

# Geothermal Energy



A geyser releases hot water and steam into the air.

Geothermal energy is  
heat inside the Earth.  
Geothermal energy is renewable.



# Geothermal Energy

**TEACHER**

**Geothermal** comes from the Greek words **geo** (earth) and **therme** (heat). Geothermal energy is heat inside the Earth. The inside of the Earth is very hot. Sometimes this heat comes near the surface. We can use this heat to warm our houses. We can make electricity with it.

The Earth is made of layers or parts, like a hard-boiled egg. It has three layers—core, mantle, and crust. At the center is a solid **core** of iron. Around that is the outer core, made of iron and rock so hot the rock is melted. This liquid rock is called **magma**. The middle layer is a mixture of rock and magma called the **mantle**. The shell of the Earth—with the oceans and mountains—is called the **crust**.

In some places, magma comes close to the Earth's surface. It heats the water underground. We can use this heated water. We dig wells and pump the hot water and steam out of the ground.

The hot water we use will be replaced by rain. The heat inside the Earth will always be there. More heat is made every day in the Earth's core. We won't run out of geothermal energy. It is **renewable** energy.

Geothermal energy is everywhere under the ground, but sometimes it is hard to reach. In most places, the crust is miles thick. Magma is near the surface in only a few places.

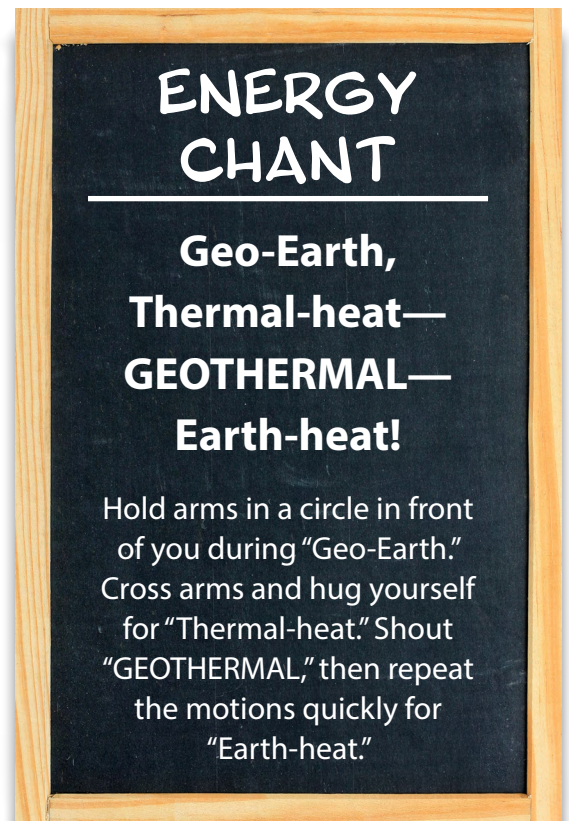
Earthquakes and volcanoes are signs that magma is near the surface. The lava from volcanoes is magma that has reached the surface of the Earth. Most of the geothermal energy in the United States is found in the western states and in Hawaii. Very little electricity (less than 1%) comes from geothermal.

