



## Renewable Natural Gas Workshop Summary

### *NARUC-DOE Natural Gas Infrastructure Modernization Partnership and NARUC Committee on Gas*

During the 2019 NARUC Summer Policy Summit, on July 23, 2019, the Committee on Gas hosted a Renewable Natural Gas (RNG) Workshop with support from the U.S. Department of Energy / NARUC Natural Gas Infrastructure Modernization Partnership. The objectives of the educational Workshop were to: (1) provide information about RNG to build a general understanding, (2) present a broad range of policy perspectives, from gas utilities to environmental advocates to state regulators, on RNG, and (3) illuminate policy and regulatory options for states interested in advancing RNG. The workshop was conducted with an introductory [presentation](#) followed by three sessions of expert speakers who engaged in robust informative dialogue with NARUC members and Workshop attendees.

### Introductory Overview

Dan LeFevers, Director of State & Consumer Programs at GTI,<sup>1</sup> offered a basic overview of RNG, defined as a substitute for natural gas derived from renewable sources. With the same molecular makeup as natural gas – largely methane (CH<sub>4</sub>) – RNG can be cleaned and processed into pipeline-quality gas. While there is no specific definition of "pipeline-quality gas," RNG projects are connected with interstate pipelines and have contracts negotiated directly with pipeline owners, and RNG needs to meet the standards set by pipeline owners. RNG is derived from digesters installed on dairy or swine farms, wastewater treatment plants, landfills, and other sources. It can also be produced from thermal chemical processes, such as gasification utilizing renewable feedstocks like wood and agricultural waste. RNG is also referred to as "biomethane," technically biogas that has been cleaned and conditioned to remove or reduce non-methane elements. Biomethane can be used as a replacement for natural gas in electricity and heat generation, but not in transportation.

Currently, almost all RNG is used as transportation fuel for compressed natural gas (CNG) vehicles. However, RNG can also be used in homes and manufacturing. Under GTI's definition, RNG must have a lower carbon footprint than fossil gas, and can even have a negative carbon footprint. Compared to fossil gas, RNG offers three main benefits: (1) an opportunity to decarbonize traditional gas applications, (2) lower-carbon fuel in pipelines, and (3) supply diversification.

### Session 1: Understanding Real World Deployment of RNG through Case Studies

Commissioner Paul Kjellander (Idaho), Second Vice President on NARUC's Board of Directors, shared first hand lessons from Idaho's RNG experience, which has largely been with dairy waste. Idaho has eight operational projects putting RNG into electricity production. Idaho had the first pipeline-quality gas production project in the country, but startup coincided with the shale revolution and cheap natural gas prices quickly drove the project out of existence.

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<sup>1</sup> The Gas Technology Institute ([GTI](#)) is a research, development, and training organization operating as an independent technology organization / Illinois not-for-profit corporation, headquartered in Des Plaines, IL. Along with consumer advocates and researchers, state utility regulators participate in GTI's Public Interest Advisory Committee (PIAC), which provides guidance to GTI on public interest issues and long-term trends related to the utility industry, natural gas consumers, and GTI. See <https://www.gti.energy/working-with-gti/collaborations-partnerships/> for more information.



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Emily O'Connell, Director of Energy Markets Policy at the American Gas Association (AGA), shared her perspective on how the gas industry is currently looking at RNG. In her view, RNG is the next step for gas utility innovation, offering a range of opportunities for local distribution companies (LDCs). AGA's definition of RNG is similar to GTI's: pipeline-compatible gaseous fuel derived from biogenic or other renewable sources with lower lifecycle CO<sub>2</sub>e emissions than fossil gas. While AGA members have interest in supplying RNG to the dominant transportation market, AGA is looking at opportunities to direct RNG into residential and commercial sectors to meet thermal load currently supplied by fossil gas. The organization is working with the consulting firm ICF on a groundbreaking study documenting the future potential of RNG produced from anaerobic digestion, gasification, and power-to-gas. The study will summarize costs and emissions reductions of RNG buildout through 2040.

