Natural Gas Utility Business Models for Facilitating Renewable Natural Gas Development and Use

Renewable Natural Gas Issue Brief ▪ Part II of IV ▪ July 2019

Introduction

This MJB&A Issue Brief is part of a series on renewable natural gas (RNG). This document summarizes natural gas utility business models. Additional issue briefs provide an overview of RNG benefits and supply, policies to support RNG use beyond the transportation and electric sectors, and the economics of RNG projects.

In recent years, an increasing number of states have adopted greenhouse gas (GHG) reduction targets. While strategies to decrease GHG emissions from the electric power and transportation sectors will account for a significant portion of these reductions, emissions from buildings and industry will also need to be addressed to achieve long-term GHG goals. Renewable natural gas (RNG) delivered through existing natural gas infrastructure can provide meaningful and cost-effective GHG reductions in the buildings and industrial sectors and contribute to long-term climate targets.

An important aspect of public utility commission (PUC) oversight is the "least cost" regulatory requirement. This principle requires utilities to demonstrate that their investment and procurement decisions represent the lowest cost options while maintaining certain expectations of risk and reliable service. Simply put, because utility costs are passed down to customers in rates, utility commissions seek to ensure that those costs are minimized. Thus, PUCs would need to review and approve any RNG program that involves higher costs than what would occur without the program. While some utility commissions may have the flexibility to structure a narrowly defined utility pilot program, approval would be subject to state-specific dynamics.

Natural gas utilities can take several actions to support development of RNG production and integration with the gas supply chain. While these steps may require approval from utility regulators, they can be important enablers to RNG projects. Utilities have access to existing distribution infrastructure, have customer bases interested in new, innovative energy sources, and can develop or leverage relationships with RNG suppliers.

Options used by gas utilities to promote RNG use

Gas quality standards and interconnection guidelines;

Gas conditioning and interconnection tariffs;

Voluntary customer programs;

Public-private partnerships; and

Technology pilots and research and development.

Gas Quality Standards and Interconnection Guidelines

Key preliminary steps that LDCs can take to facilitate RNG development include establishing clear gas quality standards, evaluating existing limits on hydrogen concentrations in pipelines, and developing interconnection guidelines for RNG. These policies safeguard system operations, proactively inform project developers of gas quality requirements, and clearly identify interconnection construction, operation, and cost responsibilities.

RNG quality standards provide LDCs and RNG producers with regulatory certainty. Producers receive clear guidance on the specifications their RNG must meet to be accepted by LDCs and pipeline companies. At the same time, LDCs have the assurance that RNG will not harm their infrastructure or customer end-use equipment. Gas quality standards have two primary components: limits on gas constituents and interchangeability requirements. Constituent limits are needed to prevent chemicals present in raw biogas that can harm gas infrastructure and human health from entering the gas supply. Interchangeability specifications address characteristics like heating value and are needed to ensure safe and reliable end-use combustion. Several utilities have developed gas quality standards that specifically address RNG.[1]

In addition to setting gas quality standards, LDCs can also evaluate existing limits on hydrogen concentrations in natural gas pipelines to determine if it is safe to increase injection of renewable hydrogen into utility networks. Adding hydrogen to natural gas can reduce GHG emissions if the hydrogen is produced from low-carbon energy sources. According to the literature, acceptable hydrogen blending ranges fall within 5%-15% hydrogen by volume.[2] Higher permitted hydrogen concentrations could support the development of renewable hydrogen supplies, further reducing the carbon intensity of the fuel that LDCs supply to customers.

