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**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)**

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Anew Climate ("Anew") appreciates the opportunity to provide formal comments on the Proposed Regulations Relating to the Section 45V Credit for Production of Clean Hydrogen (Clean Hydrogen Production Credit), Notice of Proposed Rulemaking (NPRM) as published in the Federal Register on December 26, 2023.

Anew is one of the largest climate solutions companies in North America, with a twenty-year track record of success within the markets for low carbon fuels, renewable natural gas ("RNG"), fugitive methane captured at coal mines ("coal mine methane" or "CMM"), voluntary carbon credits, emissions credits, and renewable energy certificates. We respectfully submit below both our general comments as well as responses to a selection of the specific questions posed in the Section 45V NPRM.

Anew commend the Department of the Treasury ("Treasury") and the Internal Revenue Service ("IRS") on its work to carry out the Biden-Harris Administration's bold commitment to tackle the climate crisis and putting the United States on a path to achieve net-zero emissions, economy-wide, by no later than 2050. Treasury and the IRS play a critical role in achieving the Administration's climate objectives through the expeditious and effective implementation of the transformational provisions in the 2022 Inflation Reduction Act ("IRA"), including the Section 45V Clean Hydrogen Production Tax Credit ("PTC").

In conjunction with the U.S. National Clean Hydrogen Strategy and Roadmap and provisions in the 2022 Bipartisan Infrastructure Law, IRA provisions like Section 45V have the potential to spur tremendous levels of innovation, investment, and public-private collaboration to build the clean hydrogen economy in the United States while creating well-paying jobs. However, the ability to deliver an equitable clean energy future depends on Treasury and the IRS implementing Section 45V consistent with the intent and spirit of the IRA. An overly restrictive interpretation and implementation of Section 45V could severely stifle innovation and hinder U.S. industrial

decarbonization. For example, exclusionary provisions limiting eligible low carbon feedstocks, technologies, or infrastructure could work against the intent and objective of the IRA.
Anew's comments are focused specifically on the importance of methane abatement as part of the Biden-Harris Administration's overall climate strategy and implementation of the Section 45V PTC.

Methane is the second-largest contributor to global warming after carbon dioxide due to its alarmingly high concentration in the atmosphere and the fact that it is a potent greenhouse gas (GHG) with impacts greater than 80 times that of carbon dioxide over a 20-year period. As a member of the Global Methane Pledge, the U.S. committed to work toward the common goal of reducing anthropogenic methane emissions by 30% by 2030, compared to 2020. This commitment includes reducing methane emissions from the waste sector by 15% by 2030. U.S. Climate Envoy John Kerry stated at the most recent UNFCCC Conference of the Parties ("COP") in December 2023 that a focus on methane is "the easiest, quickest, fastest, cheapest way to begin to get gains against the warming."

In that spirit, Anew strongly urges Treasury and the IRS to implement Section 45V in a manner that fully leverages the tremendous methane abatement impact of low carbon gas in a clean hydrogen economy – whether in the form of blending RNG from agricultural wastes and manure, wastewater, or municipal solid waste, or CMM[1] with natural gas for the production of clean hydrogen.

In setting the rules for lifecycle emissions calculations under the 45VH2 GREET model, the Treasury and the IRS should recognize and adequately reward the tremendous climate benefits of avoided methane emissions that – without the IRA incentive – are likely to be vented directly into the atmosphere.

Anew therefore encourages the Treasury and IRS to finalize the rules with **two fundamental principles** in mind.

**First, the rules should recognize that science-based negative carbon intensities are necessary to make methane abatement from low carbon RNG or CMM gas projects economically viable**. Without rules that reflect the actual greenhouse gas performance of low carbon gases, there is little to no economic incentive to invest in these highly effective methane abatement projects.

**Second, low carbon gas-derived hydrogen should be treated in a manner consistent with the underlying gas commodity without restrictions inherent to electrolytic hydrogen**. Low carbon gas-derived hydrogen and electrolytic hydrogen are fundamentally two very different physical commodities. The proposed rule indicated that the conditions for low carbon gases would be "logically consistent with but not identical" to the requirements for electrolytic hydrogen and would address "the differences between electricity and methane." Given the critical importance of

[1] Coal Mine Methane (CMM) is a by-product of the mining process that continues long after mining has ceased. CMM is overwhelmingly released into the atmosphere without abatement. It is a major source of fugitive methane that is frequently overlooked, despite the fact that CMM represents 8% of U.S. Methane emissions. There is currently no clear economic incentive to capture CMM for productive use, but this could be remedied with the Section 45V PTC.

incentivizing investment in methane abatement infrastructure, Anew urges Treasury and the IRS to avoid application of restrictions to low carbon gas-derived hydrogen that make sense only in the context of electricity.

Anew's main comments flow from these two fundamental guiding principles. In the interest of brevity, the highest-priority issues are:

1. **The Final Rules Should Not Include the "First Productive Use" Requirement Because it is Impractical and May Delay or Prevent Decarbonization Efforts**

    a. The "first productive use" requirement is not authorized by statute and is overly strict, excluding viable low carbon gas projects that could support clean hydrogen production today.

    b. There is no evidence provided that the concerns expressed with respect to electricity for hydrogen production apply to low carbon gas.

    c. Requiring the low carbon gas project and the hydrogen production facility to commence operations in the same year (or for hydrogen production facility operations to precede those of the low carbon gas project) is unworkable.

    d. The considerations around "Induced Emissions" of redirected electricity are not directly applicable to low carbon gas. If the "first productive use" requirement is adopted, the final rules should allow existing gas sources into the program through 2030 to ensure adequate supply. After 2030, any "Induced Emissions" that occurred could be quantified and – if applicable – included in the lifecycle analysis of existing low carbon gas facilities, as opposed to being unjustified grounds for disqualification from the program.

    e. If the "first productive use" requirement is adopted, it must be applied to each methane source – i.e. digester or lagoon-level for RNG and borehole-level for CMM – since this is reflective of how investment decisions are made.

    f. In addition to facility modifications and upgrades, potential conversion of facilities should qualify.

    g. Once a low carbon gas source is accepted as meeting a "first productive use" requirement (if adopted) under the program, it should not be exclusively tied to a particular hydrogen production facility.

2. **Science and Facts Should Govern GREET and the Final Rules Should Allow for Avoided Methane Crediting**

    a. The 45VH2-GREET model should follow the R&D GREET 2023 model and include additional pathways for low carbon gas feedstocks beyond landfill gas.

b. The lifecycle GHG emissions associated with low carbon gas pathways must include avoided emissions for facilities where the methane would have otherwise been released into the atmosphere.

c. The 45VH2-GREET model must allow input from multiple low carbon gas feedstock sources.

d. The ability to seek provisional emission rates (PERs) should not be limited and should promote additional actions to reduce upstream GHG emissions (i.e., CCS-enabled low carbon gas facilities).

e. The 45VH2-GREET model should be adapted to consider low carbon gas feedstocks as foreground (rather than background) data, with the option to input carbon intensity based on the specific project or feedstock source being used to develop hydrogen.

f. Low carbon gas projects should not be subject to potential annual changes in their carbon intensity score under the 45VH2-GREET model.

3. **The Final Rules Should Reflect the Mass Balance Fundamentals and Delivery Mechanics Inherent to the U.S. Pipeline System**

a. Treasury should permit delivery of low carbon gas under Section 45V via tracked custody transfers (also referred to as "book-and-claim") within the U.S. pipeline system, consistent with legislative intent.

b. The appropriate geographic scope should be the North American interconnected pipeline system.

c. Time-matching should not be more frequent than monthly and should be implemented with consideration to the availability of gas storage infrastructure.

d. Tracking of pipeline-injected low carbon gas can be easily achieved using existing technology.

e. Verification of low carbon gas production facilities should be done based on existing regulatory frameworks, such as RFS and LCFS, or by third parties such as CARB-accredited LCFS verifiers.

4. **The Final Rules Should Clarify that Making Low Carbon Gas Pathways Eligible for Section 45V Credits Does Not Create any "Perverse Incentives"**

a. There is no evidence that companies will create additional waste in order to generate more waste methane for the purpose of benefiting from market-based incentives.

b. Limiting the 45V program to waste streams currently captured in the EPA's Greenhouse Gas Reporting Program (GHGRP) is a fundamentally flawed approach that would strand existing waste streams.

c. Freezing waste streams at pre-IRA levels would also be virtually impossible due to a lack of monitoring data.

