FIDELIS NEW ENERGY, LLC
109 NORTH POST OAK, SUITE 140
HOUSTON, TEXAS 77024
(832) 551-3300

WWW.FIDELISNEWENERGY.COM

February 26, 2024

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

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

Dear Sirs and Madams:

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

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

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

We especially applaud the measured approach to renewable natural gas ("RNG") and fugitive sources of methane such as the "first productive use" requirement for these sources. However, significant work is left to be done to avoid market distorting hydrogen production routes that "splash blend" minor amounts of renewable natural gas derived from animal waste (i.e., manure anaerobic digestion) and other sources of fugitive methane gas with conventional natural gas to produce "ostensibly" clean hydrogen. This splash blending approach could cost Americans $65 billion annually in excess federal incentives (more than $650 billion over the life of the 45V PTC) with negligible real methane emission reductions while potentially driving an increase in emissions overall without proper safeguards.

Fidelis welcomes the opportunity to provide comments on certain questions posed within the NPRM Section 45V Credit for Production of Clean Hydrogen; Section 48(a)(15) Election to Treat Clean Hydrogen Production Facilities as Energy Property as it relates to safeguards for renewable natural gas and fugitive sources of methane.

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

NPRM Comment Area:	**Challenge(s) with NPRM:**	**Recommended Solution(s):**
Market distorting incentives for renewable natural gas and fugitive sources of methane.	Inaccurate and inappropriate counterfactuals for renewable natural gas and fugitive sources of methane will generate billions of excess costs to the American taxpayers through "splash blending" minor amounts of RNG or fugitive methane with conventional natural gas to generate $3 / kg 45V Credit. Further, the incentive generated through 45V "splash blending" is so perverse that the value dairy manure derived-RNG exceeds that of dairy milk generated from the same cows. These perverse incentives are likely to have a "cobra effect" and increase net emissions rather than decrease emissions.	1.) Define the counterfactual references for RNG to be 80% utilization or flaring of recoverable methane emissions for purposes of 45V. Likewise, define the counterfactual reference flare case for fugitive sources of methane to be 100% for purposes of 45V. 2.) Narrowly define and stringently enforce "first productive use" requirement for RNG and fugitive sources of methane. 3.) Require geographic deliverability for book-and-claim for RNG and fugitive sources methane.

Comments Responding to Key Provisions and Request for Comments in 45V NPRM

Comments on recommended safeguards to prevent market distortion and billions in excess cost to the American taxpayer from inappropriate incentives for renewable natural gas and fugitive sources of methane.

Reducing methane emissions from both fossil fuels and biogenic sources (landfills, wastewater, and animal) is critical to mitigating climate change and achieving climate targets. The U.S. has historically taken significant steps to minimize methane emissions, such as through the Landfill Rule of the Clean Air Act, and more with recently the establishment of the Methane Reduction Program ("MERP") through the Inflation Reduction Act of 2022 to address methane emissions from the oil and gas sector.[1] The MERP notably establishes a Waste Emission Charge

[1] https://www.epa.gov/inflation-reduction-act/methane-emissions-reduction-program

("WEC") penalizing excess methane emissions. This fee increases from $900 per metric ton of excess methane emissions in 2024 to $1,500 per metric ton for 2026 onwards.

There are several other existing programs that incentivize methane reductions from agricultural and other sources through waste-to-energy projects today. These programs include Federal programs like the U.S. Environmental Protection Agency's Renewable Fuel Standard ("RFS") and state programs like California's Low Carbon Fuel Standard ("CA LCFS"). Currently RFS and CA LCFS incentives for converting animal waste (manure) into RNG when utilized as compressed natural gas ("CNG") for transportation, total approximately $70 / MMBTU on a lower heating value basis.[2] This level of incentivization has led to an eight-fold increase in manure-RNG placed into the CA LCFS between December 2019 and September 2023.[3] This rapid growth is expected to continue under the current incentives for the foreseeable future as the total addressable market for animal waste-biogas is approximately 168-trillion BTU per year from 8,100 U.S. dairy and swine operations.[4] Further, the total incentive value for renewable natural gas when utilized as CNG could grow to $130 / MMBTU of animal waste derived-RNG with implementation of the 45Z Clean Fuels Production Tax Credit.

In comparison, without proper restrictions and safeguards, the splash blending animal waste-RNG with conventional natural gas to generate 45V credit results in RNG value of more than $510 per MMBTU. This value generation is so excessive that in the case of dairy manure based RNG, the value of RNG created will be 1.8 times the value of the milk produced by the cow and would cost the federal government a staggering excess $65 billion annually without a material reduction in greenhouse gas emissions. The excesses in subsidies would likely drive the expansion of dairy and swine operations negating any methane reductions from installing anaerobic digesters.

It is also important to recognize that animal waste derived-RNG is man-made methane and that other proven alternatives exist to handle the manure from milk-cows and other farm animals. For example, aerobic treatment of manure waste is proven technology which reduces greenhouse gas emissions by increasing carbon conversion to CO2 rather than methane while also reducing odor, reducing ammonia formation, and increasing nutrient value. The Settje EASYFIX Manure Technology System (Settje Agri-Services and Engineering) is an example of aerated manure management which is commercially available today.[5] This system and other systems like it allow for liquid manure to have effectively the same environmental performance as manure from free range cows. The manure from free range cows is natural exposed to sufficient oxygen that the volatile organics in manure are converted to CO2 rather than methane. Further, aerobic manure treatment functions similarly to the technology for treatment of human manure (sewage) that is used in thousands of wastewater treatment plants in the United States. Hence, the release of methane in livestock farming is a choice that does not represent a reasonable counterfactual for

[2] The analysis and results presented in this comment letter are performed on a lower heating value ("LHV") basis unless specified otherwise.
[3] Based on quarterly LCFS data: https://ww2.arb.ca.gov/sites/default/files/2023-04/quarterlysummary_042823.xlsx
[4] EPA AgSTAR Data: https://www.epa.gov/agstar/agstar-data-and-trends#adpotential & https://www.epa.gov/agstar/agstar-market-opportunities-report
[5] https://settje.com/news/2021/10/21/the-benefits-of-manure-aeration-systems/

calculation of the carbon intensity ("CI") of RNG utilized to produce hydrogen with the 45V Production Tax Credit.