In the United Kingdom, projects are underway that test hydrogen concentration limits. British gas distribution utility Northern Gas Networks (NGN) spearheaded two studies in recent years to evaluate conversion from the existing natural gas network to hydrogen served by steam methane reformer hydrogen production facilities with carbon capture and storage.[3] The first, H21 Leeds City Gate project, was launched in 2016 to determine the technical and economic feasibility of converting the existing natural gas network in Leeds, one of the largest cities in the UK, to 100 percent hydrogen. The second, H21 North of England project, expanded on the scope of the Leeds City Gate project to include other major cities in the North.[4] The studies conclude that conversion from natural gas to hydrogen is indeed feasible and cost-effective, and could serve as a critical strategy to achieve climate change targets by decarbonizing the UK economy. The studies equate the conversion from town gas (derived from coal and oil) to natural gas with the transition from natural gas to hydrogen. The North of England conversion would entail a 12.15 gigawatt (GW) natural gas-based hydrogen production facility, 8 terawatt hours (TWh) of hydrogen storage, a 125 GW capacity hydrogen transmission system, and CO_2 transport and storage infrastructure with the capacity to sequester up to 20 million tons of

[1] See PG&E Gas Rule 21, SoCalGas Rule 30, Piedmont Appendix F, and Vermont Gas RNG Quality Assurance Plan available in its RNG Manual.

[2] See "Blending Hydrogen into Natural Gas Pipeline Networks: A Review of Key Issues", National Renewable Energy Laboratory, March 2013 available at: https://www.nrel.gov/docs/fy13osti/51995.pdf

[3] Information on H21 Leeds City Gate is available at: https://www.northerngasnetworks.co.uk/wp-content/uploads/2017/04/H21-Report-Interactive-PDF-July-2016.compressed.pdf

[4] See https://www.northerngasnetworks.co.uk/event/h21-launches-national/

CO_2 per year by 2035. The total estimated capital investment necessary is £22,778 million, and operating costs come out to £955 million per year after 2035, once conversion and commissioning are complete.[5]

Interconnection guidelines clarify several important issues: the equipment and steps required to connect RNG projects with LDC pipeline systems, infrastructure ownership, and responsibility for financing and operating interconnection equipment. As with gas quality standards, interconnection guidelines offer certainty for both RNG producers and LDCs. Uniform standards provide important consistency for RNG projects across LDC operations and jurisdictions. In 2019, the Northeast Gas Association is expected to release an RNG Standard Interconnection Guideline that was developed in conjunction with natural gas utilities. While the guidelines focus on New York, they are intended to serve as a framework that can be adopted by other states. In California, LDCs and regulators are currently working on a Joint Utility Biomethane Interconnection Tariff. Like the New York guideline, this document will provide a roadmap for the RNG interconnection process as well as an overview of the current interconnection policies and requirements for California utilities.[6]

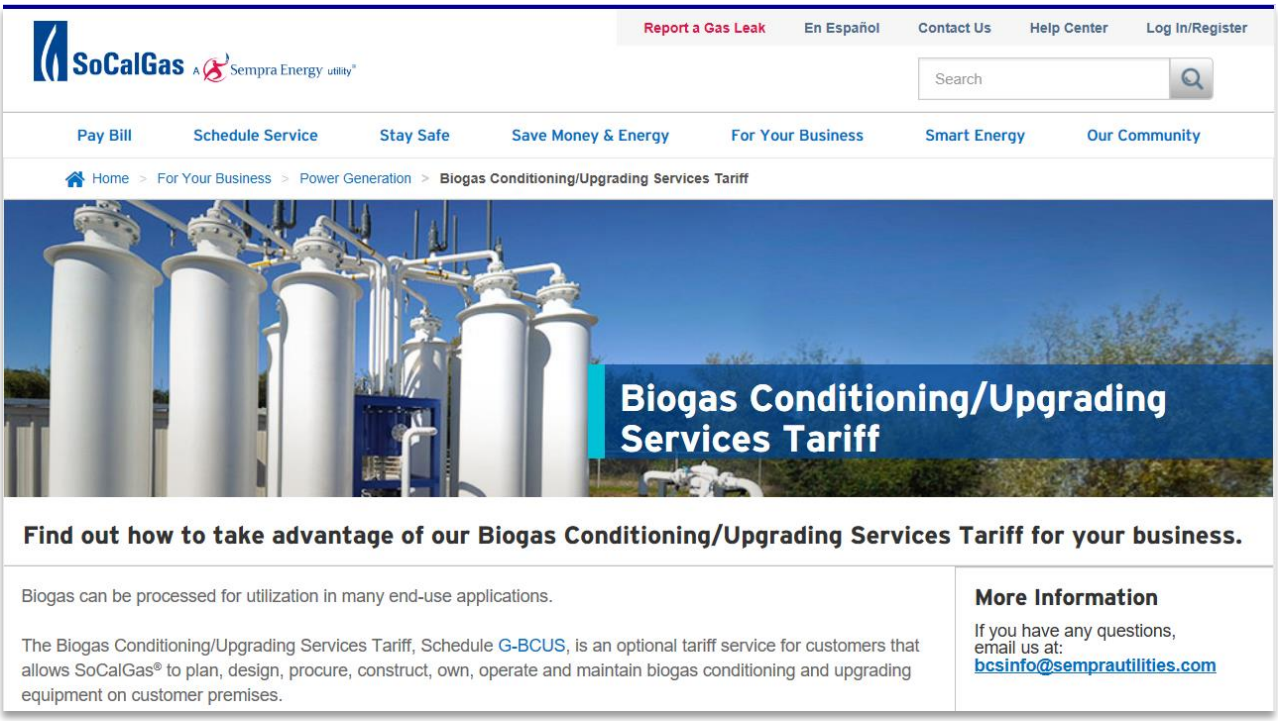
[5] Information on H21 North of England is available at: https://northerngasnetworks.co.uk/h21-noe/H21-NoE-23Nov18-v1.0.pdf