5. **The Final Rules Should Not Preclude Participation in Other Federal, State, and Local Incentive Programs**

    a. For example, generation of RINs and LCFS credits should be permitted if hydrogen is used as transportation fuel.

6. **The Final Rules Should Not Adopt the Contemplated Restrictions on Hydrogen Decarbonization through Low Carbon Gas Because They Would Undermine Methane Abatement**

    a. The final rules should avoid adopting several proposed measures that directly conflict with each other.

While Anew's general comments address many of the specific questions posed by Treasury and IRS in the Proposed Rule, Anew also provides direct responses to those specific questions in Annex 1 of this document.

## General Comments

### 1. The Final Rules Should Not Include the First Productive Use Requirement Because it is Impractical and May Delay or Prevent Decarbonization Efforts

**The "first productive use" requirement is not authorized by statute. It is also impractical, and stricter than the requirements contemplated for electricity generating facilities.** If adopted, it would result in the exclusion of technologically viable low carbon gas projects that could support clean hydrogen production. Moreover, it would support continuing less environmentally beneficial projects based on an unproven and unexplained concern regarding backfilling with natural gas.

There are various reasons the "productive use" of an existing low carbon gas facility may change, including, but not limited to, the expiration of a power purchase agreement (PPA). If there are no economic incentives to continue with the electricity project and no incentives for pipeline injection, the methane will be flared or vented and the GHG emissions reductions would be lost. Similarly, unlike some other renewable energy technologies (e.g., solar and wind), there are significant ongoing costs for low carbon gas projects that must be covered to ensure continued operation and associated GHG emissions reductions. If those projects cannot cover their operating expenses, the methane will once again be flared or vented. Low carbon gas facilities 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 pipeline quality low carbon gas. If a low carbon gas facility loses its eligibility to generate sufficient value for preventing methane emissions (for example, because it fails a poorly constructed additionality test) the facility may not be able to continue operating and will result in increased methane emissions.

**There is no evidence provided that the concerns expressed with respect to electricity for hydrogen production apply to low carbon gas**. 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 ignore methane abatement benefits of biogas or CMM that may have had a "productive use" prior to being leveraged for hydrogen production. This approach is also inconsistent with the purpose of the Administration's Regional Clean Hydrogen Hubs Program (H2Hubs) - to support diverse feedstocks and technology types and facilitate increased hydrogen production.

The successful buildout of clean hydrogen in the United States will require flexibility, particularly in regard to feedstock procurement. Low carbon gas is a readily available feedstock in the United States—it can be easily delivered via existing natural gas infrastructure to hydrogen projects and registries (both compliance and voluntary) already exist to track RNG and CMM and ensure no double counting. The "first productive use" requirement for low carbon gas projects places unnecessary restrictions on the ability to ensure available feedstock exists 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 magnitude of its potential adverse effect on low carbon gas and hydrogen investment.

**Requiring the low carbon gas project and the hydrogen production facility to commence operations in the same year (or for hydrogen production facility operations to precede those of the low carbon gas project) is unworkable.**

First, it is unclear whether any incrementality requirement is even consistent with the IRA and its legislative intent. Second, assuming that there is such a requirement, any "logically consistent" application of incrementality to low carbon gas pathways should be based on the capital expenditure-operational expenditure (CAPEX-OPEX) profile specific to those pathways. Treasury proposed that low carbon electricity projects are assumed to have no induced emissions if their online date is within 36 months of the hydrogen production facility, while low carbon gas facilities would need to start operation in the same taxable year as the recipient hydrogen facility to satisfy the "first productive use" requirement. This treatment is not equitable and does not serve the purpose of maximizing GHG reductions achieved under the 45V program. Renewable electricity production generally requires more capital investment relative to the project's operating expense requirements. For low carbon gas projects, the reality is much different – while significant upfront investment is of course necessary, keeping an RNG facility running entails higher ongoing expenditures for staffing, process energy procurement, feedstock procurement and logistics, digester cleanouts, upkeep and maintenance.

Similarly, CMM capture and productive use projects involve significant up-front capital expenditure, including, but not limited to, the installation of miles of new gathering and transmission pipelines, processing stations, compression facilities, measurement and telemetry facilities, and interconnections to existing interstate pipeline systems. In addition, ongoing active mining operations are constantly expanding, requiring new and ongoing methane capture infrastructure to be deployed.[2] There are significant operational expenses and energy requirements associated with the transportation and processing of gas, and current gas prices, combined with the dearth of tax or other economic incentives for CMM, do not justify these investments.

**If the "first productive use" requirement is adopted, Anew respectfully suggests the following adjustments:**

a. **Treasury and the IRS should wait until at least 2030 before determining if "Induced Emissions" for low carbon gas feedstocks are appropriate to include in any lifecycle analysis.** As discussed above, there is simply no basis for imposing any "incrementality" requirements on the low carbon gas industry. Recognizing the concerns of Treasury regarding unintended increases in GHG emissions, Anew recommends that the final rules contemplate a 5-year "check-in" in 2029 to assess new low carbon gas production and whether induced emissions exist.

This approach allows facilities operating prior to 2030 to potentially qualify as "incremental" or "additional" for purposes of the Section 45V credit. If there is evidence of significant induced emissions in 2029 that is quantifiable in the 45VH2-GREET model, IRS could implement an adjustment to carbon intensity scores of low carbon gas facilities applicable in 2030 and beyond.

[2] CMM capture and productive use project investment decisions are not made by the mining operator but by the fugitive methane project developer and are separate from mining operations.

Any indirect emissions factor based on induced emissions is likely to be zero and may be a negative number.

b. **Modifications and upgrades to facilities should be allowed and the determination of "first productive use" should be performed at the same source-specific level where investment decisions are made.** Biogas processing facilities with available conditioning and cleaning infrastructure may expand to add new waste digesters, cover additional manure lagoons, or invest in procuring feedstock from additional waste sources. Similarly, because significant distances need to be bridged (in many cases through mountainous terrain) between existing collection and processing locations and newly established methane sources, including waste methane venting boreholes, connecting fugitive methane capture and gathering infrastructure to additional sources requires significant financial outlay. Any of these enhancements to expand methane abatement are the result of distinct financial decisions on the part of the project owner. Anew requests that if a "first productive use" requirement is included in the final rule, the determination is performed per newly added waste source where the investment decision is made – i.e. per digester, lagoon, well or borehole – regardless of whether the additional low carbon gas volumes are processed for pipeline injection in an existing facility. The developer of RNG and CMM methane abatement infrastructure in most cases has no direct control over where additional waste methane sources (i.e. waste biomass feedstock accumulation for RNG and mine safety boreholes for CMM) are established and is left "following" the occurrence of new methane emissions with new project development.

In its proposed implementation of "Qualified Biogas Property" as part of the Section 48 Investment Tax Credit (Docket no. REG-132569-17), Treasury suggested that elements of an RNG facility must be functionally interdependent to be considered part of the same Qualified Biogas Property. While industry does not support this limitation, Treasury proposed that while "qualified biogas property includes, but is not limited to, a waste feedstock collection system, a landfill gas collection system, mixing or pumping equipment, and an anaerobic digester", connected gas upgrading equipment that performs the necessary conditioning to achieve pipeline injection of the RNG is not necessarily a functionally interdependent component of Qualified Biogas Property. A newly built RNG facility's gas upgrading equipment is an essential element of the infrastructure, functionally interdependent and thus part of Qualified Biogas Property. However, for facilities with existing gas upgrading equipment in operation, any new methane sources are clearly not functionally interdependent and thus incremental. The methane captured from these new sources should satisfy any "first productive use" requirement deemed necessary in the final rule. While fugitive methane is outside of the scope of the Section 48 Investment Tax Credit, a direct parallel can be drawn with the gas collection, gathering and processing infrastructure needed for CMM projects.

c. **Potential conversion of facilities should qualify**. In the past decades, biogas-to-electricity facilities were primarily built in the United States based on demand for renewable electricity created by state-level Renewable Portfolio Standard (RPS) obligations. Today, other resources such as solar and wind are generally more cost-effective and are prioritized for the decarbonization of electricity. Many biogas-to-power facilities in operation today

are reaching the end of power purchase agreements (PPAs) with 10 and 20-year terms. In many cases, these facilities are unable to secure a new PPA that covers ongoing operating expenses, leading to a decline in beneficial use of biogas and discontinuation of methane abatement. Accordingly, Anew requests that Treasury exclude electricity production from "first productive use" and provide that biogas sources newly converted to RNG pipeline injection from electricity generation satisfy the FPU requirement.