Blaine Collison, Senior Vice President at David Gardiner and Associates (DGA), spoke on his organization's leadership of the Renewable Thermal Collaborative (RTC) and applications for RNG to meet thermal load. The RTC is a project of C2Gas, the World Wildlife Federation, and DGA. The RTC represents large commercial and industrial energy users such as Cargill, Mars, General Motors, L'Oreal, Proctor & Gamble, and Stonyfield Organic that are heavily reliant on fossil gas for critical thermal processes. Several of these customers have sustainability goals and are interested in alternatives to fossil gas. In Blaine's view, the renewable thermal market today resembles the electricity market in the early 2000s, with new technologies and abundant interest in their potential, but complications integrating new offerings and figuring out logistics, tariffs, and costs. The RTC and other organizations are focused on making the same kind of acceleration renewable electricity experienced possible for renewable thermal. In pursuit of this goal, the RTC developed a buyers' statement on behalf of its members summarizing paths towards success: (1) accelerating cost-effective technology with an aggressive R&D agenda, (2) development of a thermal renewable energy credit market, (3) tools and data to achieve market transparency, (4) standardization of products, (5) innovative financing and product structure for offtakers, (6) offering a pipeline-delivered set of solutions for large buyers, and (7) opening avenues for collaboration between buyers, sellers, and other parties.

Ryan Childress, Manager, Business Development at Dominion Energy provides an excellent example of the importance of finding new ways to use existing infrastructure. Dominion has a goal to achieve 4% RNG throughput on its system by 2040. Ryan manages Align RNG, Dominion's \$250 million joint venture with Smithfield Foods. Currently, Align RNG has four projects in development involving nearly 100 farms in Virginia, North Carolina, and Utah. Once completed, the four projects will provide enough gas to power 13,000 homes while reducing greenhouse gas emissions. Given Smithfield's large portfolio of hog farms, initial success with these first four projects could be replicated across the country.

Brian Jones, Senior Vice President from MJ Bradley & Associates, represented the Downstream Natural Gas Initiative (DNGI), a group of gas utilities looking at opportunities for innovation and improved efficiency. DNGI initially focused on methane quantification issues at its founding in 2014, but has since shifted to providing a forum to discuss utility decarbonization. As many states have prioritized electrification as the best way to decarbonize the economy, DNGI members need to discuss the role for gas in a low-carbon future. Gas utilities also need a way to continue financing infrastructure, particularly if gas demand is decreasing as a result of increasing electrification. RNG provides an opportunity not just to continue putting infrastructure to productive use but also to produce sustainable process heat and, further into the future, hydrogen.



DNGI's set of RNG issue briefs, released just before the Workshop, summarize recent policy developments affecting the RNG market. California's low-carbon fuel standard (LCFS) is a major driver of financial incentives for RNG projects, offering over \$100 per ton of carbon reductions. Landfill projects are generally the cheapest option for RNG, followed by dairy manure projects, which are more expensive to bring to fruition but offer greater potential for onsite methane reductions. According to DNGI, a successful RNG market needs utility involvement to spread costs across rate base through well designed tariffs, as well as tracking mechanisms to document carbon reductions.

Lastly, Jeff Stander, Senior Project Developer at Ameresco, offered a pipeline developer's perspective on the RNG market. Ameresco has three operational RNG projects supplying around 2 million dekatherms per year total. Each project took approximately three years to develop. As a for-profit entity, Ameresco looked for projects that would deliver maximum profit, particularly given the volatility in gas prices. While most RNG goes to transportation uses, the short-term contracts favored by transportation customers are ill-suited to developers looking for longer-term returns. Additionally, RNG projects are expensive, and meeting varying gas quality standards inhibits development.

## **Session 2: Connecting the Dots between Supply and Demand: Integrating RNG into a Safe, Reliable, and Efficient Pipeline Network**

Commissioner Dianne Solomon (New Jersey) and Commissioner Ethan Kimbrel (Illinois) jointly moderated the second panel of the workshop, focusing on interconnection and technical issues. New Jersey has strong opportunities for RNG: the state has the highest number of landfills per square mile in the country, a relatively new stock of wastewater treatment plants that were rebuilt after Hurricane Sandy, and a 100% renewable goal. Illinois is a quiet market for RNG, but could provide future opportunities. Commissioner Kimbrel framed the panel with an initial thought provoking question: Do states have sufficient laws on the books to deal with RNG interconnection and safety?