[6] A draft of the Joint Utility Interconnection Tariff is available in this document: http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M242/K068/242068929.PDF

Biogas Conditioning/Interconnection Tariffs

LDCs can also develop tariffs for biogas conditioning and interconnection services. These tariffs are instrumental to the LDC identifying and promoting RNG opportunities in its service areas. Under these tariffs, LDCs generally build and operate the biogas upgrading and interconnection facilities and can recover capital and operation and maintenance (O&M) costs from the project developer at a set rate (e.g., $/Mcf injected into LDC pipeline). Like interconnection guidelines, these tariffs delineate the obligations and responsibilities of all parties involved. A set tariff charge also reduces financial uncertainty by providing project developers with a clear and consistent price for biogas conditioning and interconnection. As discussed in detail in the *Renewable Natural Gas Project Economics* Issue Brief, RNG project developers are responsible for facility gas and electric operating costs, any required pipeline extensions, and pipeline interconnection. The gas conditioning and upgrading system alone can represent between one quarter to one third of total project cost, and project cost can exceed tens of millions of dollars. Costs of conditioning, upgrading and interconnection demonstrate economies of scale, but the initial investment in this infrastructure is one of the most significant risks for a renewable natural gas project developer. Under the tariff structure, the producer can avoid the significant upfront capital costs that could impede initial project development.

Implementation of biogas conditioning and interconnection service tariffs is highly contingent upon state PUC and regulatory approval, limiting the ease and speed of implementation. However, several of these tariffs have been approved in states like California and Florida, and tariffs could be further expanded if more states directed their PUCs to permit utility investment in this area. SoCalGas has a biogas conditioning/upgrading



tariff that allows the utility to build, own, and operate RNG processing facilities on customer property.[7] TECO Peoples Gas recently made two tariff modifications for its RNG supply area that allow the utility to provide services similar to those of SoCalGas: (1) modifications to current tariffs to accommodate the receipt of RNG from biogas producers and (2) a new rate schedule for Renewable Natural Gas Service (RNGS) for conditioning services.[8] The RNGS rate schedule allows the LDC to build and operate upgrading facilities and interconnection infrastructure. Costs associated with infrastructure upstream of upgrading facilities are not included. Tariff charges cover a percentage of LDC capital investment in upgrading infrastructure, as well as O&M costs.

Southwest Gas Company (SWGC) in Arizona also has a biogas services tariff (Schedule No. G-65, Biogas and Renewable Natural Gas Services).[9] The tariff contains general terms and conditions under which SWGC may enter into a service agreement with a biogas or RNG producer. The tariff includes requirements for access to biogas and RNG producer facilities, interconnection points, and RNG quality testing.