**d.** In alignment with analogous provisions for electricity production sources, existing low carbon gas facilities that make significant infrastructure investments that directly or indirectly reduce GHG emissions (e.g. carbon capture and storage units) should also satisfy the "first productive use" requirement.

There is a similar and unfortunate trend among the limited facilities that currently capture CMM for beneficial use. Projects that leverage fugitive methane for power production (or pipeline injection) are steadily declining since commodity prices do not support continuation of their methane abatement activities. Some projects now flare captured CMM, resulting in $CO_2$ emissions without a corresponding useful resource. Accordingly, switching from power production to CMM pipeline injection should also qualify as "first productive use". If these projects are not eligible for the 45V credit, flaring will likely remain the only economically viable activity.

**A low carbon gas facility should not be exclusively tied to a particular hydrogen production facility.** Tying a low carbon gas source to only one hydrogen producer is an inflexible and unworkable approach that could backfire and reverse critical sources of methane abatement. Anew is concerned with potential limitations on low carbon gas continuing to be available as a feedstock for hydrogen production even if it meets the "first productive use" requirement as proposed. Once a low carbon gas source meets a "first productive use" requirement under the program, it should remain eligible without regard to the hydrogen producer to which it first delivered low carbon gas. Tying eligibility of low carbon gas projects to a third party hydrogen producer over which a project developer has no control would add a prohibitive amount of risk to investments in methane abatement. Similarly, hydrogen producers leveraging low carbon gas for decarbonization must ensure that the discontinuation or unplanned outage of any individual low carbon gas source in their procurement portfolio does not create an outsized risk to eligibility of their product for Section 45V incentives. Defining incrementality based on low carbon gas sources also ensures liquidity of eligible low carbon gas supply for hydrogen producers looking to cover unfilled low carbon gas procurement needs.

## 2. Science and Facts Should Govern GREET and the Final Rule Should Allow for Avoided Methane Crediting

Anew supports the use of GREET as a transparent and well-respected lifecycle model that follows science and appreciates the work that Argonne National Laboratories has done to provide a GREET model targeted for Section 45V. **Anew emphasizes that recognizing the methane abatement benefits of CMM and RNG is not only scientifically accurate, but also essential for the deployment of these robust methane abatement tools. The vast majority of waste biomass and mine safety driven GHG emissions will persist if the 45V program does not follow the fact-based quantification of negative lifecycle GHG emissions of these**

**commodities.** Anew respectfully requests that the following adjustments be made in the final rules with respect to the 45VH2-GREET model:

a. **The 45VH2-GREET model should follow the R&D GREET 2023 model and must include additional pathways for low carbon gas feedstocks beyond landfill gas**. Specifically, it should include the Coal Mine Methane / Waste Gas Capture and Utilization pathway, as well as Biogas from Anaerobic Digestion of Animal Waste, Biogas from Anaerobic Digestion of Wastewater Sludge, Biogas from Anaerobic Digestion of Agricultural Waste, Biogas from Anaerobic Digestion of MSW. It is also necessary to include low carbon gas-to-Hydrogen via Electrolysis[3] and Coal Mine Methane to be consistent with the legislative intent. These additional pathways are particularly important to ensure sufficient incentives exist for utilization of low carbon gas to reduce GHG emissions. For example, limitations on anaerobic digesters at dairy farms could result in emission "leakage."[4] Anew recommends various additional modifications that would better reflect the emissions profiles of these pathways.

b. **In keeping with the GREET model's science-based evolution to date, the lifecycle GHG emissions associated with low carbon gas pathways must include avoided emissions for facilities where the methane would have otherwise have been released into the atmosphere.** This approach is grounded in guidelines established by the International Organization for Standardization (ISO), which clarifies that life cycle assessment (LCA) is primarily used for "identifying opportunities to improve the environmental performance of products at various points in their life cycle" and "informing decision-makers in industry, government or non-government organizations."[5] The use of LCA-based carbon intensities in energy regulations should follow the same principles and incentivize processes and products that contribute to reducing GHG emissions and their impact on climate change. Low carbon gases such as RNG and CMM are derived from the capture, cleaning, and conditioning of surface-level methane emissions that otherwise would be emitted into the atmosphere. Further, the International Energy Agency (IEA) notes that "policy and regulation are needed to encourage companies to reduce methane

[3] RNG and CMM can be used by an electricity generator located at an electrolytic hydrogen production plant. The generator can use RNG or CMM in lieu of fossil natural gas to produce electricity used in production of 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.

[4] Ermias Kebreab, Ph.D., et al., *How California is Pioneering a Pathway to Significant Dairy 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

[5] 14044:2006, "Environmental management – Life cycle assessment – Requirements and guidelines."

emissions from coal mines."[6] Policy makers should not assume that the industry has the right incentives to undertake voluntary action sufficient to mitigate its methane emissions. While the industry may take action on its own, most mitigation opportunities are not cost-effective without pricing externalities. The GREET model has consistently included the quantification of avoided emissions benefits of various fuel pathways, including organic waste derived RNG and, more recently, CMM. 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. We further note that carbon-negative lifecycle emissions are already appropriately recognized by Treasury in the 45V program today. The 45VH2-GREET model released alongside the proposed rule applies a co-product credit to electrolysis-based hydrogen production, if oxygen is sold by the hydrogen producer. This emissions credit is based on the above-mentioned ISO 14044:2006 standard's "system expansion" or "displacement method" methodology and shares methane avoidance crediting's scientific foundation. Hydrogen producers valorizing their oxygen by-product receive the benefit of the emissions that are avoided in connection with oxygen production that would have occurred in the absence of their operations. Because of the credit received to their lifecycle emissions, hydrogen producers have a lower need to procure low-carbon electricity and can blend a higher proportion of grid electricity into their feedstock mix, while remaining below the 0.45 kgCO2/kgH2 threshold. This represents real-life emission reductions, quantified through the application of rigorous lifecycle science that benefits the producers of electrolysis-based hydrogen. We strongly urge Treasury to follow the same fact-based approach when recognizing methane avoidance crediting-enabled GREET-science for RNG and CMM.

c. **The 45VH2-GREET model must allow input from multiple low carbon gas feedstock sources.** Steam Methane Reforming (SMR) units and other hydrogen facilities require significant amounts of methane and may need to contract multiple sources of low carbon gas feedstock to ensure hydrogen can be produced at the lowest levels of carbon emission per kg. Treasury should allow integration of various low carbon gas feedstock sources, each with different lifecycle emission profiles, into the modeling of a hydrogen product's aggregated emissions. If a blend of low carbon gas feedstock sources with varying carbon intensities can be accommodated within the 45VH2-GREET model, fewer projects will require a filing following the PER process.

d. **The ability to seek provisional emission rates (PERs) should not be limited and should promote additional actions to reduce upstream GHG emissions.** For example, a low carbon gas facility that adds carbon capture and sequestration (CCS) or uses technology to improve their facility should be able to seek a provisional emissions rate if the improvement is not included in the model for the pathway. In addition, facilities with more efficient operations than those reflected in the default modeling assumptions should also

[6] "Driving Down Coal Mine Methane Emissions: A Regulatory Roadmap and Toolkit" (2023). Available at: https://iea.blob.core.windows.net/assets/ab2115cd-2b04-4e66-9a71-ec2c14d13acf/DrivingDownCoalMineMethaneEmissions.pdf

be able to seek a better emissions rate. In the California LCFS, carbon intensity scores are facility specific. The RFS program also allows participants to petition for company-specific pathways, even providing a streamlined approval process for ethanol efficient producers. Precedent offers Treasury options for allowing individualized rates while reducing administrative burden and potential delay.

e. **The 45VH2-GREET model should be adapted to consider low carbon gas feedstocks as foreground (rather than background) data, with the option to input carbon intensity based on the specific project or feedstock source**. Carbon intensity may vary even within the same low carbon gas feedstock source, and any inputs can be verified by a third party for accuracy.

f. **Low carbon gas projects should not be subject to potential annual changes in their carbon intensity score under the 45VH2-GREET model.** The applicable carbon intensity score should be determined the year the low carbon gas facility comes online (or, if prior to 2023, using the earliest applicable version of the 45VH2-GREET model) and should remain constant absent a material change in operations. Certainty around carbon intensity would support execution of longer term contracts for low carbon gas. If the facility undertakes a change at its facility that may impact the emissions rate, a new carbon intensity analysis could be required.

