GREET 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.