

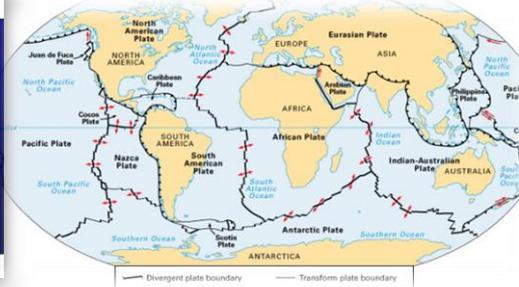
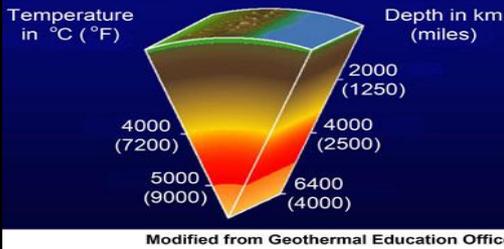


## Grenada Geothermal Resource Development

- Clean Sustainable Baseload Energy -  
Historical Overview

No. 1 Vol. 1

### TEMPERATURES IN THE EARTH



### What Is Geothermal Energy?

Geothermal energy comes from the heat within the earth. The word "geothermal" comes from the Greek words *geo*, meaning earth, and *therme*, meaning "heat."

The earth's **core** lies almost 4,000 miles beneath the earth's surface. It is made up of very hot **molten** iron surrounding a solid iron center. Estimates of the temperature of the core range from 5,000 to 11,000 degrees Fahrenheit (<sup>0</sup>F). Heat is continuously produced within the earth by the slow decay of radioactive particles that is natural in all rocks.

Surrounding the earth's core is the **mantle**, thought to be partly rock and partly magma. The mantle is about 1,800 miles thick. The outermost layer of the earth, the insulating crust, is not one continuous sheet of rock, like the shell of an egg, but is broken into pieces called **plates**. These slabs of continents and ocean floor drift apart and push against each other at the rate of about one inch per year in a process called **continental drift**.

**Magma** (molten rock) may come quite close to the surface where the crust has been thinned, faulted, or fractured by movement of the plates. When this near-surface heat is transferred to water, a usable form of geotherme - energy is created.

Geothermal energy is a renewable energy source because the water is replenished by rainfall, and the heat is continuously produced by the earth.

### Geothermal Facts

Ancient societies, including that of the Romans, Chinese, and Native Americans, used hot mineral springs for bathing, cooking, and heating. In many first world countries, water from hot springs is now used in spas, for heating buildings, and for agricultural and industrial uses. Many people also believe hot mineral springs have natural healing powers.

In the first century AD, the Romans conquered what is now Bath, in Somerset, England, and used the hot springs there to feed public baths and underfloor heating.



The admission fees for these baths probably represent the first commercial use of geothermal power.

The world's oldest geothermal district heating system in (Chaudes-Aigues), France, and has been operating since the 14th century.

The earliest industrial exploitation of geothermal energy began in 1827 with the use of geyser steam to extract boric acid from volcanic mud in Larderello, Italy.

In 1892, America's first district heating system in Boise, Idaho was powered directly by geothermal energy, and this technology was later copied in Klamath Falls, Oregon in 1900.

In the 20th century, demand for electricity led to the consideration of geothermal power as a generating source.

Prince Piero Ginori Conti tested the first geothermal power generator on 4 July 1904, at the Larderello dry steam field where geothermal acid extraction had begun. Their generator was powered by the natural steam erupting from the earth. Later, in 1911, the world's first commercial geothermal power plant was built there. It was the world's only industrial producer of geothermal electricity until New Zealand built a plant almost half a century later in 1958

In the United States, the first attempt to develop geothermal power came in 1922 at The Geysers steam field in northern California. The project failed because the pipes and turbines of the day could not stand up to the abrasion and corrosion of the particles and impurities that were in the steam.

In 1926, a deep geothermal well was used to heat greenhouses in Boise, and geysers were used to heat greenhouses in Iceland and Tuscany at about the same time. Charlie Lieb developed the first downhole heat exchanger in 1930 to heat his house. Steam and hot water from geysers began heating homes in Iceland starting in 1943.

In 1960 a small but successful hydrothermal plant opened at the Geysers. Today 28 geothermal plants are operating there. Worldwide, electricity is now produced from geothermal energy in more than 20 countries, from an operating capacity of 13.3GW, serving more than 600 million persons.

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