3. **The Final Rule Should Reflect the Mass Balance Fundamentals and Delivery Mechanics Inherent to the U.S. Pipeline System**

**Treasury should permit delivery of low carbon gas under Section 45V via tracked custody transfers within the U.S. pipeline system, consistent with legislative intent.** The displacement or mass/balance approach to custody transfers has a long history in the natural gas market, and these approaches (often referred to as "book and claim") are used in several regulatory programs including the federal Renewable Fuel Standard (RFS) and the California Low Carbon Fuel Standard (LCFS) without identified cases of fraud or double-counting. Relying on the same fundamentals of displacement that serve as the foundation of the U.S. natural gas market for hydrogen production facilities to show use of low carbon gas or electricity generated from these carbon-negative resources ensures that transactions are tracked consistently using available platforms.

Efficiencies of scale are inherent to centralized hydrogen production, just as decentralization is inherent to low carbon gas 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 gas infrastructure, hydrogen production facilities cannot often be located near low carbon gas facilities. Any meaningful opportunity to decarbonize hydrogen production through low carbon gas procurement must allow hydrogen producers to aggregate supply from low carbon gas production facilities located at various interconnection points across the North American pipeline system. By leveraging existing pipeline infrastructure, this delivery approach allows for system-wide emissions reduction efforts, consistent with the IRA's intent to promote clean energy investment across all U.S. jurisdictions.

**If additional deliverability and temporal requirements are deemed necessary for low carbon gases by Treasury, Anew requests that the following considerations are upheld in the Final Rule:**

a. **The appropriate geographic scope should be the North American interconnected pipeline system.** The pipeline system is fully interconnected and operates using existing and long-standing mass balance systems for measuring natural gas transportation and delivery. 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 mass balance system for balancing and storage, the entire natural gas pipeline system is the proper geographic scope for the 45V tax credit. See Annex 2 to this document for extensive references on the integrated nature of the natural gas pipeline system.

b. **Time-matching should not be required more frequently than monthly and should be implemented with consideration to the availability of gas storage infrastructure.** Once injected into a natural gas pipeline, low carbon gases are storable and transmittable. The natural gas distribution system has significant storage capabilities and injections into, and withdrawals from, gas storage facilities are tracked in detail. Accounting for low carbon gas has long relied on statements reporting injections onto, and withdrawals from, the pipeline system, which are issued monthly. Strict time matching requirements would be unworkable for low carbon gases.

In particular, hourly time matching does not apply to the delivery of low carbon gases. Hourly matching is discussed in the context of 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. Unlike low carbon gas, credits for low carbon electricity issued under different electricity programs, typically based on regional electricity grids, are often issued by each state with different values and rules. Temporality rules have been created to account for these differences in value, which can vary significantly. Where low carbon gas is actually purchased by the hydrogen producer (not just credits), this is not the case. Under the RFS, for example, Renewable Identification Numbers (RINs) generated from the use of renewable transportation fuel are nationally applicable and values do not differ based on the state in which the generation occurred. Unlike electricity, once natural gas is in the North American pipeline system, it is a homogeneous product that can be transported anywhere in the system. Hydrogen producers should be permitted to match their production with low carbon gas produced or withdrawn from storage during a hydrogen production month. Methane storability is not limited like electricity- the U.S. had a 5-year average storage amount of 3,002 BCF of natural gas.[7] This infrastructure can and should be used to balance needs for hydrogen facilities under 45V, particularly given there is significant seasonality inherent to low carbon gas production. For example, unheated manure lagoon-based agricultural projects freeze in the winter, and gradually ramp back up to full production towards the summer months, depending on annual weather patterns and location.

c. **Tracking of pipeline-injected low carbon gases is easily achieved using existing technology.** Although Anew does not believe an electronic tracking system is required,

[7] https://ir.eia.gov/ngs/ngs

electronic tracking systems for low carbon gas are available today, including the M-RETS (formerly known as the Midwestern Renewable Energy Tracking System) Renewable Thermal Certificate program.[8] An electronic tracking system would address concerns related to double counting, ensure transparency in supply, and allow integration with other regional programs and markets. Programs in various markets, including Oregon's Clean Fuel Program, utility procurement of RNG in Oregon, California's renewable gas standard, Washington's Clean Fuel Standard, and those who voluntarily purchase renewable gas to meet sustainability goals outside of compliance programs, utilize electronic tracking systems for various purposes. These platforms track 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.

d. **Verification of low carbon gas facilities should be done based on existing regulatory frameworks, such as the RFS and the California LCFS, or by third-parties such as CARB-accredited LCFS verifiers.** In discussing "[e]xisting tracking and verification systems" for RNG, the Proposed Rule appears to conflate tracking and verification processes. 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 system that organizes this information (similar to M-RETS) and is primarily aimed at providing assurance against double-counting, mischaracterization of the delivered commodity (such as claiming a different vintage) and confirming deliverability. In other words, tracking provides for the robust monitoring of transactions between verified facilities, but not the auditing of the facilities themselves. "Verification" of low carbon gas facilities, on the other hand, is a process with necessarily manual elements, to be conducted by a qualified third-party professional. Anew believes that most perceived challenges identified in the Proposed Rule relate to verification functions. Several federal and state-level programs exist today and offer models for implementation and verifier accreditation systems for the necessary verification steps – namely, the RFS and the California LCFS. Indeed, the 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. Most RNG producers are already familiar with these systems through RFS and LCFS program participation, allowing for efficient adoption in the Section 45V program. Anew requests that Treasury adapt 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 identified in the Proposed Rule are reliably addressed using solutions that exist today.

[8] https://www.mrets.org

## 4. The Final Rules Should Clarify That Making Low Carbon Gas Pathways Eligible for Section 45V Credits Does Not Create Any "Perverse Incentives"

Anew is confident that the Section 45V credit will not incentivize the generation of additional emissions and, therefore, there is no need for the final regulation to limit qualifying methane sources. Such a limitation is particularly difficult to reconcile in light of any "first productive use" requirements.

a. **There is no evidence that companies will create additional waste in order to generate more waste methane for the purpose of benefiting from market-based incentives.** The RFS and California LCFS programs have not created such a result; the safeguards against perverse incentives in the low carbon gas 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 low carbon gas feedstock source, making it undesirable for creation of qualified clean hydrogen under the Section 45V program.

Even skeptical academic experts have found no empirical evidence to support the "perverse incentive" claims made by some opponents of avoided methane crediting.[9] Anew is partnered with swine and dairy farmers committed to reducing emissions from their waste products. Our experience confirms what the data indicates: decisions around development and operations in the dairy and swine livestock sectors are firmly driven by strategic intent to maximize current and future value in the meat and milk markets, while maintaining strong environmental stewardship – not by increasing RNG value or with an intent to incur additional waste production.

As Americans consume meat and dairy products, the companies developing RNG projects are investing at-risk capital to abate emissions from the waste products of an essential industry. The capture and conversion of methane creates undeniable and immediate climate benefits. Thus, regulatory programs today correctly recognize RNG from agricultural digesters as an impactful methane abatement opportunity for lowering GHG emissions of livestock operations. For fugitive methane such as CMM, the value of methane incentives pales in comparison to the investment a coal operator would need to start a new mine or expand existing mining activities, and it is not reasonable to assume that CMM capture would factor into an investment decision. The California Air Resources Board (CARB) released a study[10] in 2014 that reached this conclusion. The report states that the value of methane abatement incentives, in this case, California compliance offsets, "would represent less than one half of one percent of the value of domestic coal production" from 2014 to 2020. The rate of return on CMM utilization was estimated to be "less than one percent" of mining profits. CARB ultimately determined that CMM abatement would not (a) encourage new mining activities; (b) incentivize additional coal production in existing mines; (c) shift production among existing mines; or (d) impact the price of coal.

