

Hawaii Gas 2013 Renewable Energy Report

The Gas Company LLC, dba Hawaii Gas (Hawaii Gas) has prepared this Renewable Energy Annual Report for the Hawaii Public Utilities Commission pursuant to Hawaii Revised Statutes (HRS) §269-45.² Hawaii Gas 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. 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 provide a reliable and economical source of clean energy throughout Hawaii to hotels, restaurants, military installations, public sector facilities (hospitals, universities, government, schools, and prisons), farms, laundry services, retailers and residential housing units. By using SNG as a source of firm energy, Hawaii avoided importing 840,561 barrels of oil in 2013. This amounts to a savings of \$113,744,661 (based on \$135.32 per barrel of low sulfur fuel oil).³

Renewable Energy Data & Information

Hawaii Gas produces SNG using a blend of naphtha and hydrogen, along with other feedstocks. Since 2000, approximately 50% of the hydrogen used to produce SNG is from recycled water from the Honouliuli Waste Water Treatment Plant. The water is combined with methane and other gases to produce hydrogen in the reformer and additional methane in the water shift reactor. This renewable hydrogen accounted for 2.4% of the total feedstock used to produce SNG in 2013.

Moving Forward with Renewable Gas

Hawaii Gas is committed to increasing the use of renewable gas in Hawaii. Since 2009, Hawaii Gas has focused on developing a renewable gas plant at its SNG Plant. Early lab results indicated that animal fats and plant oils can be used as feedstock to produce a renewable gas that could replace SNG. Based on these results, Hawaii Gas commissioned the design and construction of its pilot Renewable Natural Gas Pilot Plant (Pilot Plant) in 2011 to demonstrate whether the results achieved in the lab could economically and operationally be duplicated on a larger scale.⁴

Hawaii Gas has tested a wide variety of feedstock including yellow grease, brown grease, canola oil and glycerin under various operating parameters in its trials, and

² The summary of the HRS §269-45 reporting requirements can be found in Attachment 1.

³ Id.

⁴ See Docket No 2010-0334, Decision and Order No. 30096.

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thus far, the Pilot Plant has not produced renewable gas in sufficient quantity and quality on a consistent basis to enable a sustained large scale production process. Recent lab trials show that a redesign of some of the Pilot Plant components may be necessary in order to produce renewable gas at a large scale. Hawaii Gas will evaluate this and other alternatives for the Pilot Plant over the next 45 to 60 days to determine the next steps in the project.

Hawaii Gas is also currently evaluating other sources of renewable gas for use in its utility system. These sources include using renewable feedstock to replace a portion of the naphtha feedstock used to produce SNG and including renewable gas as a portion of the liquefied natural gas that will be used to backup the SNG system on Oahu. Hawaii Gas is also considering procuring renewable gas from local wastewater treatment plants, landfills, and from new projects which will produce renewable gas by anaerobically digesting various sources of biomass feedstock. Hawaii Gas plans to introduce renewable gas from one or more of these sources into its utility gas systems throughout the state as soon as it is commercially available.

Summary

Hawaii Gas has a vital role in Hawaii's energy picture as one of the State's most efficient and cost effective producers of energy for Hawaii consumers. Hawaii Gas is committed to Hawaii's renewable energy goals and will continue to look to new and innovative, yet cost-effective, ways to increase the use of renewable gas to reach these goals.

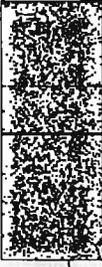
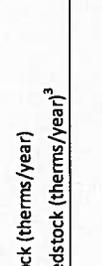
Attachment 1
Renewable Energy Report Summary

Hawaii Gas 2013 Renewable Energy Report

Confidential
Pursuant to HRS § 269-45 (a)

Annual Report to the Hawaii Public Utilities Commission

Date: March 6, 2014
Submitted By: The Gas Company, LLC dba HAWAII GAS
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745 Fort Street
Honolulu, Hawaii 96813

Requested Information	Value	BOE
Percentage of total feedstock comprised of petroleum feedstock	97.6%	
Percentage of total feedstock comprised of non-petroleum feedstock ^{1 & 2}	2.4%	
The energy quantity in therms produced from petroleum feedstock (therms/year)		
The energy quantity in therms produced from non-petroleum feedstock (therms/year) ³		
Total (therms/year)		
Savings to Hawaii from the use of Synthetic Natural Gas (SNG)⁴		
Number of barrels of imported oil avoided by the use of SNG ⁵ (barrels/year)	840,561	
Dollar value per barrel of imported oil avoided by the use of SNG ⁶	\$135.32	
Dollars saved on imported oil for the Hawaiian economy	\$113,744,661	
For every one Barrel Therm Equivalent of SNG it requires 2.756 barrels of oil as generator fuel ⁷		
Renewable Natural Gas (RNG) in Testing Phase		
Pounds of renewable feedstock purchased	3,260	
Average BTUs per pound	17,105	
RNG Therms produced at 10 % efficiency ⁸	56	
Conversion rates were very low <10% and emulsification of the oil with steam did not allow for reprocessing of the non converted oils.		
Cost per therm for the RNG were 4 - 5 times the cost to manufacture the SNG		

Footnotes

- 1 The Gas Company commissioned its renewable natural gas pilot plant in December 2012 and has utilized non-petroleum feedstock for testing purposes
- 2 Plant stoichiometric basis (HHV) - R-hydrogen therm/plant feedstock therm - use of recycled water from Honolulu Waste Water Treatment Plant
- 3 Hydrogen produced in the SNG Plant reformer and water shift reactor from recycled waste water - therm quantity based on feedstock flow
- 4 SNG is made using a naphtha, a by-product produced at a neighboring refinery, and does not require any additional oil to be imported to Hawaii
- 5 Calculated from plant conversion efficiencies with hot water production
- 6 February 2014 DBEDT Monthly Energy Data Oahu cost per barrel for electrical generation year to date (thru December)
- 7 For every Barrel Therm Equivalent of SNG produced there is a savings of 1.756 Barrels of Oil (54,461.4 therms/barrel)
- 8 Barrel of Oil Equivalent - (5,446,140 BTUs or 54,461.4 therms per barrel)
- 9 RNG Efficiency was lower than 10% and could not recover the non converted oil to reprocess