Voluntary Customer Program Offerings

For years, electric utilities have offered voluntary programs that allow customers to opt-in to a renewable electricity supply option. Today, customers are increasingly interested in low-carbon alternatives for their energy needs. This customer base includes both environmentally-conscious homeowners and large multinational companies seeking to achieve corporate climate goals.

LDCs can offer voluntary RNG programs similar to voluntary renewable electricity programs, allowing customers to purchase a certain amount of RNG by paying a premium on their natural gas bill. The cost premium helps LDCs offset higher RNG commodity costs. Therefore, these programs allow customers to purchase a renewable fuel, provide the means for LDCs to integrate RNG into their pipeline systems, and reduce the carbon intensity of their fuel supply in a manner that does not significantly increase costs for all customers. There are several examples of voluntary programs proposed or implemented by LDCs.

In Canada, FortisBC's voluntary program allows customers to pay a premium for RNG.[10] Customers can voluntarily purchase RNG in intervals such that it comprises between five to 100 percent of their gas use at an incremental cost of $7.00 per gigajoule (GJ). This is approximately two times the price of conventional natural gas. The fees do not completely offset the utility's commodity cost – the British Columbia Utilities Commission allows FortisBC to distribute the remaining program costs across non-participating customers. The impact of the proposed rate methodology and cost recovery mechanism on delivery rates for non-participating customers ranged from near zero in 2017 and 2018 to a maximum of $0.0839/GJ in 2021.[11] The Utilities Commission approved Fortis to purchase RNG equivalent to five percent of system throughput, up to an estimated 8.9 million GJ per year. Over the next five years, at least one million GJ per year is projected to be available from existing and planned projects in British Columbia.

[7] SoCalGas' tariff is available at: https://www.socalgas.com/regulatory/tariffs/tm2/pdf/GO-BCUS.pdf
[8] TECO Peoples Gas' tariff is available at: https://www.peoplesgas.com/files/tariff/tariffsection7.pdf
[9] Southwest Gas' tariff is available at: https://www.swgas.com/1409197529940/G-65-RNG-02262018.pdf
[10] Information of FortisBC's program is available at: https://www.fortisbc.com/naturalgas/renewablenaturalgas/Pages/default.aspx
[11] Decision on FortisBC's Application for Biomethane Energy Recovery Charge Rate Methodology, available at: https://www.ordersdecisions.bcuc.com/bcuc/decisions/en/item/169164/index.do#_Toc458771421

DTE Energy launched a voluntary BioGreenGas program in 2012 and transitioned to a permanent program in 2015. A flat fee of $2.50 per month is added to a customer's bill to support biogas resource development and utilization, and customers can opt out of the program each month. Customer payments are used to recover the cost of the biogas premium. The cost of RNG is not included in a gas cost recovery mechanism; therefore, the program does not affect rates for customers who do not enroll in program.[12]

Vermont Gas (VGS) launched a voluntary RNG program in March 2018.[13] Residential and commercial customers may select a blend consisting of 10, 25, 50 or 100 percent RNG. An RNG "adder" price per hundred cubic feet (Ccf), which reflects the difference in the cost of RNG and conventional natural gas, is included on the customer's bill as a separate charge and updated quarterly. At present, the adder cost is $1.2107 per Ccf for RNG supplied from Canada via pipeline. VGS' customers currently use about 6 Bcf of RNG per year. Given the Canadian Gas Association's estimate that 1,400 Bcf per year of RNG is technically available in North America, there is potential to greatly increase VGS' supply as additional in- and out-of-state RNG resources become available.[14]

In August 2018, CenterPoint Energy proposed a five-year RNG pilot program to allow Minnesota customers to purchase RNG.[15] Voluntary participants would choose to pay a set amount each month to purchase RNG. That amount would purchase as much RNG as possible at the current commodity cost while covering a set program fee. CenterPoint anticipates an RNG cost of $3.50 per therm, which along with administrative costs would result in a total cost of $3.89 per therm for participating customers. The proposal limits costs recovered from general customers to a maximum of $1 million per year, which would increase the average residential customer bill by $0.70 per year.