Further, this incentivization of higher emitting manure treatment comes at the expense of small farms and operators who employ lower emitting technologies today. These farms which either do not have the scale necessary for RNG production or have commendably chosen lower emitting manure treatments will not benefit from the 45V, and, therefore, will not be able to operate while industrial farms utilizing methane generating manure treatment get 1.8x the revenue from the cow manure than from the milk. This will lead to small farms and responsible operators being forced out of the market, accelerating a trend that is already occurring across the nation.[6]

In short without strict regulations and implementation, animal waste-RNG blending with conventional natural gas to produce 45V tax credits will result in massive windfalls for energy companies developing anaerobic digestion facilities (at the cost of the American taxpayer and responsible farms), without a corresponding net decrease in greenhouse gas emissions.

Likewise, fugitive sources of methane must be treated in alignment with existing rules for landfill gas emissions and methane leakage from the oil and gas sector.

The Treasury Department and IRS can support both the agriculture and energy industries and reduce greenhouse gas emissions at a reasonable cost to the American taxpayer through restrictions on animal waste RNG under the 45V tax credit provisions. Specifically, Fidelis recommends the following rulemaking approaches under 45V.

1. **Define the counterfactual references for RNG to be 80% utilization or flaring of recoverable methane emissions for purposes of 45V. Likewise, define the counterfactual reference flare case for fugitive sources of methane to be 100% for purposes of 45V.**
2. **Narrowly define and stringently enforce "first productive use" requirement for RNG and fugitive sources of methane.**
3. **Require geographic deliverability for book-and-claim for RNG and fugitive sources methane.**

These recommendations will limit the potential for RNG & fugitive blending to have market distorting results. The following expands upon the recommendations above.

Recommendation 1: Define the counterfactual references for RNG to be 80% utilization or flaring of methane emissions in 45VH2-GREET and for determining provisional emission rates under 45V. Likewise, define the counterfactual reference utilization or flare case for fugitive sources of methane to be 100% in 45VH2-GREET and for determining provisional emission rates under 45V.

As discussed below, the CI of animal derived-RNG is heavily dependent on the methane control strategies for conventional manure treatments as well as the consideration of biogas

[6] Aaron Smith, UC Davis, "Where are California's Dairy Cows", https://asmith.ucdavis.edu/news/how-many-dairy-cows

recovery and utilization or flaring in the counterfactual case. The CI of dairy manure-RNG as calculated in Argonne National Laboratory's R&D GREET 2023 Model can range from as low as -307.3 g CO2e / MJ to 66.3 g CO2e / MJ depending on counterfactual utilization or flare percentage of recoverable methane emissions. This extreme negativity enables "splash blending" (<5%) RNG with conventional natural gas to generate $3.00 / kg H2 45V credit.

Fidelis recommends that the IRS adopt a minimum utilization or flare rate of 80% of recoverable methane emissions as the basis in the counterfactual case for determining the CI of RNG that is utilized in the production of clean hydrogen. This would result in an average animal waste-RNG across digester types of -8.1 g CO2e / MJ, and a marginal value generation of $113 / MMBTU created through the 45V. This utilization rate introduces parity between the credit potential of animal waste-RNG utilized as compressed natural gas generating RFS, 45Z, and state incentive revenues with RNG blended to produce clean hydrogen and 45V credits.

Additionally, this utilization rate reflects that under the current incentives ($70 / MMBTU) and expected future incentives ($130 / MMBTU) animal waste derived-RNG is highly lucrative today. This is supported by the rapid expansion of biogas recovery in the U.S. described below. Therefore, conventional manure management with no utilization is an inaccurate reference case for credit under 45V. Rather for the lifecycle analysis under 45V, a marginal analysis of adoption considering both conventional manure treatment and RNG production at current and future prices must be considered. This marginal analysis justifies parity of RNG crediting regardless of utilization to produce hydrogen or as CNG.

Further, this counterfactual case is necessary to prevent animal waste derived-RNG from becoming more valuable than dairy milk based on federal incentivizes alone. Without this restriction RNG "45V splash blending" to hydrogen would generate 5.0x federal incentives and would make dairy-RNG production 1.8x more valuable than the dairy milk produced from the same number of cows.

The 80%[7] flaring reference case should apply to animal waste-RNG utilized in any segment of well-to-gate lifecycle analysis of the clean hydrogen production. For example, this baseline should apply to RNG consumed as a process feedstock directly to produce hydrogen, RNG as fuel to supply process heat to a reformer, or RNG used to generate low carbon power to supply to a clean hydrogen facility, or animal waste-RNG claimed through renewable thermal credits.

Likewise, to prevent perverse incentives and abuse, the reference case for fugitive methane should be 100% utilization. This is in alignment with the Landfill rule under the Clean Air Act that mandates the destruction of fugitive methane from landfills. Further, methane leakage from the oil and gas sector should not be eligible for consideration as a "fugitive source of methane" for purposes of 45V as these emissions are subject to the Methane Emission Reduction Program's waste emission charge. Fugitive sources of methane like coal bed methane are in principle directly

[7] Further refinement of the reference utilization case may be required based on updates to the underlying technical R&D GREET Model assumptions. Counterfactual utilization or flare percentage should be calibrated to create parity between RNG used for hydrogen production (45V Credit) or as compressed natural gas (RFS, LCFS, and 45Z Credit) to prevent severe market distortion and abuse. This approach would reflect a marginal lifecycle analysis considering existing and future utilization.

equivalent to landfill gas emissions and as such should be treated under the same policy approach for other sources of fugitive methane.