[9] Smith, Aaron, "Are Manure Subsidies Causing Farmers to Milk More Cows?" April 8, 2023. Available at https://agdatanews.substack.com/p/are-manure-subsidies-causing-farmers?r=i2qe&utm_campaign=post&utm_medium=web

[10] California Air Resources Board, 2014, The Mine Methane Capture Protocol and Mining Economics

Anew urges Treasury to stay the course established by these regulatory programs designed to reap the climate benefits of substantial investments made to date and provide investors with the clarity and confidence necessary for continued development.

b. **Limiting the 45V program to waste streams currently captured in the EPA's Greenhouse Gas Reporting Program (GHGRP) is a fundamentally flawed approach that would strand existing waste streams.** While it is a valuable tool for tracking the country's emissions based on data reported by industry, its incomplete coverage of waste streams makes it inappropriate to apply to a waste source eligibility determination. The Administration itself has acknowledged the GHGRP's coverage shortcomings, committing earlier this year to work with industry and other stakeholders to improve the program and increase the accuracy of reported methane emissions.[11] 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. Similar shortcomings are present for fugitive methane:

    - Abandoned mines, surface mines, and mines below certain emissions thresholds are not obligated to report to the GHRGP.
    - Certain active underground mine operators may not measure, estimate, or include known methane emissions in their GHGRP reporting.
    - Certain active underground mine operators could create new mine IDs for separate sections of their mining operation to keep their divided emissions below reporting thresholds.
    - The highest fugitive methane volume from CMM production typically occurs within the first 6 months of the life of a source. If a productive use project was obligated to wait for the mine operator to report the source to GHGRP before connecting to a productive use project, ~50% of the volume associated with the life of the source would be vented to atmosphere prior to a connection to productive use. This policy would create the unintended consequence of requiring methane liberation to atmosphere as a pre-condition to subsequent qualifying productive use.

c. **Freezing waste streams at pre-IRA levels would also be virtually impossible due to a lack of monitoring data.** Waste streams are not static. Headcounts of farms fluctuate, and the organics collected at materials recovery systems (MRFs) change in quantity over time. At the point-source level, the liberation of fugitive methane to the atmosphere is also variable and the lion's share of methane pollution happens in the first few years of a mine safety borehole – i.e. restricting developers to only tap into old fugitive methane sources forces them to leave the majority of waste methane emissions unaddressed. Trying to define "pre-existing" waste quantities is very challenging and would end up being arbitrary. It also

[11] https://www.epa.gov/newsreleases/biden-harris-administration-announces-proposed-rule-reduce-wasteful-methane-emissions

directly contradicts methane abatement commitments made by the federal government. There is no good justification for not abating a cubic foot of methane merely because it occurred at a greenfield farm/facility that started in or after 2024.

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

> *'[t]he 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."*[12] ...
>
> *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.*[13]

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.[14]

## 5. The 45V PTC Should Not Preclude Participation in other Federal, State, and Local Incentive Programs

The Proposed Rule provides that "[i]n 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

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[12] 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.

[13] *Id.* at 386.

[14] *See, e.g.,* Aaron Smith, *Are Manure Subsidies Causing Farmers to Milk More Cows?*, Ag Data News, Apr. 8, 2023, https://agdatanews.substack.com/p/are-manure-subsidies-causing-farmers; 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.

or used for compliance with other policies or programs."[15] While Anew understands limiting the sale or use of the same *volume* or quantity of low carbon gas to other parties beyond the taxpayer (i.e. if a hydrogen facility purchases a quantity of RNG or CMM, the same quantity cannot be claimed as a different end use), Anew does not believe it is the intent of the Section 45V program to limit or preclude low carbon gases used in hydrogen production from participation in other federal, state, or local programs when otherwise eligible for those benefits. We ask Treasury to clarify that participation in other federal, state, and local programs does not impact eligibility for the 45V tax credit.

For example, 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 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 seek to incentivize the infrastructure necessary to increase the use of low carbon fuels 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.

**6. The Final Rules Should Not Adopt the Contemplated Restrictions on Hydrogen Decarbonization through Low Carbon Gas Because They Would Undermine Methane Abatement**

Anew is particularly concerned about the aggregate impact of the contemplated restrictions under Section 45V and strongly urges Treasury to evaluate not only what the primary intent of each measure is, but also how its intended and non-intended effects shape program participation as a whole. Highlighted below are some of the major areas that warrant consideration (without restating the details of each measure):

- Treasury intends to "provide rules addressing hydrogen production pathways that use renewable natural gas (RNG) or other fugitive sources of methane (for example, from coal mine operations) for purposes of the section 45V credit" but contemplates restrictions on applying the R&D GREET model's methane avoidance crediting. The two concepts are simply incompatible: **meaningful low carbon gas use for the decarbonization of hydrogen production cannot happen without full recognition of GREET's life cycle science.**
- Treasury has raised the concept of limiting low carbon gases to historic feedstock sources, while also requiring that the gas facility come online in the same taxable year as the hydrogen production facility it supplies. This severely constrains methane abatement under the program, potentially making it impossible. Most feedstock sources that pass the arbitrary "pre-existing" filter will not warrant low carbon gas production development. This is especially concerning for coal mine methane, where most fugitive methane occurs

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

in the first half of a borehole's methane capture life cycle. Also, these sets of restrictions would drive inefficiency. Of the few projects that can "check both boxes," most will expend significantly more costs and process energy per unit of low carbon gas production than feedstock-optimized developments would. Anew does not believe that raising the societal cost of methane abatement is an appropriate outcome for program implementation.

- The proposed rule considers restrictions on low carbon gas deliverability through the U.S. interstate pipeline system, while implementing IRA's tiered system for production tax credit calculation. Any gas-based hydrogen production at scale will require several sources of low carbon gas to achieve the emission reduction thresholds of the 45V program. Restrictions on sourcing low carbon gas will likely deprive facilities of the ability to achieve the necessary GHG reductions. Regional limitations on low carbon gas supply work against the decarbonization of the U.S. gas grid and make the tiered structure of the 45V program unviable.

- Key to the success of the 45V program are the synergistic and catalytic effects with other federal initiatives, within and beyond the IRA. By harmonizing these programs, Treasury can build a comprehensive framework for economy-wide decarbonization that is far more than the sum of its parts:

    - The Biden-Harris Administration's bold hydrogen hub program is poised for success. The Administration has carefully selected projects for DoE funding that represent a diversified portfolio of technological solutions, to maximize the benefits of each region's available resources. The 45V program should mirror this thought leadership and focus on science-based decarbonization, leveraging all resources available – not arbitrarily selecting a few.

    - It is hard to overstate the synergies between low carbon gas-based methane abatement and CCS at gas-based hydrogen production. Alongside other technology solutions, major CCS-hydrogen production facilities will and should be built. Anew urges Treasury to consider the potential of not only sequestering CO2 underground following hydrogen production but sourcing that carbon from waste sources that would have emitted methane instead, with a GHG impact 25-80 times higher.

    - The IRA itself supports biogas development, for example through the inclusion of Qualified Biogas Property in the Section 48 investment tax credit program. The 45V program is in a prime position to create a predictable, stable demand for RNG, setting the table for unprecedented investment into methane abatement from waste biomass.

    - As recently as during COP28[16], the US has identified methane emissions reduction as one of the most urgent and efficient opportunities for GHG mitigation today and

[16] U.S. EPA, Biden-Harris Administration Finalizes Standards to Slash Methane Pollution, Combat Climate Change, Protect Health, and Bolster American Innovation
available at https://www.epa.gov/newsreleases/biden-harris-administration-finalizes-standards-slash-methane-pollution-combat-climate

committed to hard action. We reemphasize that methane vented for coal mine safety reasons makes up 7% of US methane emissions, yet to date it has entirely fallen through the cracks of federal methane abatement efforts. The 45V program represents an unparalleled opportunity to not only put these commitments into action, but do so while catalyzing development of a decarbonized, large-scale hydrogen economy.

In conclusion, the transformational clean energy tax credits of the IRA offer tremendous potential for synergies between different renewable feedstocks, carbon and methane abatement strategies and technology pathways in achieving an equitable clean energy future.

