GEOTHERMAL ENERGY & PLANTS

Deep inside the Earth lies the top layer of the mantle consisting of hot liquid rock called magma. Underground, water can be heated up to boiling temperatures and turn into steam through the heat emitted by these rocks. Harnessing the thermal energy fomr hot water and steam, we can produce electricity through environmentally-friendly means.

What is Geothermal Energy?

The word "*geothermal*" means "*Earth*" plus "*heat*". Most of the geothermal energy inside the Earth that we use is in the form of subterranean reservoirs of water. A number of technologies have developed that has allowed us to take advantage of this heat.

How Geothermal Plants Work

All geothermal plants work by producing steam to turn a turbine and generator. However, several modifications have improved the technology, making it more suitable for mainstream usage.

Dry Steam Power Plants: Dry steam power plants were the first type of geothermal plants. They rely on steam pumped directly from underground wells to turn a turbine which drives a generator to produce electricity. These plants only emit excess steam and minor amounts of gases.

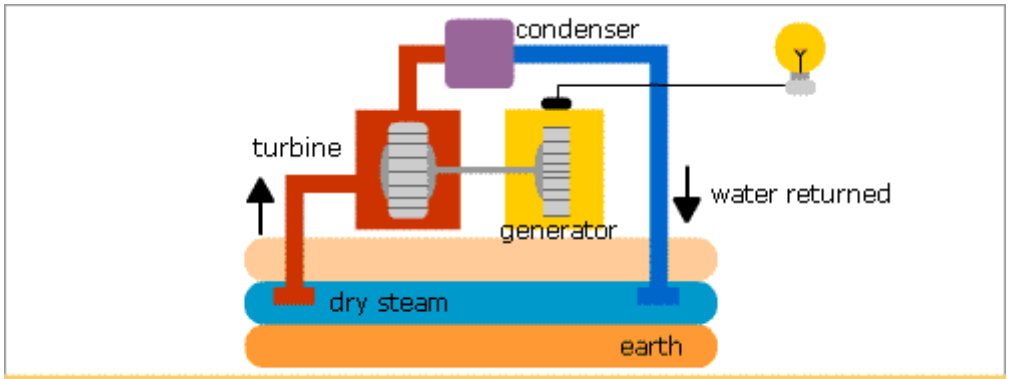

fig1. How a dry steam power plant works

Flash Steam Power Plants: The most common type of geothermal plants. Flash steam power plants use water with temperatures greater than 200°C pumped at high pressures to the surface, where the pressure is suddenly dropped, causing the hot water to "flash" into steam. The steam is then used to power a turbine and generator. Any leftover water is pumped back into the reservoir, or into a second tank where it can be flashed again to generate more steam. The only by-products of this process are excess steam and trace gases.

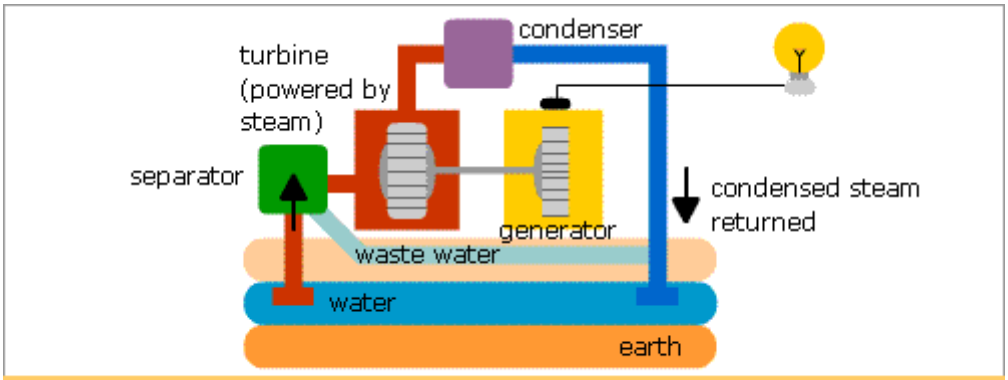

fig2. How a flash steam power plant works

Binary-Cycle Power Plants: Binary-cycle power plants operate at lower temperatures than flash steam power plants. Binary-cycle power plants use the heat of the hot water to boil a secondary fluid with a low boiling point. The heat from the water thus causes the secondary fluid to flash to steam, which will drive the turbines. After a cooling process, the water is then injected back into the reservoir to be reused again later. Because the two fluids are separated during the whole process, almost nothing is emitted to the atmosphere. Since water in underground reservoirs usually have moderate temperatures, binary-cycle power plants will likely be the main geothermal technology in the future. The disadvantage of this system is that it tends to be less efficient.

Geothermal Energy Advantages and Disadvantages

Advantages	Disadvantages
• Reliable • Low emissions • Plentiful resource • Sustainable as water can be injected back into hot rock to pick up more heat • Cost effective (on par with hydrocarbons) • Takes up little space compared to oil and gas production	• Naturally occurring vents are not widely available (accessible in only select locations) • Potential artificial vents are often too far and deep in the ground to be effective • Occasionally limited due to heat and water depletion

Summary

Geothermal has many environmental and economic advantages. In countries where hydrocarbon resources are limited, geothermal power can be cost competitive. As a plentiful and low emission energy source, research continues into geothermal energy to make it more widely available.

Source: http://www.odec.ca/projects/2006/wong6j2/geothermal.html

EXAMPLES of GEOTHERMAL PLANTS

Steam rising from the Nesjavellir Geothermal Power Station in Iceland.

Geothermal power station in the Philippines

Krafla Geothermal Station in northeast Iceland

Geothermal Development in the Caribbean

West Indies Power is a geothermal power company registered in the Netherlands Antilles and with the head office in Charlestown, Saint Kitts and Nevis. It has geothermal power development activities in Nevis, Saba and Dominica.

Projects at Nevis

At Nevis, West Indies Power has two geothermal projects. These projects, if completed, will make Saint Kitts and Nevis the first country in the Caribbean to utilize large-scale geothermal energy, and one of the least dependent nations in the world on fossil-fuels. West Indies Power is looking also for the third geothermal project at Nevis.

Nevis 1

The first project Nevis 1 is located at Spring Hill. In February 2007, the Nevis Island Administration issued a license to West Indies Power for exploration of the geothermal resource of Nevis. West Indies Power commenced explorations at the same month. The drilling at Spring Hill commenced in January 2008.[4] The geothermal reservoir at Spring Hill was discovered on 2 June 2008. The geotechnical work started in July 2008.

When completed, the plant Nevis 1 plant will supply 50 megawatts (MW) of electricity, enough to fulfill all of Nevis' demand (approximately 10 MW) as also to export to neighboring Saint Kitts and other nearby islands via submarine electrical transmission cables. Generated electricity will be sold to the Nevis Electricity Company Limited.

The second project Nevis 2 is located at Upper Jessups Village in the St. Thomas Parish. The drilling started on 24 June 2008.

Project in Dominica

The Government of Dominica awarded geothermal exploration and development license to West Indies Power (Dominica) Ltd. on 10 July 2008. Initial geologic and geochemical field exploration work will begin in August 2008. Based on the results of the thermal gradient holes slim holes will be drilled in 2009 and the geothermal power plant will be constructed in 2010.

Project in Saba

In Saba, West Indies Power develops geothermal power plant with capacity of 75 MW.

Source: wkipedia.org