Recommendation 2: Narrowly define and stringently enforce "first productive use" requirement for RNG and fugitive sources of methane.

The NPRM makes a significant positive stride in requiring that the use of RNG for hydrogen production be the "first productive use" of that RNG. Enforcement of this and narrowly tailoring the definition of "first productive use" is critical to prevent the significant amount of RNG production today shifting to producing "ostensibly" clean hydrogen. As the original productive use of the RNG would be backfilled with fossil gas this shift would come at significant cost to the American taxpayer without any emission reductions. This is especially true for existing RNG heat applications and CNG powered vehicles as renewable electricity would not be able to immediately replace this RNG. Thus, any existing renewable natural gas diverted to hydrogen production would be filled on a one-for-one basis with fossil natural gas.

Recommendation 3: Require geographic deliverability for book-and-claim for RNG and fugitive sources methane.

For the book-and-claim of RNG, any RNG claimed by a hydrogen producer should be required to be delivered into the same natural gas transmission network as the hydrogen producer claiming the utilization of the RNG in alignment with the deliverability requirement for electricity under the proposed regulations.

This requirement ensures that the RNG claimed by the clean hydrogen production facility is in fact displacing fossil natural gas. Without this requirement clean hydrogen facilities on different transmission networks will use conventional natural gas in the production of hydrogen. In addition, the geographic distance from the RNG facility to the clean hydrogen facility and the related energy costs of transporting the RNG to the hydrogen production facility should be factored into the lifecycle emissions rate of the clean hydrogen.

Overview of Animal Waste RNG production and environmental incentives

Manure management is an important process to mitigate GHG emissions from livestock operations. This is especially important for swine and dairy operations that produce significant amounts of liquid manure. Conventional liquid manure management approaches, including manure ponds, generate significant volumes of methane which are subsequently released into the atmosphere. Anaerobic digesters enable this waste to be beneficially converted into biogas, a mix of methane and carbon dioxide, and digestate.[8] This biogas can then be upgraded to produce a renewable natural gas stream meeting pipeline natural gas specification by removing impurities (primarily carbon dioxide).

The CI of the produced RNG can be determined via the Argonne National Laboratory's R&D GREET 2023 model which forms the basis of 45VH2-GREET and would form the basis for CI determination under 45Z. To determine the CI of the RNG, the R&D GREET model compares the RNG production and utilization emissions with a counterfactual reference case to determine the relative GHG emissions of RNG versus conventional manure treatment.

The critical assumption in the R&D GREET Model driving the CI is assumed utilization or flaring percentage of recoverable methane emissions in the reference case. Counterfactual cases with no or low flaring result in significant methane emissions. These emissions are "avoided" through the production of RNG or more stringent collection and flaring and thus result in a very negative CI for RNG. The dependency of the CI of RNG on the counterfactual reference case is highlighted in Argonne National Laboratory report on animal waste to renewable natural gas in GREET and is summarized in Table 1 comparing the CI of the produced RNG across reactor type and baseline flare percentage.[9]

Table 1. Impact of counterfactual utilization or flaring of recoverable methane on animal waste derived-RNG CI across anaerobic digester reactor types.

Counterfactual Utilization or Flare % of Recoverable Methane:	**0%**	**50%**	**80% Recommended**	**100%**
Reactor Type:	**CI Scores (g CO2e / MJ)**			
Covered Lagoon	-294.2	-121.9	-18.5	50.4
Complete Mix	-283.5	-108.6	-3.72	66.2
Horizontal Plug Flow	-273.3	-103.6	-1.7	66.2
Mixed Plug Flow	-307.3	-120.5	-8.4	66.3
Average Across Reactor Types	-289.6	-113.7	-8.1	62.3

The average CI for animal waste derived-RNG placed into the CA LCFS program as compressed natural gas ("CNG") since 2021 is -271.6 g CO2e per MJ even after including transportation and compression energy at fuel stations in California.[10] Further, numerous animal waste derived-RNG to CNG pathways in the CA LCFS have achieved carbon intensities less than

[8] https://www.epa.gov/sites/default/files/2014-12/documents/recovering_value_from_waste.pdf
[9] https://doi.org/10.2172/1036091
[10] Volume weighted CI for swine and dairy manure-RNG since 2021 calculated based on LCFS Quarterly data published through Q3 2023. (https://ww2.arb.ca.gov/sites/default/files/2024-01/quarterlysummary_Q32023.xlsx)

- 400 g CO2e per MJ with one proposed application with a CI less than -700 g CO2e per MJ.[11,12] Based on these incentives animal waste derived-RNG to CNG production has seen explosive growth.

Animal Waste Derived-RNG to Compressed Natural Gas Value Generation Today

To demonstrate the billions in annual cost to the American taxpayer that unconstrained blended RNG/natural gas hydrogen pathways could generate in 45V credits, it is important to consider the current incentive structure and RNG value today with CA LCFS and the EPA's RFS program, as well as with the upcoming 45Z credit. Today, manure-RNG sold as CNG with a CI of -271.6 g CO2e / MJ would generate approximately $70 / MMBTU considering the value of the natural gas, CA LCFS, and RFS. The environmental incentives (LCFS and RFS) are 23x times as valuable as the underlying natural gas product.

