

**REPORT TO THE
HAWAI'I PUBLIC UTILITIES COMMISSION**

2012 Renewable Energy Annual Report
Required by Act 30 (SLH 2010)

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PUBLIC UTILITIES
COMMISSION

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Overview of Report Requirements

Pursuant to Hawai'i Revised Statutes § 269-45, The Gas Company LLC, dba HAWAI'IGAS (HAWAI'IGAS) submits its Renewable Energy Annual Report to the Hawai'i Public Utilities Commission (PUC).

As required, this report addresses the following information¹:

- 1) The percentage of total feedstock used to produce natural gas, biogas, biofuels, or biofeedstocks for use in the State that is comprised of petroleum feedstock;
- 2) The 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;
- 3) 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; and
- 4) The energy quantity in therms of natural gas, biogas, or gallons of biofuels, or biofeedstocks produced from non-petroleum feedstock energy for use by the gas utility in the State.

The following definitions are explained for clarity²:

- "Feedstock" means a material that is converted, consumed, or blended to produce an end use product.
- "Non-petroleum feedstock" includes but is not limited to plant and animal fats and oils, algae and algae products, other organic material, organic waste, municipal solid waste, waste water, or sewage.
- "Total feedstock" means petroleum and non-petroleum feedstock combined.

HAWAI'IGAS Overview

HAWAI'IGAS is the only gas utility in the United States using renewable feedstock as part of its utility gas product. We are also Hawai'i's only government franchised full-service gas company, manufacturing and distributing gas products and services in Hawai'i. The market includes Hawai'i's approximately 1.4 million residents and approximately 7.3 million visitors in 2011. HAWAI'IGAS manufactures synthetic natural gas (SNG) for its utility customers on Oahu, and distributes propane to utility and non-utility customers throughout the state's six primary islands.

¹ Hawai'i Revised Statutes § 269-45(a)1), (2), (3) and (4).

² Ibid at (b).

HAWAI'IGAS has two primary businesses, utility (or regulated) and non-utility (or unregulated):

- The utility business serves approximately 35,000 customers through localized pipeline distribution systems located on the islands of O'ahu, Hawai'i, Maui, Kaua'i, Moloka'i and Lana'i. Over 90% of these customers are on O'ahu. The utility business includes the manufacture, distribution and sale of SNG on the island of O'ahu and distribution and sale of propane.
- The non-utility business sells and distributes propane to approximately 33,300 customers. Propane is supplied by tank and cylinder services on O'ahu, Hawai'i, Maui, Kaua'i, Moloka'i and Lana'i.

HAWAI'IGAS' two products, SNG and propane, are clean-burning fuels that produce lower levels of carbon emissions than other hydrocarbon fuels such as coal or oil. SNG and propane also have a wide number of applications including water heating, drying, cooking, emergency power generation and decorative lighting such as tiki torches. Propane is also used as a fuel for passenger vehicles and specialty vehicles such as forklifts. SNG and propane provide a reliable and economical source of gas energy throughout Hawai'i to our hotels, restaurants, military installations, public sector facilities (hospitals, universities, government, schools, and prisons), farms, laundry services, retailers and residential housing units.

Renewable Energy Data & Information

Pursuant to Hawai'i Revised Statutes § 269-45, HAWAI'IGAS provides its 2012 annual renewable energy report to the PUC in Attachment 1, portions of which, is submitted as confidential³. The amounts shown in the report reflect HAWAI'IGAS' gas production activity during the period January through December 2012 and include the following non-confidential information:

- 1) The percentage of total feedstock used to produce natural gas, biogas, biofuels, or biofeedstocks for use in the State that is comprised of petroleum feedstock: 97.6 Percent.
- 2) The 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: 2.4 Percent.

HAWAI'IGAS' contribution to Hawai'i's renewable energy portfolio is significant. Based on the above-referenced performance data, the number of barrels of imported oil avoided by the use of SNG is 866,978 barrels per year. This amounts to \$121,265,582

³ Hawai'i Revised Statutes §269-45 "Due to the proprietary nature of the information required by paragraphs 3) and 4), that information shall be held in confidence by the PUC; 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."

saved on imported oil for the Hawai'i economy (based on \$139.87 per barrel of low sulfur fuel oil).

With the anticipated and increased production capacity of HAWAI'IGAS' Renewable Natural Gas Pilot Plant (RNG) at Campbell Industrial Park, the percentage of total feedstock used to produce natural gas, biogas, biofuels, or biofeedstocks that is comprised of non-petroleum feedstock is likely to increase in 2013.

Existing Synthetic Natural Gas Manufacturing Feedstock

HAWAI'IGAS' SNG Plant does not require additional oil to be imported to Hawai'i in order to manufacture its SNG. Instead, the SNG Plant uses a by-product called light naphtha as its feedstock, which is produced as a necessary part of the refining process at a local refinery. This material is not suitable for any other use without further processing and would probably have to be exported if not utilized at the SNG plant.

The naphtha is combined with hydrogen as part of the SNG manufacturing process. Since 2000, approximately 50% of the hydrogen used at the SNG Plant has been produced using reverse osmosis (RO) recycled water from the Honouliuli Waste Water Treatment Plant. The water (H₂O) is combined with methane (CH₄) and carbon monoxide (CO) in two separate reactions to produce hydrogen (H₂) in a chemical conversion process. The non-petroleum feedstock RO-based hydrogen accounts for 2.4% of the total feedstock required to produce SNG in 2012.