We thank the Treasury and IRS for their work in implementing the IRA tax credits and appreciate the opportunity to comment. Should you have any questions regarding our comments or need further detail, please contact Randy Lack at rlack@anewclimate.com.

Anew Climate LLC

**Annex 1: Responses to Select Questions Posed by Treasury and IRS**

**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?**

Treasury appears to be asking this question under the premise that incentivizing the production of low carbon gas 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 low carbon gas (particularly RNG) has been the result of regulatory incentive programs that have supported RNG expansion, acknowledging and allowing RNG to be introduced into commercial distribution pipelines to displace fossil fuel.

Hydrogen produced using low carbon gas (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 (i.e., dairy digester, WWTP, landfill, coal mine, etc.) and injected into the common-carrier pipeline for any potential end use – not just directed for sale in CNG vehicles, which is the most common end-use to date, thanks to the incentives put in place through regulatory programs such as the federal RFS, the California LCFS, and others. Given that the methane is immediately captured/avoided at the source, all low carbon gas that is introduced to the pipeline displaces the equivalent volumed needed to be derived from fossil fuels regardless of whether that low carbon gas is directed to hydrogen, transportation, 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, low carbon gas both prevents methane emissions upstream and displaces higher emissions activities downstream. Changing the downstream end use for low carbon gas does not diminish the emissions that low carbon gas prevents upstream. However, excluding low carbon gas projects from markets will increase methane emissions and changing the end use is likely to reduce systemwide emissions.

Furthermore, creating the opportunity to use low carbon gas in the Section 45V program will enable participation in an additional market which will drive further GHG emissions reductions, as low carbon gas will be brought on to serve this new market. More demand for low carbon gas facilities will make it more economical to develop projects associated with additional low carbon gas feedstock sources, 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. While most low carbon gas is going to the transportation fuel market today, the need to haul goods in the US will continue to grow and a diversity of clean fuels are needed to meet this growing need, which can include clean hydrogen. There is ample potential supply of low carbon gas and limiting its use for hydrogen production—when it is widely 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, Treasury should recognize the industry standard practice of mass balance accounting which serves to directly link a volume of fuel produced to a single end-use, to ensure against double counting of emissions reductions. A shift to hydrogen as a primary end-use will only incentivize further development of RNG projects to serve the growing need of methane reductions.

**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?**

Refer to Section 3 of general comments.

**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?**

As noted in Section 1 of our main comments, the" first productive use" concept as it is contemplated in the proposed rule oversteps Treasury's authority and improperly excludes eligible low carbon gas projects. There is no evidence that low carbon gas-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 low carbon gas 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 low carbon gas and withdrawal of gas from the same pipeline system. The low carbon gas industry has established chain of custody best practices to document and substantiate low carbon gas 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 or fugitive methane and attributes with company owning asset
- Agreement and attestations for biogas or fugitive methane cleaning and conditioning and equipment operation
- Unredacted records for low carbon gas amount injected
- Agreement with local utility for low carbon gas injection
- Agreement and attestations with local utility and pipeline authority to take low carbon gas injected into pipeline balance

- 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.

**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?**

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 low carbon gases that all entail end use combustion, Treasury should issue guidance that minimizes systemwide emissions by incentivizing low carbon gas-to-hydrogen pathways. If Section 45V is implemented in a way that restricts eligibility for existing low carbon gas facilities, it will trap these facilities in end uses that combust uncontrolled emissions until new hydrogen production displaces those end uses, forcing the low carbon gas facility to shut down and revert to venting methane directly into the atmosphere when it loses its market.

**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?**

Refer to Section 4 of general comments.

**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?**

Refer to Section 4 of general comments.

**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?**

Refer to Section 3 of main comments.

**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?**

The R&D GREET 2023 model already includes assumptions for methane leakage in existing natural gas pipelines (e.g., transportation and distribution emissions), and Anew proposes to continue to use existing R&D GREET 2023 model emissions for RNG or fugitive methane as the default. As pipeline data is beyond the control of both the low carbon gas producer and the hydrogen developer, and given other characteristics of the interconnected pipeline system, the US 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?**

The 45VH2-GREET model must include different types of low carbon gas feedstock projects, not just landfill gas, as it currently does. Specifically, it should include the Coal Mine Methane / Waste Gas Capture and Utilization pathway, as well as Biogas from Anaerobic Digestion of Animal Waste, Biogas from Anaerobic Digestion of Wastewater Sludge, Biogas from Anaerobic Digestion of Agricultural Waste, Biogas from Anaerobic Digestion of MSW. It is also necessary to include low carbon gas-to-Hydrogen via Electrolysis[17], and Coal Mine Methane to be consistent with the original legislative intent. The counterfactual assumptions are provided below for these 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 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. Anew supports the same input system that exists in the 45VH2-GREET 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.

[17] RNG and CMM can be used by an electricity generator located at an electrolytic hydrogen production plant. That generator can use RNG or CMM 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.

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 percentage of each manure management system identified in the R&D GREET 2023 model corresponding to the state in which the digester is located should be selected. Once RNG is selected, the R&D GREET 2023 model U.S. averages should be used as the default, which can then be replaced with site specific data. Justification for an alternative to the state-specific lookup would require that the pre-project percentage of manure destined for a lagoon would be subject to third party verification.

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. 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.

5. Counterfactual for Coal Mine Methane

In December of 2023, ANL published a summary of their lifecycle analysis which recognized methane venting as the counterfactual baseline scenario for CMM. Given Treasury's intention to separate the 45VH2-GREET from R&D GREET, the following key takeaways from the Argonne National Laboratory published summary[18] analysis of CMM are equally applicable with the 45VH2-GREET model:

- There is no legal requirement to destroy the (CMM) that must be liberated for health and safety.
- Unlike oil and natural gas wells, CMM sources are not governed by EPA 40 Code Federal Regulations, Part 60, Subpart OOOO, or Section 60113 of the IRA (Methane Emissions Reduction Program).
- Current CMM destruction activities are entirely voluntary and primarily are motivated by the valuation of GHG emission reductions in carbon markets.

[18] Summary of Expansions and Updates in R&D GREET® 2023, December 2023

- EPA acknowledges that "the recovery and use of CMM are considered emissions avoidance."[19]
- Beneficial use of CMM is decreasing.[20]
- The observed increase in flaring projects is not material due to small volumes and low adoption rate (less than 3% by volume,[21] and less than 1% by number of mines.[22] [23])
- Analysis supports 100% of CMM would be released in the counterfactual scenario.[24] [25]
- CMM emissions are likely underreported in EPA GHGRP.[26]
- CMM emissions are expected to increase 8X over this century.[27]
- CMM captured for beneficial use can help the U.S. decarbonize and meet GHG reduction targets.[28]

The introduction of differences between 45VH2-GREET model and the GREET R&D model opens new questions on how these differences will be reconciled. Omitting methane avoidance accounting from hydrogen LCA and resultant carbon intensity determinations are prohibitive to the beneficial use of waste methane, hurts carbon capture sequestration (CCS)-hydrogen development and conflicts with methane pledges made by the U.S. government.[29]
Refer to Section 2 of general comments for additional details.

