

GEOTHERMAL ENERGY

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In the search for new energy resources, scientists have discovered ways to use the Earth itself as a valuable source of power. Geothermal power plants use the Earth's natural underground heat to provide clean, renewable energy.

The word geothermal comes from the Greek words geo (Earth) and therme (heat). Geothermal energy is heat from within the Earth. Geothermal energy is generated in the Earth's core, almost 4,000 miles beneath the Earth's surface. The double-layered core is made up of very hot magma (melted rock) surrounding a solid iron center. Surrounding of the outer core is the mantle, which is about 1,800 miles thick and made of magma and rock. The outermost layer of the Earth, the land that forms the continents and ocean floors, is called the crust. The crust is three to five miles thick under the oceans and 15 to 35 miles thick on the continents. The crust is not a solid piece, like the shell of an egg, but is broken into pieces called plates. Magma comes close to the Earth's surface near the edges of these plates. The lava that erupts from volcanoes is partly magma. Deep underground, the rocks and water absorb the heat from this magma. We can dig wells and pump the heated, underground water to the surface. People around the world use geothermal energy to heat their homes and to produce electricity.

Geothermal energy was used by ancient people for heating and bathing. Even today, hot springs are used worldwide for bathing, and many people believe hot mineral waters have natural healing powers. Using geothermal energy to produce electricity is a new industry. A group of Italians first used it in 1904. The Italians used the natural steam erupting from the Earth to power a turbine generator. The first successful American geothermal plant began operating in 1960 at The Geysers in northern California. There are now just under 60 geothermal power plants in five states, with many more in development. Most of these geothermal power plants are in California with the remainder in Nevada, Hawaii, Idaho, and Utah.

There is more than one type of geothermal energy, but only one kind is widely used to make electricity. It is called hydrothermal energy. Hydrothermal resources have two common ingredients: water (hydro) and heat (thermal). Depending on the temperature of the hydrothermal resource, the heat energy can either be used for making electricity or for heating.

Hydrothermal resources at low temperatures (50 to 300 degrees Fahrenheit) are located everywhere in the United States, just a few feet below the ground. This low temperature geothermal energy is used for heating homes and buildings, growing crops, and drying lumber, fruits, and vegetables. In the U.S., geothermal heat pumps are used to heat and cool homes and public buildings. In fact, each year about 50,000 geothermal exchange systems are installed in the U.S. Almost 90 percent of the homes and businesses in Iceland use geothermal energy for space heating.

Hydrothermal resources at high temperatures (300 to 700 degrees Fahrenheit) can be used to make electricity. These high-temperature resources may come from either dry steam wells or hot water wells. We can use these resources by drilling wells into the Earth and piping the steam or hot water to the surface. Geothermal wells are one to two miles deep. In a dry steam power plant, the steam from the geothermal reservoir is piped directly from a well to a turbine generator to make electricity. In a hot water plant, some of the hot water is turned into steam. The steam powers a turbine generator just like a dry steam plant. When the steam cools, it condenses to water and is injected back into the ground to be used over and over again.

Geothermal energy produces only a small percentage of U.S. electricity. Today, it produces almost 16 billion kilowatt-hours, or less than one percent of the electricity produced in this country. Between years 2010 and 2050, geothermal power capacity in the world would increase from 11,000 MW to perhaps as high as 58,000 MW. Rate of growth in power capacity can be much higher if adequate commercial incentives are given by governments and international agencies.

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