March 31, 2023

Via E-Filing

The Honorable Chair and Members of
the Public Utilities Commission of the State of Hawaii
Kekuanaoʻa Building
465 South King Street, Room 103
Honolulu, Hawaii 96813

Re: Hawaii Revised Statutes (HRS) § 269-45, Gas Utility Companies Renewable Energy Report

To the Honorable Public Utilities Commission of the State of Hawaii:

In accordance with HRS § 269-45, The Gas Company, LLC, dba Hawaii Gas hereby submits its Annual Renewable Energy Report for 2022. Portions of this report have been redacted as described in the attached Confidentiality Log.

Sincerely,

/s/ Kevin Nishimura

Kevin Nishimura
Vice President Operations
The Gas Company, LLC, dba Hawaii Gas

cc: Office of the Consumer Advocate (*via email*)
Hawaii State Energy Office (*via email*)

Hawaii Gas
2022 Renewable Energy Report

Overview

The Gas Company, LLC, doing business as Hawaii Gas (Hawaii Gas), has prepared this Annual Renewable Energy Report for the Hawaii Public Utilities Commission (PUC) in accordance with Hawaii Revised Statutes (HRS) § 269-45.

Hawaii Gas' utility gas operations consist of the purchase, production, transmission, distribution, and sale of utility gas, which includes synthetic natural gas (SNG) (including 10-12% hydrogen by volume), renewable natural gas (RNG), propane, and liquefied natural gas (LNG), which are cleaner-burning fuels that produce significantly lower levels of carbon emissions during combustion than other hydrocarbon fuels, such as oil, diesel, and coal. Hawaii Gas provides a safe, reliable, and economical source of energy to approximately 70,000 residential and commercial customers throughout the State, with almost half of those customers served by the utility system on Oahu.

SNG is produced using naphtha, a byproduct of Par Hawaii's refining process. The production process is approximately 85% efficient, whereas electricity generation from oil-derived fuels is approximately 32% efficient. As a result, natural gas delivers nearly three times more energy to the end-user per barrel of oil as compared to electricity produced from oil. In 2022, an additional 724,720[1] barrels of oil were avoided by the fact that Hawaii Gas customers on Oahu used gas energy instead of electricity, which remains predominately sourced from oil. This amounts to savings of $84,848,187 based on an average cost of $117.08 per barrel of fuel oil.[2]

Current Non-Petroleum Resources

Hawaii Gas produces SNG using mainly a blend of liquid naphtha, (water) steam, and hydrogen gas, along with other gas feedstocks. Since 2000, approximately 50% of the hydrogen used to produce SNG has been from recycled water from the Honouliuli Wastewater Treatment Plant. Recycled water is combined with methane and other gases to produce hydrogen and additional methane in Hawaii Gas' utility processes. In 2022, the non-petroleum feedstock portion, based upon molar calculations, was 51.70% of the total feedstock used to produce SNG and RNG.[3]

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[1] *See* Attachment 1.

[2] *Id.*

[3] *Id.*

About Renewable Natural Gas

Hawaii Gas is committed to integrating as much cost-effective RNG and zero carbon hydrogen into its fuel supply mix as possible, and to do its part to help meet Hawaii's goal of carbon neutrality by 2045, in an affordable, resilient, and sustainable way for our customers and Hawaii's communities. RNG is chemically equivalent to natural gas and is produced by capturing and purifying previously flared raw biogas to obtain a methane content of at least 96.4%. Today, raw biogas is produced at several landfills and wastewater treatment plants (WWTPs) in Hawaii through the anaerobic breakdown of organic matter by microorganisms. The resulting biogas contains approximately 60% methane and 40% carbon dioxide. According to the Argonne National Laboratory GREET model, RNG made from organic materials is carbon-neutral to carbon-negative.

In December 2018, Hawaii Gas commissioned the Honouliuli WWTP Biogas Project in partnership with the City & County of Honolulu, which allows Hawaii Gas to purchase previously flared raw biogas and upgrade it to pipeline quality RNG for direct injection into Hawaii Gas' utility pipeline system. The Honouliuli WWTP Biogas Project was awarded the American Biogas Council's 2019 Project of the Year. In 2022, Hawaii Gas upgraded 288,734 therms of biogas to biomethane from the Honouliuli WWTP Biogas Project. Hawaii Gas and the City & County of Honolulu are also in the process of extending the contract from December 31, 2024 to December 31, 2034, which will ensure continued RNG production for an additional ten years.[4]

Hawaii Gas is still considering additional potential partnerships with the City & County of Honolulu for other biogas resources, which could contribute additional RNG to Hawaii Gas' fuel mix. However, while some incremental improvements in biogas production technology have been made, these resources are generally not scalable due to feedstock limits.

