



March 31, 2022

Via E-Filing

The Honorable Chair and Members of
the Public Utilities Commission of the State of Hawaii
465 South King Street
Kekuanao'a Building, 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 2021. Portions of this report have been redacted in accordance with HRS § 269-45(a).¹

Sincerely,

/s/ Laurent Nassif

Laurent Nassif
Senior Director – Clean Energy and Innovation
The Gas Company, LLC, dba Hawaii Gas

cc: Office of the Consumer Advocate

¹ HRS § 269-45(a) states in part, “Due 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.”

Hawaii Gas

2021 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), 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 or waste of the existing oil refining process in Hawaii. 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 2021, an additional 692,410² barrels of oil were avoided by the fact that Hawaii Gas customers on Oahu used gas energy instead of electricity, which is predominately sourced from oil. This amounts to savings of \$51,818,621 based on an average cost of \$74.84 per barrel of fuel oil.³

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 2021, the non-

² See Attachment 1.

³ *Id.*

petroleum feedstock portion, based upon molar calculations, was 50.70% of the total feedstock used to produce SNG and RNG.⁴

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 2021, Hawaii Gas upgraded 323,128 therms of biogas to biomethane from the Honouliuli WWTP Biogas Project, despite the impact of the COVID-19 pandemic on overall utility demand and biogas production.

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 *Id.*

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 2021, 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.

Key Accomplishments

- In 2021, Hawaii Gas upgraded 323,128 therms from biogas to biomethane (RNG).
- In 2021, Hawaii Gas executed two term sheets for the potential production of RNG, with specific timing contingent on a variety of factors, including fuel supply, project development, and regulatory review and approval.
- In 2021, 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 2021, 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.

Calculations

In 2021, the Honouliuli WWTP Biogas Project represented around 2% of Hawaii Gas' total feedstock, produced 323,128 therms, and was 100% non-petroleum. With the inclusion of Honouliuli, the total supply molar ratio of non-petroleum feedstock in 2021 was 50.70%, and the total supply molar ratio of petroleum feedstock was 49.30%.

With the inclusion of Honouliuli, the total energy quantity of non-petroleum feedstock in 2021 was ████████ therms, and the total energy quantity of petroleum feedstock was ████████ therms.

Hawaii Gas retained a third-party to perform and validate the mole percentage calculations provided in this report. The methodology consists in 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 Renewable Energy Report, with modifications to input volumes and compositions to match the 2021 values.

Summary

Hawaii Gas continues to aggressively pursue cost-effective local renewable energy projects to reduce Hawaii's reliance on imported oil. A key priority for Hawaii Gas continues to be integrating 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 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.

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