

# Geothermal Energy on the Big Island

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**December 15, 2017**

Submitted as coursework for [PH240](#), Stanford University, Fall 2017

## Introduction

Within the last half century, geothermal power has been recognized as one of the primary projects for renewable energy on the Big Island of Hawai'i. In the early 1980's, Campbell Estate teamed up with True Oil Company to exploratory drill in the forest just east of Volcanoes National Park. However in 1993, True Geothermal abandoned the project for financial reasons and turned it over to the state. [1] Since then, Puna Geothermal Venture has operated a well field and power plant (see Fig. 1) adjacent to the HGP-A site through permits issued by the State and County. [1]



**Fig. 1:** Puna Geothermal Venture (PGV) power plant. (Courtesy of the [DOE](#))

## What is Geothermal Energy?

Geothermal energy is created through the decay of radioactive elements heating rocks below the surface. Water comes down through man made springs or natural cracks in the ground and gets heated by rocks. The water then returns to the surface as steam or hot water, which can be used to power turbines and produce electricity. [2] This is the process being carried out at the Puna Geothermal Venture unit on the Big Island. Originally, geothermal plants were constructed near geysers or other places where hot fluids flow easily. However, recent developments have allowed this method to be applied even in places where the rocks are not naturally permeable and porous. [3]

## How Does Hawai'i Benefit From Geothermal Energy?

Geothermal resources are difficult to characterize without exploration and drilling since Hawai'i's high-temperature resources are usually more than a mile beneath the surface. However, estimates from exploration efforts in the 1970s and 80s indicate that there may be more than 1,000 megawatts (MW) of geothermal reserves (recoverable heat at drillable depths) on Maui and Hawai'i islands, which would be sufficient to collectively power Maui, Hawai'i Island, and about one quarter of Oahu or, alternatively, about 60% of Oahu's energy needs. [4] Reaching that level of production would require interconnection of the islands grids. The Big Island's single geothermal power plant, Ormat's Puna Geothermal Venture (PGV) facility, produced 230.5 gigawatt-hours (GWh) in 2015; approximately 22% of the total electricity distributed on Hawaii Island in 2015. The PGV facility, which began operating in 1993 and was expanded from 30 MW to 38 MW in 2011, produces both baseload and dispatched electricity. [4] Although the price per kilowatt-hour generated from

geothermal can sometimes be double the U.S. average, geothermal electricity is cheaper than that produced from petroleum fuels in Hawai'i, and is generally cheaper than other forms of renewable electricity. [4]

## Conclusion

As the PGV facility continues to operate and the possibility of more geothermal units emerging on the Big Island increases, it's important for residents to understand how geothermal energy works and the advantages it presents to Big Island residents and residents of the state. Geothermal projects have the potential to lower electricity costs, substantially, while supporting Hawai'i's efforts to replace imported petroleum with renewable energy sources. [1,4]

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