Table 2. Value of animal waste derived-RNG today considering CA LCFS, RFS, and Natural Gas Value[13]

CNG from Animal Waste Derived-RNG Carbon Intensity	g CO2e / MJ	-271.6
California Low Carbon Fuel Standard ("CA LCFS") Assumptions		
LCFS Credit Price	$ / MT CO2e	$75.00
2024 Diesel Compliance Baseline	g CO2e / MJ	87.9
EPA RIN Assumption		
D3 Rin Price	$ / D3 RIN	$2.80
Value Stack (MMBTU LHV)		
Natural Gas Price	$ / MMBTU	2.8
LCFS Value Generation	$ / MMBTU	28.4
RIN Value Price	$ / MMBTU	36.4
Total Value Stack	$ / MMBTU	67.6
Environmental Incentives Vales vs. Natural Gas Value	Multiple vs. NG	23.0

Animal Waste Derived-RNG to Compressed Natural Gas Value Generation in 2025

This value stack is expected to further increase in 2025 due to increased stringency in the CA LCFS market and implementation of the 45Z Clean Fuel Production Tax Credit.[14] The California Air Resources Board plans to strengthen the LCFS Market with new guidance. The draft regulations released in December include a 2030 CI reduction target of 30% relative to 2010, a 5% stringency step down in 2025, and an auto acceleration mechanism.[15] These actions should boost

[11] Based on current certified carbon intensities in the California LCFS program: https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/current-pathways_all.xlsx
[12] https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/b0490_summary.pdf
[13] Value stack presented on a LHV basis. CI based on volume weighted average Dairy and Swine Manure-RNG CI (https://ww2.arb.ca.gov/sites/default/files/2024-01/quarterlysummary_Q32023.xlsx). Pricing Basis: CA LCFS pricing based on 2023 average credit price (https://ww2.arb.ca.gov/sites/default/files/2024-02/January%202024%20-%20Monthly%20Credit%20Transfer%20Activity.pdf); RIN Pricing based on 2021-2023 average RIN Pricing (https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rin-trades-and-price-information); Natural Gas pricing based on U.S. Energy information Administration Short Term Energy Outlook Henry Hub Price for 2024 converted to LHV Basis (https://www.eia.gov/outlooks/steo/) released on 2/6/2024.
[14] Title 26 – Internal Revenue Code Section 45Z
[15] Proposed Low Carbon Fuel Standard Amendments (https://ww2.arb.ca.gov/rulemaking/2024/lcfs2024)

credit prices from their current lows. In addition to increased LCFS credit prices, animal waste-RNG to CNG will also qualify for the 45Z Clean Fuel Production Credit once in effect in 2025. This could double the value generation of animal waste derived-RNG from $70 / MMBTU to over $130 / MMBTU. At a total value of approximately $130 / MMBTU for RNG, the value of the animal waste-RNG could reach 32% of the total revenue from a dairy cow as demonstrated in Figure 1.

Table 3. Animal Waste Derived-RNG as CNG Value in 2025 (CA LCFS, RFS, 45Z, NG Value Stack)[16]

CNG from Animal Waste Derived-RNG Carbon Intensity	g CO2e / MJ	-271.6
CA LCFS Assumptions		
CA LCFS Credit Price	$ / MT CO2e	133.1
2025 Diesel Compliance Baseline	g CO2e / MJ	85.9
EPA RFS RIN Pricing Assumption		
D3 Rin Price	$ / D3 RIN	$2.80
45Z - Clean Fuel Production Tax Credit Assumption		
Applicable Amount	$/gal	$1.00
CNG from Animal Waste Derived-RNG Emission Factor		6.7
RNG to DGE Equivalence	DGE	0.16
Total Value Stack		
Natural Gas Price	$ / MMBTU	3.3
CA LCFS	$ / MMBTU	50.2
RFS RIN Value	$ / MMBTU	36.4
45Z Credit Value	$ / MMBTU	42.1
Total Value Stack	$ / MMBTU	131.9
Environmental Incentives Value vs. Natural Gas Value	ratio	39.5

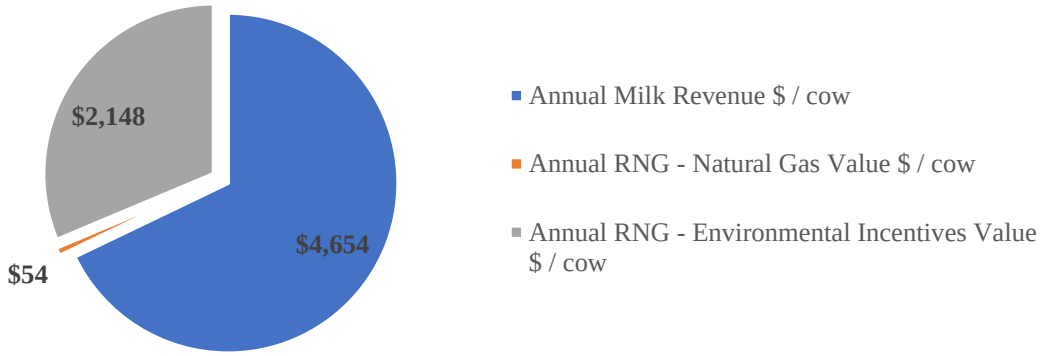

Figure 1. Dairy cow value generation per cow from Milk and RNG considering LCFS, RING, 45Z Credits.

[16] Pricing Basis: CA LCFS pricing based on 2023 average credit price (https://ww2.arb.ca.gov/sites/default/files/2024-02/January%202024%20-%20Monthly%20Credit%20Transfer%20Activity.pdf); RIN Pricing based on 2021-2023 average RIN Pricing (https://www.epa.gov/fuels-registration-reporting-and-compliance-help/rin-trades-and-price-information); Natural Gas pricing based on U.S. Energy information Administration Short Term Energy Outlook Henry Hub Price for 2025 converted to LHV Basis (https://www.eia.gov/outlooks/steo/) released on 2/6/2024.

