

The sparsely populated island of Iceland leads many other nations in the effort to produce electricity from alternative resources. Sixty-six percent of the electricity used by the inhabitants of Iceland comes from geothermal energy. Geothermal energy uses heat from Earth to produce electricity.

Located in the North Atlantic, Icelanders (population 318,000) live far from major trade routes that distribute the world's oil to industrial nations. The little oil that does reach Iceland is expensive. To reduce its dependency on petroleum products for the production of electricity, Iceland taps into a very abundant local resource—geothermal energy.

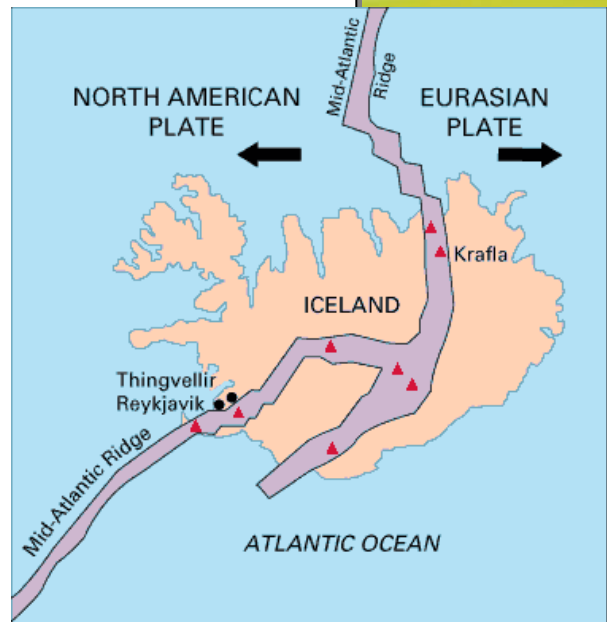
Tapping into the Heat

Plate tectonics are slowly tearing Iceland in two. The island nation sits over the Mid-Atlantic Ridge. At the ridge, the Earth's crust splits apart. The tear in the crust allows magma from within the depths to flow upward. The result is the formation of new land, volcanoes, and hot springs—all required for geothermal energy. Icelanders tap into the heat that rises from the center of the Earth to produce electricity.

Life on the surface of Earth exists within a very narrow temperature band. On a cold day temperatures might drop to below freezing (0°C). On a hot day, the temperature could reach over 35°C . Beneath Earth's crust, temperatures never range from cold to hot. The temperatures deep within Earth are always extremely hot. At the center of the planet is a hot, spinning, liquid-metal core. Scientists estimate that the temperature at Earth's core ranges from $3,000^{\circ}\text{C}$ to $5,000^{\circ}\text{C}$. The heat given off by the core

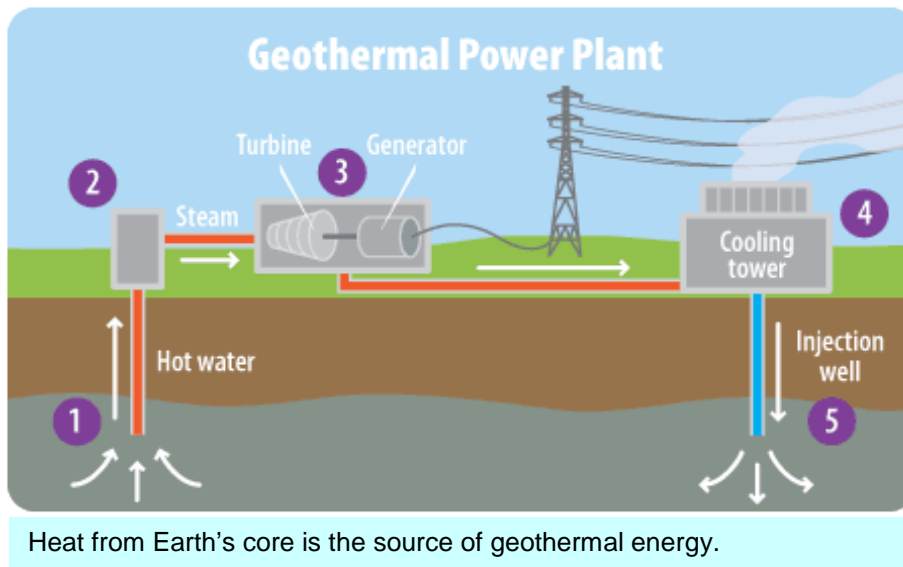


Icelanders relax in a hot spring while a geothermal power plant produces electricity.



The Mid-Atlantic Ridge runs beneath Iceland.

rises toward Earth's surface. As the heat rises, the heat warms surrounding materials, including water. Water easily absorbs heat. The hot water rises as well, and in doing so forces its way through cracks in the rock layers to eventually erupt at the surface in the form of geysers. If the super-heated water is not under pressure when water comes to the surface, the water forms a hot spring.



How Do Geothermal Plants Work?

Geothermal energy plants turn hot water into electricity in five easy steps:

1. Geothermal power plants pump hot water to the surface.
2. At surface pressures the hot water becomes steam that is then forced through the blades of a turbine.
3. The turbine spins, like a windmill, turning a shaft to a generator that produces electricity.
4. The steam cools and condenses back to form cool water.
5. The water is then returned to the ground through an injection well.

Geothermal energy is only one of several renewable energy sources used to produce electricity. Other examples include hydroelectric, wind, and solar energy. Renewable energy is a much greener alternative than non-renewable petroleum energy.

Petroleum v. Geothermal Energy

For most of the past 200 years, humans have burned coal to heat water to turn turbines and create electricity. Coal and other petroleum products produce environmentally damaging waste products such as carbon dioxide. In contrast, electricity produced by alternative sources such as geothermal energy do not produce harmful gases. One advantage of coal is that coal can be transported to a power plant at any location. To take advantage of geothermal energy, the power plant must be built near the source. The western United States represents the greatest area for future production of electricity using geothermal energy in this country.



Hot springs are examples of natural heat sources that could someday be harnessed for geothermal power.

Geothermal activity is highest in volcanically active areas. One of the most volcanically active areas in the United States is Yellowstone National Park. Guests visiting the park see geysers, hot springs, and boiling mud pots. All of these are evidence of the heat within Earth rising to the surface.