Moving Forward with Renewables

In December 2011, HAWAI'IGAS commissioned its Renewable Natural Gas Pilot Plant (RNG) located at the company's Campbell Industrial Park Synthetic Natural Gas Plant. In its efforts to develop and utilize renewable and recyclable products as feedstock, the RNG Plant will convert various types of renewable liquid feedstocks into renewable methane, propane and hydrogen. The pilot plant is capable of processing up to one million gallons of liquid feedstock and is designed to allow for expansion to accommodate increasing demand and feedstock supply availability. These products will be incorporated into the existing SNG manufacturing process to increase the amount of renewable gas energy as a percentage of total inputs. The RNG Plant is a vital part of the renewable energy supply chain in Hawai'i in three important ways:

- It provides a way to further process renewable liquid feedstocks into higher value products such as methane, propane, and hydrogen;
- It sets prices for the renewable liquid feedstock market helping landowners and farmers determine economic feasibility of renewable based projects which is critical to growing a biomass industry in Hawai'i; and
- The renewable products are distributed using existing pipeline infrastructure versus having to build new infrastructure.

In 2012, the RNG plant achieved the following milestones:

- Achieved operational status;
- Installed the following equipment;
 - A 2,000 gallon feedstock storage tank;
 - Three 1,050 gallon product storage tanks;
 - gas chromatograph has been received and is installed;
 - RNG Steam Super Heater;
 - New Separation Vessel with insulation;
 - Feedstock Heat Exchanger;
 - New discharge piping and flow meter;
 - Steam Super Heater; and
 - Separation Vessel
- Received the clean air permit from the Department of Health; and
- Tested the following feedstocks;
 - Fats and oils from Island Commodities;
 - Pyrolysis oil from Big Island Carbon;
 - Yellow Grease;
 - Canola Oil; and
 - Glycerol from Pacific Biodiesel plant on Hawai'i.

To date, HAWAI'IGAS has flared the renewable gas produced at the RNG plant. Starting in the 3rd quarter of 2013, HAWAI'IGAS plans to start inserting RNG into the SNG pipeline and expects RNG to comprise 4 – 6% of the total volume sent to the utility system on O'ahu.

High Efficiency of Gas Energy v. Oil Fired Plants

The SNG Plant, built in 1972, operates at an efficiency of 86%, compared to an oil fired plant at 30%. Oil-fired power plants in Hawai'i convert fuel oil into electricity at an efficiency of about 30% meaning about 70% of the energy content in each gallon of fuel oil is lost due to system inefficiencies. This means that in Hawai'i gas energy delivers 2.8 times more energy to the end-user than does grid electricity from oil-fired power plants.

As noted above, without SNG, the State would have had to import an additional 866,978 barrels of oil to produce an equivalent amount of electricity in 2012, resulting in a significant cost savings to Hawai'i consumers.

HAWAI'IGAS is clearly contributing to the State's goal of meeting 70% of its energy needs by 2030 through clean energy, with 30% coming from energy efficiency measures, and 40% coming from locally generated renewable sources⁴. Related

⁴ Hawai'i Revised Statutes §269-92 Renewable portfolio standards (a)(4).

language in the Hawai'i Revised Statutes §269-96 Energy-efficiency portfolio standards calls for a) The public utilities commission to establish energy-efficiency portfolio standards that will maximize cost-effective energy-efficiency programs and technologies; and b) The energy-efficiency portfolio standards shall be designed to achieve four thousand three hundred gigawatt hours (4,300 GWH) of electricity use reductions statewide by 2030⁵.

Without question, HAWAI'IGAS is helping Hawai'i achieve its energy efficiency goals by extracting more useful energy from every barrel of imported oil, while also utilizing by-products and waste-products from the refining and waste water treatment processes.

HAWAI'IGAS' Hydrogen Initiatives

HAWAI'IGAS is also part of the Hawai'i Hydrogen Initiative whose purpose is to help build out the required infrastructure to support the introduction of fuel cell technologies in Hawai'i. Fuel cell technologies include passenger vehicles, public bus transportation and various other vehicles types used in industrial settings such as forklifts. HAWAI'IGAS' role is to provide a reliable and cost effective source of high purity hydrogen as the fuel source and a reliable and economical distribution system.

Today, HAWAI'IGAS' SNG contains about 10% hydrogen produced in the manufacturing process and is distributed using existing pipeline infrastructure. This provides a cost effective means to distribute hydrogen to the point of use since it is carried within the SNG. It is possible to separate and purify the hydrogen at the point of use (fueling station) and return the non-hydrogen gas (tail gas) to the pipeline utilizing our existing pipeline system.

Since the SNG Plant operates at approximately 86% efficiency and fuel cell vehicles are approximately 50% efficient that equates to a system efficiency of about 43%, versus their internal combustion engine counterparts, which combust gasoline and operate at approximately 14-26% efficiency. Gas energy and fuel cells deliver about 1.7 times more energy than gasoline and internal combustion engines enabling Hawai'i to get more energy out of available resources.

Summary

Today, HAWAI'IGAS plays a vital role in Hawai'i's energy picture as one of the State's most efficient, cost effective and pollution free producers of energy for Hawai'i consumers. Achieving Hawai'i's renewable energy goals is a collaborative approach and HAWAI'IGAS is committed to working with all stakeholders to reach these goals. Gas energy is a key part of our nation's and Hawai'i's energy strategy providing a balanced approach to meeting our energy needs in partnership with renewable energy.

⁵ Hawai'i Revised Statutes §269-96 Energy-efficiency portfolio standards (a) and (b).