Table 4. Dairy cow value generation Milk vs. manure derived-RNG sold as CNG in 2025[17]

Milk Revenue Assumptions		
Annual Milk Production	lbs. / cow	241
Average Milk Price	$ / 100 lbs.	$19.30
Annual Milk Revenue	**$ / cow**	**4,654.0**
Manure-RNG as CNG Revenue Assumptions		
Annual RNG Production	MMBTU/ COW	16.7
2025 Annual RNG Value sold to CNG Market	$/MMBTU	$131.88
Annual Manure - RNG Revenue	**$ / cow**	**2,202.4**

Animal Waste-RNG Potential Value Generation Through 45V Hydrogen Production

Lax guidance on 45V "splash blending" could cost Americans $510 / MMBTU vs. $80 / MMBTU (RFS + 45Z), without reducing methane emissions. This cost stems from using inappropriate reference cases to determine the CI of animal waste derived-RNG. Blending extremely low-CI RNG with natural gas (<5% RNG) can reduce emissions in CCS-based hydrogen production to < 0.45 kg CO2e / kg H2. This blending approach would enable the CI of reforming with CCS hydrogen to drop from ~2.0 kg CO2e / kg H2 which generates $0.75 per kg H2 to the full $3.00 / kg H2 with a CI below 0.45 kg CO2e / kg H2. The marginal value of increased 45V hydrogen production tax credit results in the staggering $510 / MMBTU value generation for the animal waste derived-RNG as demonstrated below.

[17] Annual Milk Production based on 2023 Annual Average from USDA (https://usda.library.cornell.edu/concern/publications/h989r321c?locale=en); Milk price based on 2022 10 year average milk price received from USDA (https://www.nass.usda.gov/Statistics_by_Subject/result.php?E94FA81E-0625-33BD-8731-F4408357227D&sector=ANIMALS%20%26%20PRODUCTS&group=DAIRY&comm=MILK)

Table 5. Animal waste derived-RNG value potential through 45V "splash blending" [18]

Autothermal Reformer Operating Assumptions		
ATR Specific Natural Gas Demand	MMBTU / MT H2	145.0
ATR Specific Electrical Demand	MWH / MT H2	3.5
ATR Onsite Carbon Capture	%	99
Feed and Fuel Emission Factor Assumptions		
Electrical Supply (Renewable Power) EF	kg CO2e / MWH	0
Fossil Natural Gas EF	kg CO2e / MMBTU	13.4
Animal Waste Derived-RNG	kg CO2e / MMBTU	-286.7
Results		
Well-to-Gate CI without RNG	kg CO2e / kg H2	2.0
45V Credit Generation without RNG	$ / kg H2	$0.75
Required RNG Blend percentage	%	3.04%
Well-to-gate CI with RNG	kg CO2e / kg H2	0.44
45 Credit with RNG Blending	$ / kg H2	$3.00
Marginal Credit Generation	$ / kg H2	$2.25
Marginal 45V RNG Value Generation	$ / MMBTU	509.8
Environmental Incentives Values vs. Natural Gas Value	ratio	156.5

Furthermore, at $510 / MMBTU the produced manure-RNG for dairy cows is 1.8x times as valuable milk as shown in Figure 2. Such a market distorting value and windfall for a select few sizable industry participants would likely lead to a "cobra effect"[19] and increased methane emissions. At $510 / MMBTU of RNG would likely drive an expansion of the underlying dairy capacity and/or optimization of dairy operations with increased waste production for no benefit other than claiming the value of the tax credits. This encouraged marginal increase in the dairy cow population and operational methane is likely to result in significant greenhouse gas emissions due to the increase in unrecoverable methane from belches arising from enteric fermentation in the digestive tract of the animals, unrecovered flatulence from the animals, and leaks in the biogas recovery.

[18] Operating assumptions are based on industry knowledge. CI considers sourcing 100% 24/7 with qualifying EACs. Similar results are possible with comparable resulting RNG values using product hydrogen to close the power balance if renewable power is not possible. The natural gas upstream CI is based on default 45VH2-GREET emission factor. RNG CI based on CA LCFS average lower values are possible in R&D GREET 2023 depending on AD type. 45V credit generation assumes meeting the prevailing wage and apprenticeship requirements. RNG value generation excludes the NG value of the RNG.

[19] The "cobra effect" refers a bounty on dead cobras in British Colonial India which lead to cobra breeding farms for the purpose of capturing the bounty. https://www.forbes.com/sites/forbesbusinessdevelopmentcouncil/2020/08/26/beware-of-the-cobra-effect-in-business/?sh=27dbbec35f6f

Figure 2. Dairy Cow value generation milk vs animal waste derived-RNG through 45V "splash blending."

Table 6. Annual value generation per cow from Milk and RNG through "45V splash blending"

Milk Revenue Assumptions		
Annual Milk Production	100 lbs. / cow	241.1
Average Milk Price	$ / 100 lbs.	$19.30
Annual Milk Revenue	**$ / cow**	**4,654.0**
Manure Revenue Assumptions - 45V "Splash Blending"		
Annual RNG Production	MMBTU/ COW	16.7
2025 Annual RNG Value though 45V "Splash Blending"	$/MMBTU	509.8
Natural Gas Value	$/MMBTU	3.3
Annual Manure-RNG Revenue	**$ / cow**	**8,567.9**

To provide further evidence of this unnecessary windfall to developers, the simple payback for capital recovery on anaerobic digesters cow through the LCFS, RIN, and 45Z is reasonable at 14 months, compared to a 4-month payback period enabled through 45Z.

Table 7. Simple payback period on capital in 2025 for RNG sold as CNG vs 45V "splash blending."

	LCFS, RINs, 45Z	**45V**
Capital Cost ($ / Cow)	$2,500	$2,500
Annual RNG Value ($ / Cow)	2,202.4	8,567.9
Simple Payback Period (Months)	**13.62**	**3.50**

As clearly demonstrated, through 45V regulations with inappropriate counterfactual for animal waste biogas utilization or flaring, RNG will be "splash blended" with conventional natural gas to produce "ostensibly" clean hydrogen reaping $3.00 / kg H2 all the while increasing GHG emissions. Implementing an appropriate counterfactual like 80% utilization or flaring as outlined in recommendation #1 is essential to prevent market distortion. Further, an 80% utilization reference case for purposes of 45V is supported by the rapid market uptake of anaerobic digesters today and the strong incentives through state level programs as well as federal programs through the 45Z and RFS.