In February 2019, Southern California Gas Company and San Diego Gas & Electric submitted a proposal to the California Public Utilities Commission to offer a voluntary Renewable Natural Gas Tariff (RNGT) program to their residential, small commercial, and industrial customers that collects program costs through rates charged to program participants. Residential customers would select a pre-defined maximum monthly dollar amount for the purchase of RNG, but small industrial and commercial customers would be given the additional option to purchase RNG as a percentage of their monthly gas bill. The minimum participation commitment would be one year for residential customers and two years for non-residential customers.[16] Shortly following its proposed RNGT, Southern California Gas Company announced a plan to replace 20 percent of its natural gas supply with RNG by 2030. As a first step, the company will pursue regulatory authority to implement an RNG procurement program with a goal of replacing 5 percent of its natural gas supply with RNG by 2022.[17]

In April 2019, National Grid proposed a Green Gas Tariff offering that will enable its Downstate New York customers to voluntarily purchase RNG to meet all or a portion of their energy needs. The offering will

[12] Initial filing for the DTE pilot is available at: https://www.michigan.gov/documents/mpsc/u-17628_4-23-15_569241_7.pdf
[13] Information on VGS' program is available at: https://www.vermontgas.com/renewablenaturalgas/
[14] Information on potential supply is available on slide 8 of: https://www.ccrpcvt.org/wp-content/uploads/2018/05/RNG-CCRPC-April-2018.pdf
[15] An FAQ on CenterPoint's proposed program is available at: https://www.centerpointenergy.com/en-us/inyourcommunity/pages/renewable-gas-faq.aspx
[16] SoCalGas/SDG&E's application for the proposed RNGT is available at: https://www.socalgas.com/regulatory/documents/a-19-02-xxx/Application%20-%20Renewable%20Gas%20(A.19-02-XXX)%20-%20Final.pdf
[17] The SoCalGas March 6, 2019 press release is available at: https://sempra.mediaroom.com/index.php?s=19080&item=137611

include four tiers, allowing customers to select the level of green gas procurement that works for their budget and environmental aspirations. Fees range from $5-$50 per month for residential customers and from $25-$500 per month for non-residential customers.[18]

Public-Private Partnerships

Natural gas utilities can also foster public-private partnerships with local governments to successfully develop RNG projects. Producing RNG at government-owned biogas sources (e.g., wastewater treatment plants and landfills) yields a beneficial use for a resource that can contribute to achieving climate-related goals but might otherwise be wasted. Other benefits to municipal governments from public-private partnerships include outside expertise, transfer of risk to private entities, and alternative project financing. Public-private RNG projects are currently under development in New York City and Portland, Oregon.

The Newtown Creek project is a public-private partnership between National Grid and the New York City Department of Environmental Protection.[19] The Newtown Creek Wastewater Treatment Plant Project, which will be one of the first and largest of its kind in the country, is expected to produce approximately 277,500 dekatherms of RNG per year and reduce CO_2 emissions by approximately 16,000 tons annually (the emissions of about 3,000 automobiles). National Grid is paying for the total project and annual O&M costs through rates. National Grid's agreement with NYC provides for use of the property and methane gas at the wastewater treatment plant at no cost until National Grid's customers have been fully compensated for the project costs through the sale of the project's output. National Grid will seek to monetize the environmental attributes of the RNG produced by the facility and apply those revenues to offset the project's revenue requirement.

NW Natural is working with the City of Portland's Bureau of Environmental Services Columbia Boulevard Wastewater Treatment Plant to capture RNG and inject it into the pipeline for use in the heavy-duty transportation sector.[20] This public-private cooperative effort is expected to cut 21,000 $MTCO_2e$ per year and replace enough diesel to power 154 garbage trucks each year. The project will be the first in Oregon to inject RNG into the natural gas system. NW Natural will pay through rates (minus the environmental attributes) for delivery to customers. The environmental attributes will be separated from the RNG and sold by the city via a third party.