First to speak was Kristine Wiley, R&D Director at GTI, covering GTI's research into RNG integration. Kristine conveyed that pressures on the energy industry to decarbonize operations could make RNG increasingly popular. RNG is typically 90 to 95% methane and contains a similar BTU content to fossil gas. The trace constituents present in low concentrations can present issues to pipeline infrastructure, which was designed for a specific composition of the product inside. Siloxanes can appear in RNG and turn into powder when combusted, presenting potential issues for end users. Therefore, it is important to understand the characterization of different sources of RNG and their impacts on pipeline structure and integrity and ultimate end use. Minor changes to gas composition are not insurmountable issues, but the industry and its regulators need to be aware of and proactive about these issues. GTI has assisted the Northeast Gas Association on its [interconnection guidance for RNG](#). The guidance offers a technical roadmap for producers and pipeline operators or LDCs to engage in the interconnection process, from preliminary evaluation and feasibility analysis to a checklist of different components for the applicant and operator and gas quality recommendations, as well as techniques for measurement, monitoring, and verification.

Following Kristine was Jay Hopper, Vice President of Business Development at Aria Energy, offering his reflections from 30 years of RNG work at Aria, an energy developer with offices in Michigan and New York, and on the board of directors of the RNG Coalition. Aria processes 50 bcf/d of natural gas to 36 interstate pipelines and 5 LDCs. Half goes to transportation and half goes to utilities and other non-



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transportation users. Jay emphasized that preventing methane emissions is an important goal, but it needs strong incentives. The biggest issue with RNG projects, in his view, is interconnection. As an example, he put forth a typical landfill project producing 4000 dT/d versus a dairy farm with 100 – 200 dT/d. Interconnection costs range from \$1 – 3 million. While the landfill project can afford that, the dairy farm cannot. Further, it would not be prudent for a utility commission to authorize a rate-based pipeline to such a small project. Regarding gas quality, Jay recommended continuing to rely on current technologies dialed into pipeline specifications that can automatically shut down if an issue is detected. Lastly, Jay advocated for contracts with term lengths of at least ten years. As a gas processor, Aria prefers long-term contracts, and believes similar contracts for RNG will help the market grow.

Next, Stuart Nachmias, Vice President, Energy Policy & Regulatory Affairs at Consolidated Edison (ConEd) talked about RNG's importance to the New York market. When New York City customers using fuel oils were required to switch over to cleaner fuels, most decided on natural gas. ConEd needed to get new supplies to fill this increased demand. Given the difficulty of getting new gas supplies to the area, the utility considered non-pipeline alternatives including expanded gas demand response and efficiency programs. In response to an RFP asking for alternatives, ConEd received several offers to integrate RNG, and ultimately decided it would be an environmentally proactive approach to meeting future customer needs. ConEd proposed several RNG projects to the PSC but faced obstacles resulting from the small volume, high cost (up to five times the cost of fossil gas), lack of a regulatory structure for cost recovery, and high interconnection costs. On the gas quality side, RNG had a slightly lower BTU content than natural gas and could present issues to customer appliances. The small volume of the projects actually minimized this issue, as RNG injected into a high-quantity pipeline network would have little impact on the end product. However, mitigation of the BTU content issue depended on the location of the industrial site and the gas mains. In segments where RNG concentration was higher, there could be localized impacts for non-RNG customers. Overall, ConEd saw obstacles in an uncertain and length regulatory process dealing with a new product.

Lastly, Jamie Ormond, Public Utilities Regulatory Analyst for Renewable Natural Gas at the California PUC, offered her takeaways from California's experience and what other states can learn. In her view, treating RNG like renewable electricity is an oversimplification, as commissions have different jurisdiction over electricity and gas – but California's experience with renewable electricity offers valuable lessons. California's Rule 21 interconnection standard was an important step towards bringing more renewable electricity online following the Public Utilities Regulatory Policy Act (PURPA) in 1978. Jamie offered a history of what led to Rule 21: in 2003, California passed a renewable portfolio standard for electricity, which led to a flurry of new procurement. Utility engineers needed to evaluate projects to make sure they could be safely interconnected to the distribution grid. Large solar developers complained in 2007 and 2008 that utilities were not interconnecting projects or taking too long to come to a decision. In 2009, CPUC opened a rulemaking to standardize and streamline the interconnection process. Utility engineers and stakeholders then came together to create an engineering-based interconnection process that exhibited three key characteristics: it was documented, understandable by all parties, and applicable to all renewable electricity projects.