**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?**

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[19] EPA Coalbed Methane Outreach Program, 2023
[20] Global Methane Initiative, 2022
[21] U.S. Environmental Protection Agency (2023) Underground Coal Mines. Greenhouse Gas Reporting Program (GHGRP). Office of Atmospheric Protection. https://enviro.epa.gov/query-builder/ghg
[22] U.S. Energy Information Administration (2023) Annual Coal Report 2022. https://www.eia.gov/coal/annual/pdf/acr.pdf
[23] Mine Safety and Health Administration (2023) Mine Employment and Coal Production. U.S. Department of Labor. https://www.msha.gov/data-and-reports/statistics/mine-employment-and-coal-production
[24] Mucho, T. P., Diamond, W. P., Garcia, F., Byars, J. D., Cario, S. L. (2000). Implications of Recent NIOSH Tracer Gas Studies on Bleeder and Gob Gas Ventilation Design. 2000 SME Annual Meeting, Salt Lake City, Utah, February 28 - March 1, 2000. Littleton, CO: Society for Mining, Metallurgy, and Exploration, Inc., Preprint 00-08, 1-17. https://stacks.cdc.gov/view/cdc/9025
[25] Schatzel, S. J., Krog, R. B., Dougherty, H. (2017). Methane emissions and airflow patterns on a longwall face: Potential influences from longwall gob permeability distributions on a bleederless longwall. Transactions of Society for Mining, Metallurgy, and Exploration, 342(1), 51–61. http://transactions.smenet.org/abstract.cfm?articleID=8108&page=51
[26] Global Energy Monitor, Global Coal Mine Tracker, October 2023 release
[27] Kholod, N., Evans, M., Pilcher, R., et al. (February 2020). Global methane emissions from coal mining to continue growing even with declining coal production. Journal of Cleaner Production, 256. https://www.globalmethane.org/documents/Global_Methane_Emissions_from_Coal_Mining.pdf
[28] California Air Resources Board (2013) The Mine Methane Capture Protocol and Mining Economics. https://www.arb.ca.gov/regact/2013/capandtrade13/1mmcecon.pdf
[29] Global Methane Pledge, 2022

The suggestions provided in the response to Question 11 address how the 45VH2-GREET model should be modified to recognize the site-specific factors which drive the avoided methane value and accurate carbon intensity accounting. Conservative defaults are suggested being pulled directly from the R&D GREET 2023 model with an option to input site-specific details where appropriate. Third-party verification, which involves the review of supporting documentation behind the site-specific inputs, is already common practice in the low carbon gas industry and something Anew strongly supports. To the extent site specific modifications can be allowed within the 45VH2-GREET model, it will reduce the need for projects to seek PERs and reduce the burden associated with administering the program which in turn allows clean hydrogen project development to occur faster without sacrificing quality or risking additional gaming.

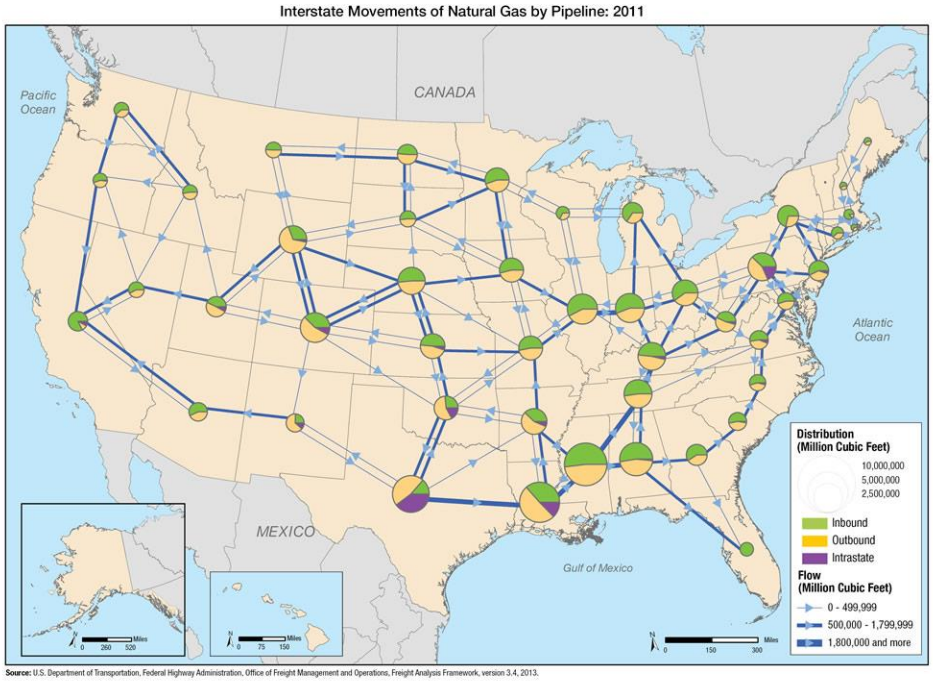
In addition, PERs should be considered for low carbon gas facilities that submit third-party validated data evidencing material improvements to site-specific emissions based on engineering, technology, or equipment improvements. Emissions weighted incentives like 45V will drive emissions reducing innovation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

**Annex 2: U.S. Natural Gas Pipeline Infrastructure & Flows**

Natural gas, unlike power, is not regional in nature as all gas pipelines are interconnected, sharing gas flow and balancing (versus power which is grid dependent with limit wheeling between regions). Under the RFS and the California LCFS, there are currently no restricted limits on injection, delivery locations and connectivity so long as the gas is injected into the common carrier pipeline.

Gas currently flows fluidly throughout the United States depending on production, weather, LNG export pricing, and natural gas balancing. For example, gas flows from the Northeast region to all areas of the United States, from Texas to California, and from the Rockies to California and Midwest. The entire pipeline system in the United States is interconnected and in many cases is now bidirectionally flowing. For example, Rockies Express, which is one of the largest pipeline systems in the country that was built to export gas from the Rockies to the Midwest and East Coast has begun flow reversal and is now delivering gas from the Marcellus and Utica areas (PA, OH, New York, Virginia, and WVA) to the West on the pipeline. Another example is the Transco Pipeline, which was originally built to flow gas from the Gulf Coast to the Northeast. In the past couple of years, Williams has converted the system to be bidirectional. These days most of the gas flows from the Marcellus/Utica south, rather than the other way around. Below is some specific data to support this point:

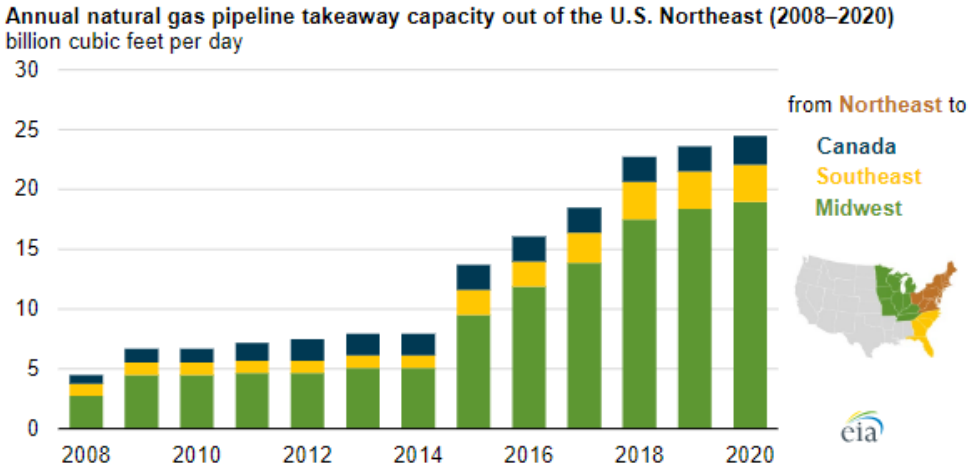
Historically, flows of natural gas have been fluid throughout the United States.[30] The map below shows flows dating back to 2011 illustrating the interconnectivity of the US gas pipeline system.



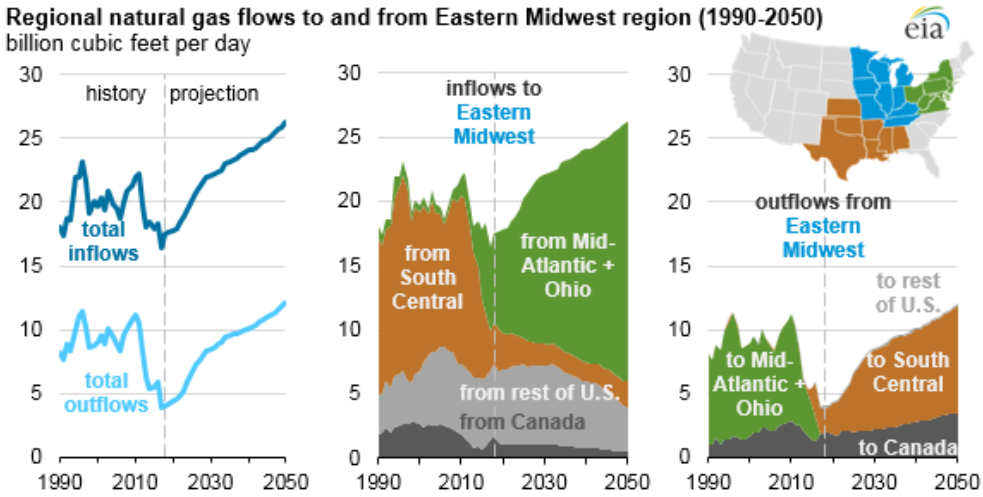

[30] https://ops.fhwa.dot.gov/freight/freight_analysis/nat_freight_stats/interstatenatgas2011.htm

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 region to the South Central and West regions.