Current Market Uptake of Animal Waste Derived-RNG

In addition to producing market distorting effects like inverting the value of dairy manure vs dairy milk, a low counterfactual biogas utilization is contradictory to the strong market uptake of anaerobic digesters today. The value of RNG through the CA LCFS and RFS has resulted in an eight-fold increase of animal waste derived-RNG production into the CA LCFS since Q1 2020 which shown in Figure 3.

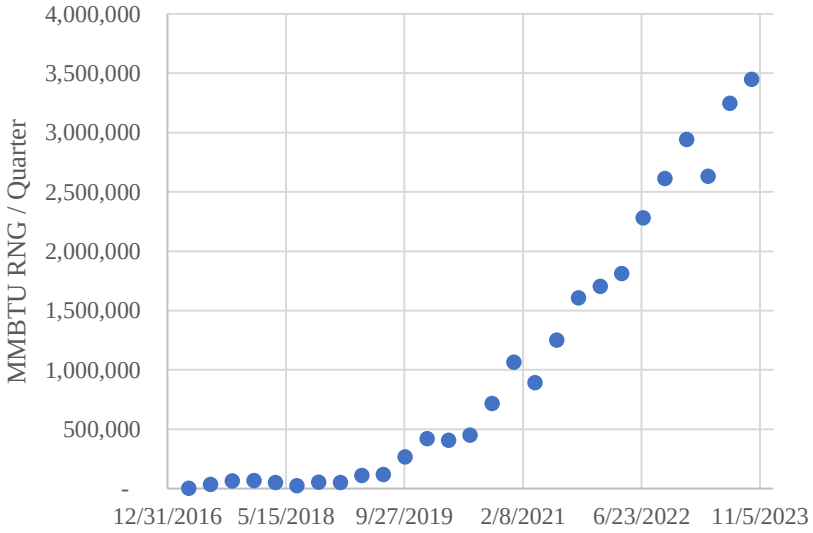

Figure 3. Animal waste derived-RNG sold into the California LCFS Market[20]

The total Q3 animal waste derived-RNG sold into the LCFS market was ~3.5 trillion BTU (LHV) with a total addressable market estimated to be 168 trillion BTU (LHV) per year from 8,100 U.S dairy and swine operations this rapid growth will certainly continue.[21]

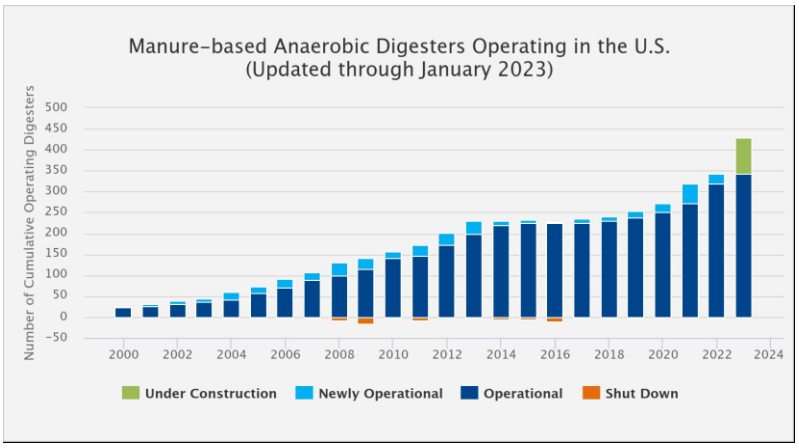

Figure 4. EPA AgSTAR Manure-based Anaerobic Digesters operating in the US.[22]

[20] Based on CA LCFS Quarterly data published through Q3 2023 (https://ww2.arb.ca.gov/sites/default/files/2024-01/quarterlysummary_Q32023.xlsx)
[21] EPA estimate of RNG to CNG potenital of 1.3 billion diesel gallon equivalent (https://www.epa.gov/sites/default/files/2018-06/documents/epa430r18006agstarmarketreport2018.pdf)
[22] EPA AgSTAR (https://www.epa.gov/agstar/agstar-data-and-trends#adpotential)

This explosive growth of anaerobic digesters further highlights that a conventional manure counterfactual disregarding the utilization of biogas for RNG, electricity, and heat production is inaccurate. Additionally, the rapid growth rate demonstrates that credits above current incentives and future incentives with 45Z is wholly unnecessary and will cost billions, while only increasing the risk of perverse market incentives. To demonstrate the magnitude of 45V credit generation under current RNG production rates and future adoption, consider the following examples.

As stated, the Q3 2023 total animal waste derived-RNG sold into the California LCFS market was 3.5 trillion BTU (LHV), or 37,500 MMBTU/day. Without stringent safeguards and enforcement of the "first productive use" principle and an appropriate counterfactual utilization as recommended in recommendations 1 & 2, this 37,500 MMBTU/day would generate approximately $9 billion annually in production tax credits as shown in Table 8 below with no investment in animal waste derived-RNG production. Further, this price tag comes without any incremental emissions reductions since this manure-RNG is already produced today and utilized in the California transportation market as CNG and will be backfilled with conventional natural gas. The treasury and IRS must implement rigorous evaluations of "first productive use" to ensure that existing animal waste beneficially utilized today is not shifted to 45V credit through a "shell game" of shifting dairy production to new anaerobic digesters.

