

Frequently Asked Questions about Geothermal Energy

What is geothermal energy?

Geothermal energy is heat (thermal) that comes from within the earth (geo). Water and steam warmed by the earth's heat are used to generate electricity, or can be used directly for heating. Even without water present, we can use the warm ground at depths of 4 to 300 feet for heating and cooling residential or commercial buildings.

How does geothermal heat get from the interior of the earth to the surface?

Heat is constantly generated within the earth's core and flows outward into cooler rocks, towards the earth's surface. This process is more efficient where magma (molten rock) reaches the earth's surface and volcanoes form. The hot rock heats groundwater that has accumulated from rain and snow melt that seeps into the ground. Sometimes this heated water re-emerges as hot springs.

Is geothermal energy a renewable resource?

Yes, the heat coming from the core of the earth cannot be depleted by human activities. When generating electricity from a geothermal reservoir it is common practice to inject the produced water back into the earth to be reheated and used again.

Where is geothermal energy found?

Since geothermal energy is heat from the earth, it can be found virtually anywhere. Rocks hot enough to be used to generate electricity are commonly found at tectonic plate boundaries where faults and volcanoes are common, like the "Ring of Fire" that borders the Pacific Ocean, or where continental crust is being broken and pulled apart like the African Rift Valley or the Basin and Range of the western US, or at "hot spots" in places like Yellowstone National Park and Hawaii. Geothermal energy can even be found in your back yard, and used to heat and cool your house!

In Utah, geothermal resources are used to produce electricity, grow flowers in greenhouses, provide hot water for the prison, bathing in hot springs, and to heat and cool homes, colleges and schools.

How is geothermal electricity produced?

There are three main types of geothermal power plants.

- **Dry steam plants** use steam from geothermal wells to directly spin a turbine which drives a generator that produces electricity.
- **Flash plants** bring hot water to the surface where it boils to produce steam. The hot water (above about 440°F) "flashes" to steam when pressure is reduced in the surface facility. The steam is then sent directly to a turbine to drive the generator. The remaining liquid water is reinjected.
- **Binary cycle plants** use hot water to boil an organic fluid similar to the fluid used in air conditioners (a working fluid). The water is never directly in contact with the working

fluid, however heat is exchanged. The expanding gas produced by boiling the working fluid is used to spin the turbine and drive the generator. All of the water used in the binary plant is injected into the subsurface where it is naturally reheated and eventually used again.

Do geothermal power plants produce emissions that lead to global warming?

Dry steam and flash power plants produce very small amounts of emissions. Binary plants release no emissions - they are closed loop systems. You can read more about emissions in

www.nationalgeographic.com/environment/global-warming/geothermal-energy/

What are the advantages of geothermal energy?

Geothermal power has many advantages. For example:

1. It is a renewable resource with a very low environmental impact and small footprint.
2. The resource is immense, safe to use and clean.
3. Unlike solar and wind energy, geothermal energy is available 24 hours a day, 365 days a year.
4. Commercial and industrial direct heat or ground source (heat pump) users see large savings in cost and decreased water use when compared to conventional boilers. Heat pump technologies allow geothermal energy to be used anywhere in the world.

What are the advantages of geothermal energy compared to other green energies?

Unlike solar and wind energy, geothermal energy can be generated constantly, not just when the sun is shining and the wind is blowing. The surface footprint of a geothermal power plant is very compact, generally less than 5 acres. Because the footprint is so small, geothermal plants have little impact on the local environment or wildlife.

What are the drawbacks of geothermal energy?

There are no drawbacks, only advantages to the use of geothermal energy for electricity production and direct use (heating, cooling). Currently, geothermal development for electricity generation occurs in areas where hot springs are found. In the future, new techniques will allow geothermal development anywhere in the world.

How long do geothermal resources last?

Geothermal heat is virtually inexhaustible. Larderello, Italy is the first geothermal field in the world to be developed. It has been producing electricity commercially since 1913. Other geothermal fields in the United States, New Zealand, and Mexico have been producing electricity for more than 50 years. District heating in Boise, Idaho has operated since 1892 and in Iceland since the 1930.