- 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.[31] The EIA further notes that gas flowing from the Northeast to the Midwest often flows onto the South Central region/Gulf Coast.

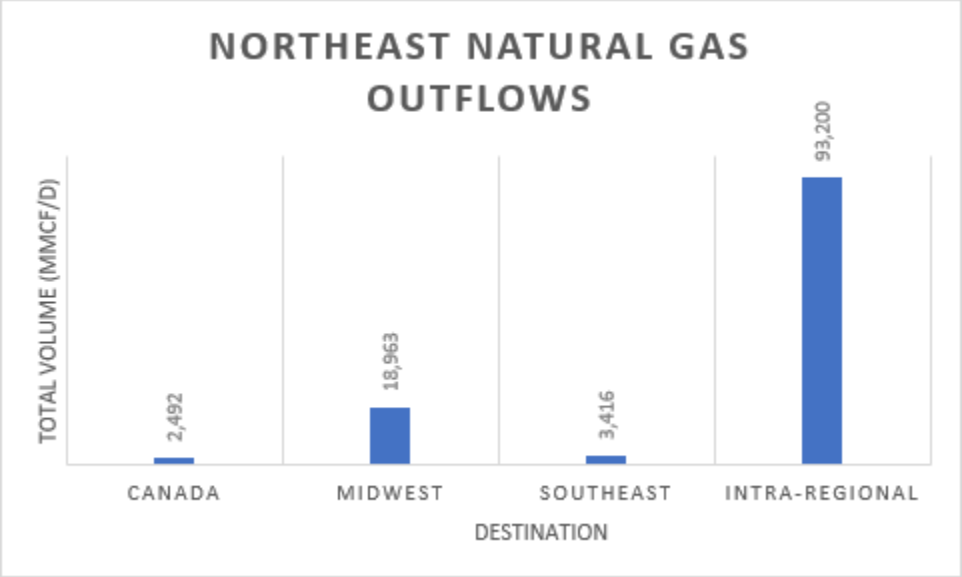



- The EIA projects continued growth in production from the Marcellus and Utica that will result in even more gas flowing to the Eastern Midwest and ultimately to the South Central/Gulf Coast region.[32]

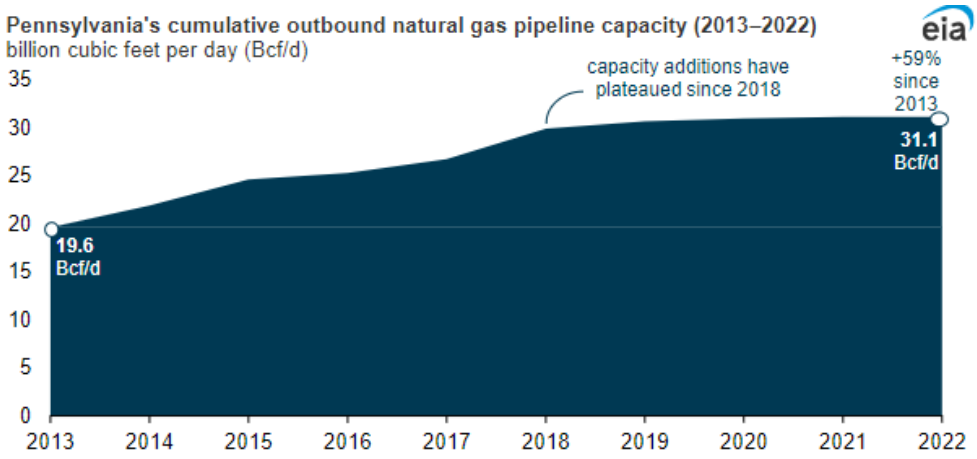



[31] https://www.eia.gov/todayinenergy/detail.php?id=38652
[32] Ibid.

- In 2022, according to the EIA, the Northeast produced 18,963 mmcf/day of gas that flowed to the Midwest, enabling connectivity to the South Central and West.[33]



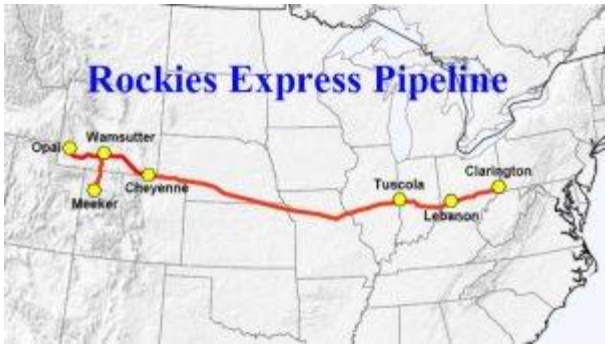

- In Pennsylvania, one of the largest gas producing states in the US, an additional 11 Bcf/day of outbound natural gas pipeline capacity has entered service since 2013. Most interstate pipelines transporting natural gas out of Pennsylvania ran close to maximum capacity in 2022.[34]




- 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 to

[33] https://www.eia.gov/naturalgas/pipelines/EIA-StatetoStateCapacity.xlsx
[34] https://www.eia.gov/todayinenergy/detail.php?id=56180

the West than the East, indicating growth in supply in the East and growth in demand in the West.[35]



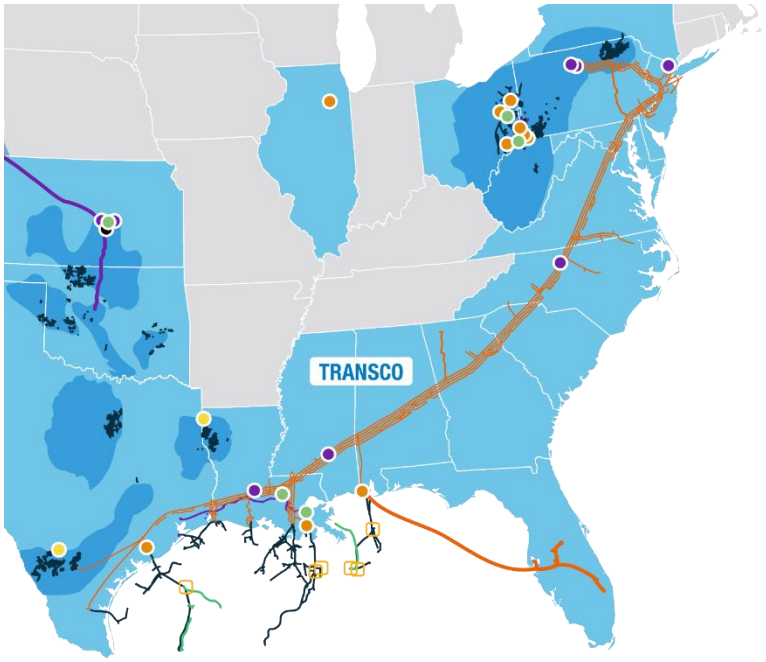

- In 2022, Tallgrass Energy purchased the formerly bankrupt Ruby Pipeline, which flows from Wyoming to Oregon near the California border, to bring Appalachian gas to the higher-priced West Coast markets. Ruby Pipeline interconnects with REX and was an attractive investment because of the gas brought in from the Northeast due to the bidirectionality of REX.[36]


- 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 gas only flowed from South to North. Today, the pipeline transports 15% of the nation's natural gas.[37]

[35] https://insight.factset.com/rex-flows-into-the-rockies-in-january-a-fluke-or-a-sign-of-things-to-come#:~:text=Western%20flows%20on%20REX%20were%20as%20high%20as,to%20yet%20another%20strong%20winter%20storm%20in%20mid-February; and https://energypolicynews.com/news/fercs-approval-rockies-express-zone-3-mainline-goes-bi-directional/

[36] https://rbnenergy.com/ruby-ruby-will-you-be-mine-tallgrass-bid-breathes-new-purpose-into-languishing-ruby-pipeline

[37] https://elibrary.ferc.gov/eLibrary/docinfo?accession_number=20180515-3002; and https://www.williams.com/pipeline/transco/


TRANSCO