Table 8. 45V Credit Generation Potential from Existing CA LCFS RNG with 0% utilization counterfactual

California LCFS Animal Waste Derived-RNG CI	MMBTU / Quarter	37,489.1
Average CA LCFS Animal Waste Derived-RNG CI	kg CO2e / MMBTU	-286.7
RNG Blend % to Achieve <0.45 kg CO2e / kg H2	%	3.04%
Clean Hydrogen Produced	MT / day	8,494.1
Daily 45V Value Generation	MMUSD / day	25.5
Annual 45V Generation	MMUSD / year	8,918.8
Marginal 45V Value vs. Base case ATR	MMUSD / year	5,667.7

Based on EPA AgSTAR data, there are currently anaerobic digesters operating or under construction on about ~10% of the total U.S dairy cow population and producing approximately 17.5 trillion BTU (LHV) of manure biogas annually.[23] EPA estimates that the total manure RNG production can grow significantly to 168 trillion BTU (LHV) annually from U.S. swine and dairy operations. Animal waste derived-RNG with 90% adoption, would generate a staggering $~80 billion dollars annually in 45V production tax credits, and cost the American taxpayer $65 billion in excess subsidies compared to the cost of these emissions reductions through the RFS and 45Z. This untenable cost will require significant government cash outlays, which will hamper the government's ability to support other crucial climate and investment activities. Implementing realistic counterfactuals that consider the rapid uptake of anaerobic digesters and utilization of RNG today as recommended will prevent these untenable costs.

[23] https://www.epa.gov/agstar/livestock-anaerobic-digester-database & https://www.nass.usda.gov/Charts_and_Maps/Milk_Production_and_Milk_Cows/milkcows.php.

Table 9. Excess Federal Subsidies for animal waste RNG through 45V due to inappropriate counterfactual assumptions

Annual U.S. Animal Waste-RNG Production Potential	Trillion BTU/year	168.3
AD Uptake	%	0.9
Federal Incentive for RNG through 45V "Splash Blending"	$ / MMBTU	509.8
Federal Incentive for RNG to CNG through 45Z and RFS	$ / MMBTU	78.4
Excess Federal Subsidy for RNG	$ / MMBTU	431.4
Annual Excess Federal Subsidy for RNG at Potential Scale	MMUSD	65,351.2

Comments in response to specific requests for comment in the 45V Notice of provisional rulemaking.

Request for Comment:

"Requirements would be established to reduce the risk that entities will deliberately generate additional biogas for purposes of the section 45V credit, above historic and expected future levels or an equivalent metric, for example by generating biogas through the intentional generation of waste, and to ensure that other factors affecting the emissions rate of hydrogen produced with biogas-based RNG or RNG procurement via RNG certificates are taken into account. The Treasury Department and the IRS request comment on these and other potential conditions. Any fugitive sources of methane would be treated in the same fashion as described above for RNG."

Response:

As demonstrated above, an inappropriate counterfactual reference case under 45V, which ignores the rapid adoption of beneficial utilization of biogas based RNG today, will create a perverse market distorting potential value of >$510 / MMBTU (LHV). This incentive will likely drive the expansion of the underlying animal population or facilities will optimize towards more manure production through feed selection and higher emission manure management systems. To avoid this incentive, the Treasury and IRS should adopt a counterfactual utilization rate of 80% as outlined in recommendation #1.

Further, the Treasury and IRS must narrowly define the "first-productive use" principle. This principle when enforced properly could prevent billions of dollars in 45V credit generation that does not result in any emissions reductions as the existing RNG production is backfilled with fossil natural gas. One potential risk is a rise of dairy and swine "shell games" where cows and swine are simply shifted to a new anaerobic digester to reap the 45V value generation or existing biogas utilization equipment is retired early so that sufficient time has passed for the biogas to qualify for the first productive use.

Request for Comment:

"Regarding fugitive methane, the Treasury Department and the IRS request comment on the appropriate lifecycle analysis considerations associated with specific fugitive methane sources, such as counterfactual scenarios, to account for direct and significant indirect emissions, and also the manner in which to assess methane from these sources if the current practice is flaring."

Response:

Reducing methane emissions across agricultural and energy sectors is essential to mitigating climate change and achieving climate targets. However, over incentivization of fugitive sources of methane through inappropriate counterfactuals risks the same "cobra effect" that is possible with animal waste derived-RNG. Many fugitive sources of methane like coal bed methane are similar in principle to methane emissions from landfills with both landfill gas ("LFG") and

coal bed methane being direct byproducts of human activity. As such, the counterfactual case should consider 100% flaring or utilization of this methane.

For fugitive methane from the oil and gas sector, this methane should be treated like fossil natural gas. These methane emissions would already be regulated under the EPA's Methane Emission Reduction Program and excess methane emission would be subject to the waste emission charge. As such, it is unnecessary and inappropriate to consider these as methane sources as "fugitive methane sources" under the 45V. Recovering leakage from the oil and gas sector should be treated as natural gas for the purposes of 45V.

Request for Comment:

"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:

No response at this time.

Request for Comment:

"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:

Implementation of a set counterfactual utilization of 80% as described in recommendation #1 will prevent the risk of significant indirect emissions from expansion of underlying animal populations and/or optimization for the production of waste at existing facilities.

Request for Comment:

"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:

No response at this time.

Request for Comment:

"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:

For RNG to meet the definition of "first productive use" annual documentation of the prior five years detailing herd population along with an attestation that there was no productive use of biogas should be required. There should also be scrutiny for recently established dairy and swine operations that the animal population was not shifted from an operation with existing biogas capture and utilization to prevent a "shell game". These stringent requirements and scrutiny will ensure that animal waste derived-RNG is not simply shifting from one productive use to another with the prior use being backfilled with natural gas.

Fugitive sources of methane like coal bed methane, should only be allowed when the source of fugitive methane has been publicly documented through public reporting for the EPA's GHGRP program or state equivalent program. As iterated above, the reference case for fugitive sources of methane should consider a 100% utilization rate similar to LFG.

Again, methane leakage from the oil and gas sector is subject to the EPA's Methane Emissions Reduction Program and waste emission charge for excess emissions. As such, it is inappropriate to treat this methane source as a "fugitive source of methane" under the 45V.