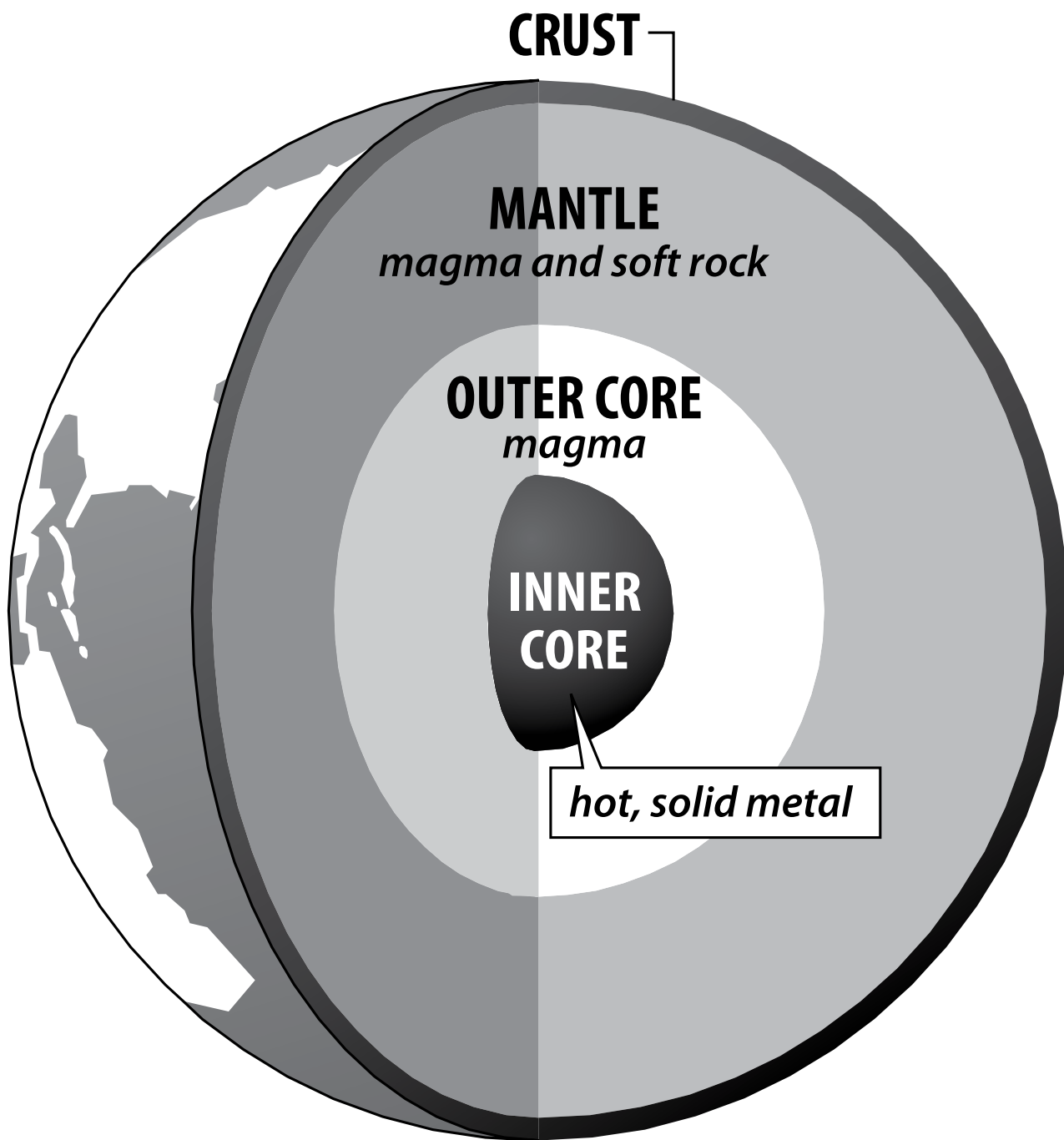
People have used geothermal energy for thousands of years. In some places, there are pools of water that are always hot. They are warmed by underground springs. These **hot springs** have often been used for bathing. Many people believe these springs have healing powers.

Most people in Iceland use hot water from geothermal wells to heat their homes. Some scientists think that someday we will be able to capture the energy in volcanoes.

**Power plants** use steam from geothermal wells to make electricity. The steam is used to spin turbines. The turbines spin magnets in coils of copper wire to make electricity. The power plants are built close to the wells. The steam is pumped straight from the wells to the power plants.