Nevada Senate Bill 154, passed in May 2019, directs the Public Utilities Commission of Nevada to adopt regulations authorizing LDCs in the state to engage in RNG activities. The regulations shall include procedures for utilities to apply to the Commission for approval of a reasonable and prudent RNG activity that will be used and useful and will provide environmental benefits to Nevada; and procedures for utilities to apply to the Commission for the recovery of all reasonable and prudent costs associated with a RNG activity. Furthermore, the bill also requires LDCs to attempt to incorporate RNG into their gas supply portfolios in the following amounts: not less than 1 percent of the total amount of gas sold by public utility to its retail customers by 2025; not less than 2 percent by 2030; and not less than 3 percent by 2035.[21]

[18] More information on National Grid's Future of Heat Filing is available at: http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=19-G-0309&submit=Search
[19] Information on the Newtown Creek project is available at: https://www1.nyc.gov/html/dep/html/press_releases/13-121pr.shtml#.XEIkeVVKjIU
[20] Information on the City of Portland's project is available at: https://www.portlandoregon.gov/bes/77813
[21] See SB 154

Pilot Projects and R&D

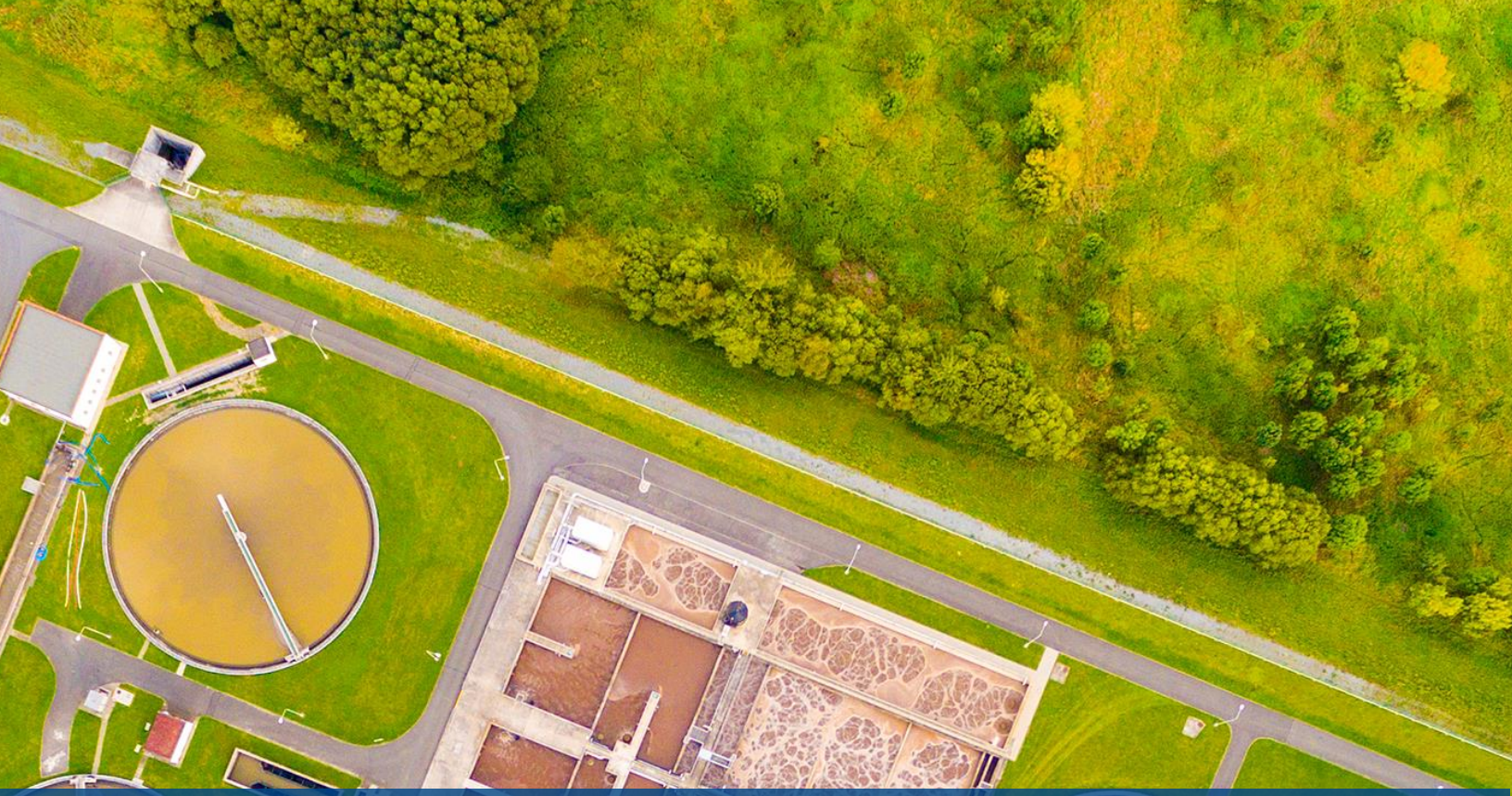
Beyond programs to directly incorporate RNG into their pipeline systems, LDCs can advance and support new RNG production technologies through the implementation of pilot projects and through research and development. Natural gas LDCs can invest in gas innovation research and development with a cost recovery mechanism, although this approach typically faces challenges in rate cases. Utilities have a long track record of investment in gas innovation, working to modernize the transmission and distribution networks to improve pipeline safety, reduce methane emissions, improve energy efficiency, and develop more cost-effective pipeline inspection and repair processes. LDC involvement in gas innovation R&D not only supports the development of a potential new RNG supply resource, but also facilitates understanding of how this resource can be integrated into the LDC natural gas supply chain. Given the need to decarbonize the energy system, natural gas LDCs could engage in R&D to improve alternatives to conventional natural gas, including RNG and hydrogen. Research and development efforts could target technical performance, economic cost, and environmental benefits of different technologies and feedstocks depending on service area specifics. By pursuing R&D to support the ability to decarbonize gas supply, natural gas LDCs can contribute to state climate change policy objectives.