[4] *See* Docket No. 2016-0340, Hawaii Gas notice regarding Biogas Fuel Supply Agreement First Amendment, filed on January 24, 2023.

In addition to biogas from landfills and WWTPs, Hawaii Gas continues to assess the use of energy crops to produce biomethane, which are the only local RNG feedstock sources that are potentially scalable in Hawaii. To minimize the cost of producing biomethane from energy crops, it is key to select an energy crop that: 1) maximizes energy production per acre of land; 2) minimizes water requirements; and 3) utilizes the most efficient pre-treatment, digester, and purification technology available. In 2022, Hawaii Gas continued to collect scientific and market data through confidential agreements to assess the viability of energy crops projects coupled with advanced treatment and anaerobic digestion technology.

About Hydrogen

As part of Hawaii Gas' recent change of control proceeding (Docket No. 2021-0098), the utility agreed to the following condition of approval (COA):

> SEO COA No. 7. Hydrogen reporting. Hawaii Gas commits to give an annual informal briefing (or supplement to its Renewable Energy Report discussing hydrogen) to the Commission, SEO, and the Consumer Advocate on a confidential basis providing an update on Hawaii Gas' progress on hydrogen and pertinent data from its participation in pilot studies.[5]

Hawaii Gas subsequently notified the Commission that it intended to comply with this COA by filing a supplement to its annual Renewable Energy Report discussing hydrogen.[6] Based on the foregoing, Hawaii Gas offers the following update regarding its progress on hydrogen:

Hawaii Gas is very active with hydrogen initiatives both locally and at a national level. [redacted]

Hawaii Gas is also participating in hydrogen blending research and development, which is driven by nationwide interest in blending hydrogen with utility gas. Because Hawaii Gas has been blending hydrogen with its utility SNG since the early 1970s, there is significant interest

[5] *See* Docket No. 2021-0098, Stipulation of Settlement in Lieu of Hawaii Gas' Reply to the Hawaii State Energy Office's Statement of Position, filed on May 3, 2022, at 10-11, 17-20. This COA is referred to as "SEO COA No. 7" in Decision and Order No. 38478 filed on June 29, 2022.

[6] *See* Docket No. 2021-0098, Hawaii Gas' Submittal of Deadlines for Reporting Requirements in Compliance with Ordering Paragraph 4 of Decision and Order No. 38478, filed on August 4, 2022.

in Hawaii Gas' pipeline operations and experience with gas appliances. [redacted]

Lastly, Hawaii Gas is sharing its experience with operation and maintenance of gas transmission, distribution, meters, regulators, and end user equipment with gas distribution companies, gas trade organizations, and research teams to help advance opportunities across the country and Canada to blend hydrogen with gas. This is a unique opportunity for Hawaii to take center stage in the energy arena, particularly with respect to audiences interested in integrating hydrogen with gas.

Key Accomplishments

- In 2022, Hawaii Gas upgraded 288,734 therms from biogas to biomethane (RNG).
- In 2022, Hawaii Gas continued to advocate and evaluate for potential solutions and responses to the capture and upgrading of biogas flared at Waimanalo Gulch Landfill and Sand Island WWTP, should an RFP be issued for these two facilities.
- In 2022, Hawaii Gas partnered with multiple stakeholders and participated in multiple national and international studies to better understand the technical aspects of integrating more hydrogen into its Oahu transmission and distribution. These studies are ongoing and Hawaii Gas continues to seek other opportunities toward achieving the potential for large-scale and affordable hydrogen production, storage, and distribution in Hawaii.
- In 2022, Hawaii Gas and the City & County of Honolulu worked toward an extension of the Biogas Fuel Supply Agreement, which will result in an additional ten-years for biogas offtake and RNG production at the Honouliuli WWTP.
- In 2022, the Commission approved Hawaii Gas' request for a change of control, transferring Hawaii Gas' ownership to Argo Infrastructure Partners from Macquarie Infrastructure Holdings. As an independent infrastructure fund manager, Argo seeks to combine its investment return with responsible and sustainable investing, thus

paving the way for Hawaii Gas to further commit to a reduction in its carbon footprint in pursuit of a clean energy future.

- In 2022, Hawaii Gas participated in an integrated resource planning (IRP) proceeding, in which it worked with numerous stakeholders to, among other things, assess and discuss numerous pathways for the utility to decarbonize its fuel supply, including evaluation of existing and potential future renewable resources.