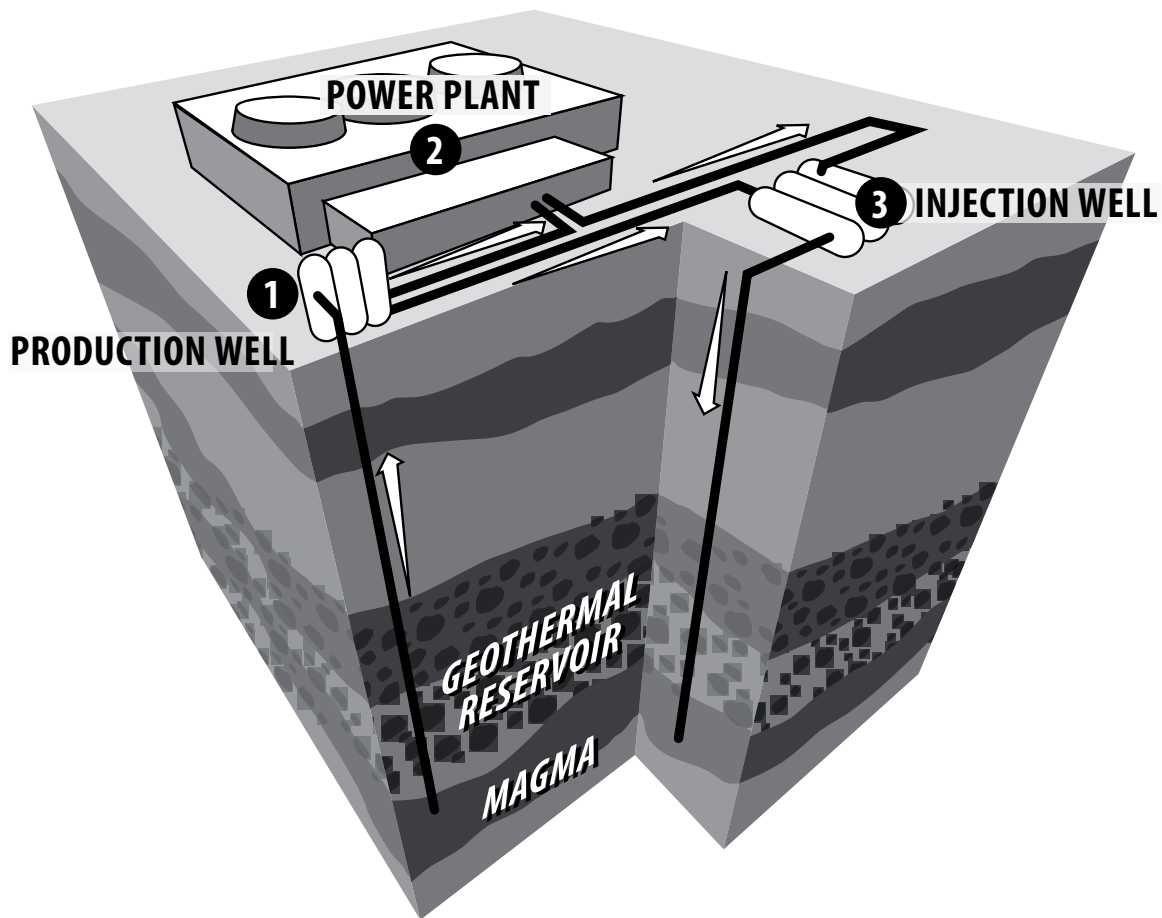
Geothermal energy is clean energy. No fuel is burned, so there is little to no air pollution. The steam is turned into water and put back into the Earth. And geothermal energy is cheap—once they are built, new power plants can make electricity for less cost than coal or natural gas plants.





The Earth is made of layers.

# Geothermal Power Plant



- 1. Production Well:** Geothermal fluids, such as hot water and steam, are brought to the surface and piped into the power plant.
- 2. Power Plant:** Inside the power plant, the geothermal fluid turns the turbine blades, which spin a shaft, which spins magnets inside a large coil of wire to generate electricity.
- 3. Injection Well:** Used geothermal fluids are returned to the reservoir.

Geothermal power plants  
make electricity.