Utilities can and do conduct their own research into the current and future potential of RNG, and contract with other organizations to develop reports. For example, a NW Natural-commissioned a study, "Pacific Northwest Pathways to 2050," investigated and demonstrated the role of RNG in long-term decarbonization studies.

A critical area in which pilot projects and research and development are especially relevant is power-to-gas (P2G).[22] P2G is the production of hydrogen or synthetic gas through electrolysis using electricity. The vast majority of hydrogen produced today comes from steam reformation of natural gas for industrial uses. However, hydrogen produced through electrolysis, where the electrolysis process is powered by renewable electricity, holds the promise of integrating and storing intermittent renewable energy while also decarbonizing the gas grid. LDC collaboration on P2G not only supports the development of a potential new RNG supply resource, but also facilitates understanding of how this resource can be integrated into the LDC natural gas supply chain.

SoCalGas is currently supporting two P2G demonstration projects focusing on different components of P2G technology.[23] A project with the National Fuel Cell Research Center at the University of California at Irvine uses solar electricity to generate renewable hydrogen used to fuel the university's power plant. The other project, with National Renewable Energy Laboratory (NREL) in Golden, Colorado, is testing a biomethanation process that uses bacteria to convert hydrogen and CO_2 into methane. National Grid's Future of Heat filing also proposes a P2G demonstration project. Under the proposal, National Grid would assess a project that converts renewable electricity into hydrogen, which in turn is converted into methane in a bioreactor and delivered via the existing natural gas network.

[22] Power-to-gas refers to both hydrogen and methanation of that hydrogen into a renewable gas that can displace fossil natural gas.
[23] Information on SoCalGas' P2G projects is available at: https://www.socalgas.com/smart-energy/renewable-gas/power-to-gas



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