Learning from the success of Rule 21, California took an important step in establishing a statewide biomethane pipeline injection standard to create a level playing field for RNG producers. Producers that want to determine if their product can be interconnected can look to one standard rather than having to comply with varying standards established by each of the state's four gas utilities. Similar to the Rule 21



process, gas utility engineers have a common set of questions about projects interconnecting to the system, and establishing a procedure that is written down, understandable, and universally applicable can go a long way towards pushing projects towards the finish line. So far, two dairy and agricultural waste projects have been interconnected. Six biomethane dairy projects will be built over the next two years. While the first project took ten years to be constructed and interconnected, the statewide injection standard will help speed up future projects.

In response to questions from the moderators about whether current pipeline siting and financing processes are sufficient for RNG, panelists responded that utilities should estimate cost upfront, have a minimum pipe flow where they can figure out how much additional revenue they can make from new gas sales, and subtract that from the initial interconnection fee so the producer is not saddled with a high upfront interconnection cost.

Interest in RNG can come from state legislatures, utilities, commissions, and customers. California is 90% rural with numerous wastewater treatment facilities that are currently flaring gas, as well as large numbers of landfills, which ultimately move 75% of materials elsewhere. Trees burned by wildfires or eaten by beetles following droughts also offer biomass RNG opportunities. The low-carbon fuel standard offers RNG producers a strong incentive to reduce methane emissions from the transportation sector. New York utilities have been collaborating on RNG development through the Northeast Gas Association's interconnection guidance document. Panelists expressed a need for commissions to work with utilities on navigating cost and interconnection issues.

Commissioner Greer Johnson Gillis (District of Columbia) brought up the need for regulatory certainty and misalignment between timelines for RNG and other utility processes. ConEd forecasts costs over three years, but RNG developers need ten-year commitments. Utilities and regulators need to work together on cost-benefit analysis to justify costs that are passed through to consumers. RNG typically does not make sense on a pure cost-benefit analysis, but exhibits other attractive qualities.

Commissioner Jay Balasbas (Washington), Chair of NARUC's Pipeline Safety Subcommittee, asked about his state's law allowing utilities to offer voluntary RNG to customers and how the state can develop injection and interconnection standards to get projects into service quickly. Panelists recommended inviting utility engineers to discuss what they are comfortable with and where they see issues. Commissioner Balasbas encouraged regulators to understand that pipelines often cross state lines, so a standard in one state may not apply to an entire pipeline. Further, some projects don't have the opportunity to completely assimilate into the pipeline network before reaching customers. Developing interconnection guidance or standards will require collaborative work from regulators, utilities, and RNG producers.

### **Session 3: Bringing the Renewable Heat: How Renewable Natural Gas Market Dynamics Are “Burning Up” Preconceived Notions of Traditional Regulatory Structures and Planning**

In the final session of the workshop, Commissioner Mary-Anna Holden (New Jersey), Chair of NARUC's Committee on Water, and Commissioner Megan Decker (Oregon) moderated a discussion on regulators' options for leading on RNG. New Jersey needs more feedstock for RNG, particularly sources that can maintain heating values of 1000 btu/cf. The state's Energy Master Plan will outline new avenues for RNG. In Oregon, the PUC is implementing a new RNG standard passed by the legislature. Utility interest



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in RNG is nothing new, but the state is now progressing towards using RNG as a key ingredient in deep decarbonization of the energy system.

Zach Kravitz, Director of Rates & Regulatory Affairs at Northwest Natural (NWN), talked about NWN's reliance on RNG to serve customers while contributing to decarbonization. NWN recently began diversifying by acquiring water and wastewater utilities throughout Oregon and Washington. In 2020, 2% of its portfolio will be made up of RNG. NWN has looked at RNG supply as a way to avoid both future reinforcement investments in under-pressurized areas in the gas system and upstream capacity. To improve regulatory certainty, NWN came to the Oregon PUC early with a request to approve a methodology for forecasting RNG costs so that the utility could enter into long-term contracts. NWN also benefits from strong support from the Oregon legislature. Oregon passed laws requiring a study of RNG potential. The study revealed that of the state's 660,000 gas customers, residential load can be served entirely with feasible RNG projects. SB98 passed shortly after the RNG Workshop, allowing voluntary utility purchases of RNG up to 30% of load in 5% increments over 30 years. The law offers cost off-ramps and third-party procurement. Washington has also demonstrated policy support for RNG through HB1257, providing a mandate for gas utilities to offer a voluntary RNG tariff.