Calculations

In 2022, the Honouliuli WWTP Biogas Project represented around 1.3% of Hawaii Gas' total feedstock, produced 288,734 therms, and was 100% non-petroleum. With the inclusion of Honouliuli, the total supply molar ratio of non-petroleum feedstock in 2022 was 51.7%, and the total supply molar ratio of petroleum feedstock was 48.3%.

With the inclusion of Honouliuli, the total energy quantity of non-petroleum feedstock in 2022 was [redacted] therms, and the total energy quantity of petroleum feedstock was [redacted] therms.

Calculation of the mole percentage calculations model provided in this report consists of balancing three reactions (gasification, hydrogen reformer, shift converter). In the production of SNG and hydrogen, which are components in Hawaii Gas' final SNG stream, naphtha petroleum feedstock and water from a renewable source are used in the production. As such, the analysis focuses on three elements (C, H, O) and calculates the proportions for each reactant in feedstock (in mole).

For this report, Hawaii Gas used the same material (molar) balances and followed the same methodology used in its 2020 and 2021 Renewable Energy Reports, with modifications to input volumes and compositions to match the 2022 values.

Summary

Throughout its history, Hawaii Gas has been a pioneer in the gas utility industry. In the 1970s, its SNG process was developed to meet the environmental needs of the State at the time, as well as to ensure that the State would have a reliable energy source. Today, Hawaii Gas is again at the leading edge of its industry given its integration of both RNG and hydrogen into its fuel supply mix and distributing it through the utility pipeline system. Hawaii Gas continues to aggressively pursue cost-effective local renewable energy projects to reduce Hawaii's reliance on imported oil, and a key priority for Hawaii Gas is to integrate as much cost-effective RNG and zero carbon hydrogen into its fuel supply mix as possible, in an affordable, resilient, and sustainable way for our customers and Hawaii's communities. Hawaii Gas plays a vital role in Hawaii's energy portfolio by providing clean, reliable and cost-effective energy to commercial and residential customers. We are committed to

supporting Hawaii's clean energy and carbon neutrality goals, and will continue to look toward new, innovative, and economic ways to incorporate renewable energy sources and support the State's clean and renewable energy future, while also reducing greenhouse gas emissions and aiding in waste diversion.

Attachment 1: Renewable Energy Report Summary for Renewable Non-Petroleum Feedstocks

THE GAS COMPANY

The Gas Company, LLC
Suite 1800
745 Fort Street
Honolulu, Hawaii 96813

Date: Feb-23

2022 Renewable Energy Production Report to the Public Utilities Commission

Mole Percentage of total feedstock used to produce natural gas, biogas, biofuels, or biofeedstocks for use by the gas utility in the State that is comprised of petroleum feedstock

48.30% Feedstock used comprised of petroleum feedstock

Mole Percentage of total feedstock used to produce natural gas, biogas, biofuels, or biofeedstocks for use by the gas utility in the State that is comprised of non- petroleum feedstock

51.70% Feedstock used comprised of non-petroleum feedstock [1]

The energy quantity in therms of natural gas, biogas, or gallons of biofuels, or biofeedstocks produced from petroleum feedstock for use by the gas utility within the State

[redacted] Annual Therms

The energy quantity in therms of natural gas, biogas, or gallons of biofuels, or biofeedstocks produced from non-petroleum feedstock for use by the gas utility within the State

[redacted] Annual Therms [2]

21,776,133

724,720 Barrels of Oil saved by using SNG instead of electricity [3]

$ 117.08 2020 Avg Cost per Barrel Oil

$ 84,848,187 Savings

Footnote

[1] Plant basis (HHV) - R-hydrogen therm / Plant Feedstock therm

[2] RNG produced at Honouliuli WWTP + Hydrogen produced in the reformer and water shift reactor from Water.

[3] Calculated from plant conversion efficienies with hot water production

Attachment 2: Methodology Description

Hawaii Gas notes that the Renewable Energy Report format as provided under HRS § 269-45, follows a methodology common for electric utility direct combustion, and heat rate power production applications, which are different than the unique chemical conversions of liquids, gases and catalytic chemical processes, used to produce SNG.

The non-petroleum feedstock calculations for the SNG Plant focused on the chemical reactions associated with the gasification, hydrogen reformer, and shift converter processes used to produce SNG. As provided in this report, the non-petroleum feedstocks used to produce SNG as part of these processes are water, hydrogen (portion), and carbon monoxide (portion). The portion of the hydrogen that is non-petroleum based is made from recycled water. The portion of the carbon monoxide that is non-petroleum based is made from recycled water in the reformer.