Request for comment:

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

Response:

Emissions associated with transporting RNG and fugitive methane by pipeline or vehicle are no different than the transportation of the fossil equivalent natural gas. As such RNG and fugitive methane should be subject to the same leakage and energy emissions as fossil natural gas.

Request for Comment:

"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:

As outlined above, an 80% counterfactual utilization brings the credit generation of animal waste derived-RNG through 45V to parity with credit generation under 45Z, RFS, and state incentives. This ensures that RNG can be applied to the highest and best use where it is produced today and, in the future, whether that be RNG utilized for CNG production, conversion into sustainable aviation fuel, or the production of hydrogen.

Request for Comment:

"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:

As described in detail above, implementing an 80% counterfactual utilization as recommended in recommendation #1 will prevent the generation of additional emissions from the production of additional waste and waste diversions from lower emitting sources.

Request for Comment:

"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 the purposes of the section 45V credit? How should additional capture of existing waste or waste streams be documented and treated?"

Response:

As discussed, there alternative minimally producing methane manure treatments like aerobic treatment that produce minimal methane, as such animal waste derived-RNG is man-made methane. Aerobic treatment such as The Settje EASYFIX Manure Technology System (Settje Agri-Services and Engineering)[24] allow for liquid manure to have effectively similar environmental performance to manure from free range cows. Therefore, the release of methane in livestock farming is a choice that does not represent a reasonable counterfactual for calculation of the CI of RNG utilized to produce hydrogen with the 45V Production Tax Credit.

Establishing a reasonable counterfactual of 80% to apply for new and existing methane sources will prevent the perverse incentive to artificially increase manure or waste production for the sole purpose of capturing the 45V through splash blending.

Request for Comment:

"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:

Yes, geographic constraints are required to prevent the risk of indirect emissions. RNG sources and consumers must be located on a common distribution network, else increased natural gas consumption from hydrogen facilities will be met with increased fossil natural gas and induce indirect emissions from upstream natural gas activities as outlined under recommendation #3. Without this requirement, RNG would not be displacing fossil gas on the same system.

Request for Comment:

"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

[24] https://settje.com/news/2021/10/21/the-benefits-of-manure-aeration-systems/

withdrawn, season of year, age of pipelines, or other factors? Are data or analysis available to support this?"

Response:

Variation in methane leakage across distribution and transmission of RNG should be based on the natural gas transmission and distribution leakage as reported to the EPA under the GHGRP and Methane Emission Reduction Program as detailed in our supplemental comments. This variation should apply to both RNG and natural gas as they use the same infrastructure and therefore are subject to the same leakage.

Request for comment:

"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:

Venting to atmosphere is an inappropriate counterfactual for purposes of 45V, not only does this enable perverse credit generation of more than $510 / MMBTU of RNG, but it ignores the rapid deployment of anaerobic digesters today. While the 2011 Waste-to-Wheel report on animal waste derived-RNG to CNG counterfactual case on only conventional manure treatment was adequate when there were only 167 AD in operation, with now over 400 operational or under construction and $130 / MMBTU incentive expected in 2025, this counterfactual is insufficient.[25,26] As outlined throughout this comment letter, the current incentivization and adoption of RNG production must be considered in the counterfactual. Fidelis recommends establishing an 80% counterfactual to recognize these factors and establish parity for incentivization of RNG used for hydrogen production and CNG. Alternatively, free range milk-cows or aerobic manure treatment systems of industrial scale milk-cow facilities that both do not create any methane emissions could be used as the baseline.

Request for Comment:

"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 conservatively default parameters and counterfactuals be used unless proven otherwise by a third party?"

Response:

PERs should not be allowed for specific RNG sources regardless of the existing counterfactual at the RNG production facility. Industry parameters should be established and locked as "background data" to prevent gaming and cobra effects of RNG that reward highly emitting facilities today.

***

[25] Han, J, Mintz, M, & Wang, M. Waste-to-wheel analysis of anaerobic-digestion-based renewable natural gas pathways with the GREET model… (2011). United States. https://doi.org/10.2172/1036091

[26] EPA AgSTAR (https://www.epa.gov/agstar/agstar-data-and-trends#adpotential)

Conclusion

While reducing methane emissions across all sectors, including agriculture, is a critical step to mitigating climate change, this reduction should not come at an unreasonable cost, nor should it discourage actual physical GHG emission reductions. The federal RFS program combined with the 45Z credit and state LCFS programs generate more than adequate support for the installation of anaerobic digesters at dairy and swine agricultural operations at reasonable cost to the American taxpayer today. Enabling unconstrained animal waste-RNG blending pathways to produce "ostensibly" clean hydrogen through the 45V production tax credit will increase the cost of the same emission "reductions" by $65 billion dollars annually (more than $600 billion over the life of the 45V tax credit) while simultaneously increasing net GHG emissions through expansion of dairy and swine operations. Fidelis recommends that the Treasury Department and IRS take prudent steps to prevent this market distorting over incentivization by: (1) restricting the reference case in animal waste-RNG to consider 80% minimum flaring on recoverable manure methane emissions; (2) implementing strict enforcement of the "first productive use" principle; and (3) requiring animal waste-RNG be deliverable to the hydrogen production facility. By incorporating these three recommendations, the Treasury Department and IRS will eliminate massive excess federal subsidies and protect the integrity of 45V CI-based regulation.

Alternatively, minimally emitting manure treatments such as free-range milk-cows or aerobic manure treatment systems of industrial scale milk-cow facilities that limit methane emissions could be used as the baseline. Both are fully proven technologies and reduce the methane emissions while RNG capture of methane from manure ponds is only partially effective – and many times more expensive when considering the premiums paid for the environmental attributes of the man-made dairy RNG.

* * * *

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

Respectfully submitted,

Fidelis New Energy, LLC