Kenzie Schwartz, Analyst at National Grid's Gas Utility of the Future group, emphasized the importance of the Northeast Gas Association's standard interconnection guideline. Outlining a process from proposal to interconnection for regulators, developers, and utilities can inform other state guidelines and standards, lower barriers to entry for developers, and grow the market. National Grid offers a voluntary green gas tariff for customers to procure RNG. With developers looking for ten-year contracts, National Grid is building capacity to quickly evaluate those proposals. The utility wants to see more market certainty, citing Oregon as an example for setting long-term market signals. Lastly, Kenzie called for valuation of not just the energy content of RNG but also its benefits for water quality, waste management, and captured carbon.

Representing Southern California Gas Company (SoCal Gas), Tanya Peacock, Public Policy and Planning Manager, offered another utility perspective on procurement. SoCal delivers gas to half of the customers in California. Like NWN, SoCal needs to make investments that are used and useful while also contributing to decarbonization. Recognizing that gas will be part of the energy mix for decades to come, SoCal made a voluntary commitment of 5% renewable gas by 2022 and 15% by 2030. Regulators and utilities should consider interdependencies between the gas and electric systems and opportunities for gas infrastructure to serve as energy storage for excess renewable electricity. SoCal sees storage as a key avenue for decarbonization: the gas grid could turn into the largest flow battery in the world, soaking up excess renewable electricity and powering the state around the clock.

Given high interconnection costs, utility investments in interconnection or the availability of incentives to offset some interconnection costs can be critical for developers. The key policy intervention is creating mandatory and voluntary procurement programs. California passed a law in 2018 directing CPUC to consider developing utility RNG procurement programs. SoCal's application for a voluntary program is under consideration. SB1383, passed in 2017, codified California's carbon reduction program to include capturing methane from organic sources. 45 dairy farms participate, producing 400,000 dT/d from \$320 million in projects.



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Ben Gerber, Executive Director of the Midwest Renewable Energy Tracking System (M-RETS), discussed the importance of renewable thermal certificates. Initial REC markets were on paper, and now spread across ten online tracking systems. Ben sees today's RNG market as similar to REC markets in 2000. As ratepayers ultimately benefitted from tradable RECs in tracking systems, RTCs could enhance the long-term value of RNG and overcome cost barriers. An initial obstacle is the Federal Trade Commission's oversight of REC markets. The FTC has no regulatory language specific to RNG, and language would need to be developed through the federal regulatory process in order to create an RTC market.

M-RETS is working on tracking thermal credits in dT, and showed a beta version during the RNG Workshop. Each certificate in the system will be backed by a PDF document showing its carbon intensity analysis as well as project documentation, third-party engineer sign-off, and other data. Ultimately, the system can be used for both voluntary and mandatory markets. M-RETS's system will cover gas from production to injection, but could provide contractual data. The system will go live to the public by January 1, 2020.

## **Conclusions and next steps**

Advances in drilling technology have opened up large reserves of fossil natural gas in the United States, raising the possibility of abundant, inexpensive supplies for the coming decades. The large potential for domestic natural gas production is prompting interest in new end-use applications to create demand. While the trucking sector has been identified as a key sector for deployment of natural gas fuel, substituting natural gas for diesel fuel is not expected to lower carbon emissions sufficiently to meet long run climate change goals. One potential solution is to supplement and eventually replace fossil natural gas with renewable natural gas. The potential of RNG for lowered greenhouse gas emissions and lowered criteria pollutant emissions can improve resource supply diversity, defer infrastructure investments, and deliver other benefits – a compelling value proposition that is attracting attention from regulators, utilities, and customers.

This workshop provided a broad summary of the RNG market and options for regulators to understand both the potential for RNG in their states and steps they can take as commissioners to grow the market. Standardized interconnection procedures and strategies to allocate costs between developers and ratepayers are two areas in which commissions can lead. NARUC, through the DOE-NARUC NGIMP, will continue to follow developments in the RNG market and produce resources to help commissioners understand how to take advantage of this small but growing resource.

NARUC and the members of the NGIMP and the Committee on Gas extend sincere gratitude to all the speakers who invested time and resources into giving commissioners a well-rounded understanding of the RNG market and regulatory landscape.

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