The Gas Company, LLC dba Hawaii Gas – 2022 Renewable Energy Report
CONFIDENTIALITY LOG

Document Name/ Reference	Page Number; Line Number(s) or Section Redacted	Designation	Identification	Basis of Confidentiality	Cognizable Harm
2022 Renewable Energy Report	Redacted portion of pages 3-4	Confidential	Information regarding proprietary and confidential hydrogen projects	Commercially Sensitive Information; Competitive Harm – Frustration Exception The redacted information is protected from public disclosure, pursuant to the "frustration of legitimate government function" exception of the UIPA. Pursuant to HRS § 92F-13(3), the Commission may withhold "records that, by their nature, must be confidential in order for the government to avoid the frustration of a legitimate government function[.]" The redacted information meets the frustration exception under UIPA because the contents contain confidential business/ commercial information where public disclosure would likely result in substantial competitive harm. See Office of Information Practices, Open Records: Guide to Hawaii's Uniform information Practices Act, at 20-21 (August 2019), available at https://oip.hawaii.gov/wpcontent/uploads/2019/08/August-2019-UIPA-Manual.pdf The redacted information contains confidential business, commercial, and financial information and/or other information considered confidential, privileged, and/or proprietary in the form of the proprietary and confidential project status and counterparty names, including content subject to contractual confidentiality restrictions.	Public disclosure of the redacted information could competitively disadvantage Hawaii Gas by providing competitors with confidential information that could be used without expending their own resources to obtain it to the competitive disadvantage of Hawaii Gas. Misuse or unpermitted disclosure of the redacted information could place Hawaii Gas at a competitive disadvantage with respect to industry competitors and would give competitors information useful in making their own investment, financial, business and market decisions, without expending the time, resources, and investment necessary to gather and develop data and/or could provide competitors with insights regarding Hawaii Gas' confidential business operations, practices and decisions that could be used for unfair strategic advantage in the highly competitive energy environment. The redacted information is also subject to contractual confidentiality restrictions, the disclosure of which

					could expose Hawaii Gas to contractual liability.
2022 Renewable Energy Report	Two redacted values on page 5	Confidential	Information regarding proprietary energy data	HRS § 269-45(a), provides that ""[d]ue to the proprietary nature of the information required by paragraphs (3) and (4), that information shall be held in confidence by the commission; provided that any information obtained by the commission under this section, including confidential information, shall be made available to the department of business, economic development, and tourism or its authorized representative, which shall safeguard the confidentiality of that information." The redacted information constitutes energy quantity data in therms of natural gas produced from petroleum feedstock and non-petroleum feedstock under HRS §§ 269-45(a)(3) and (a)(4), and therefore qualifies as proprietary under the foregoing confidentiality provision.	Public disclosure of the redacted information could competitively disadvantage Hawaii Gas by providing competitors with confidential information that could be used without expending their own resources to obtain it to the competitive disadvantage of Hawaii Gas. Misuse or unpermitted disclosure of the redacted information could place Hawaii Gas at a competitive disadvantage with respect to industry competitors and would give competitors information useful in making their own investment, financial, business and market decisions, without expending the time, resources, and investment necessary to gather and develop data and/or could provide competitors with insights regarding Hawaii Gas' confidential business operations, practices and decisions that could be used for unfair strategic advantage in the highly competitive energy environment.
Attachment 1, 2022 Renewable Energy Report	Two redacted values in Attachment 1	Confidential	Information regarding proprietary energy data	HRS § 269-45(a), provides that ""[d]ue to the proprietary nature of the information required by paragraphs (3) and (4), that information shall be held in confidence by the commission; provided that any information obtained by the commission under this section, including confidential information, shall be made available to the department of business, economic development, and tourism or its	Public disclosure of the redacted information could competitively disadvantage Hawaii Gas by providing competitors with confidential information that could be used without expending their own

				authorized representative, which shall safeguard the confidentiality of that information." The redacted information constitutes energy quantity data in therms of natural gas produced from petroleum feedstock and non-petroleum feedstock under HRS §§ 269-45(a)(3) and (a)(4), and therefore qualifies as proprietary under the foregoing confidentiality provision.	resources to obtain it to the competitive disadvantage of Hawaii Gas. Misuse or unpermitted disclosure of the redacted information could place Hawaii Gas at a competitive disadvantage with respect to industry competitors and would give competitors information useful in making their own investment, financial, business and market decisions, without expending the time, resources, and investment necessary to gather and develop data and/or could provide competitors with insights regarding Hawaii Gas' confidential business operations, practices and decisions that could be used for unfair strategic advantage in the highly competitive energy environment.

The foregoing document was electronically filed with the State of Hawaii Public Utilities Commission's Document Management System (DMS).