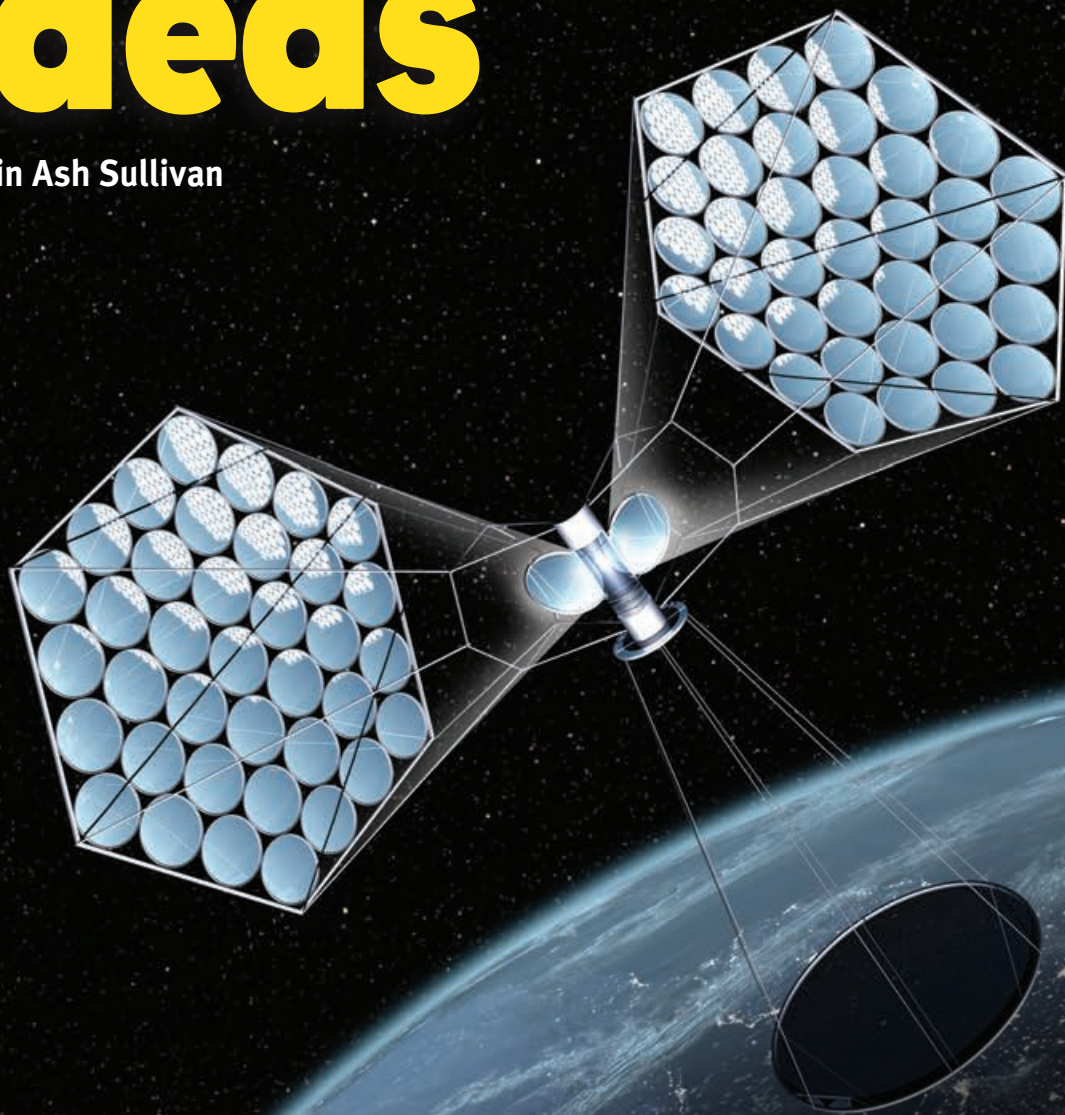


Opinions About New Energy Ideas

by Erin Ash Sullivan



**Which new energy technology
can best power the future?**

OPINION TEXT

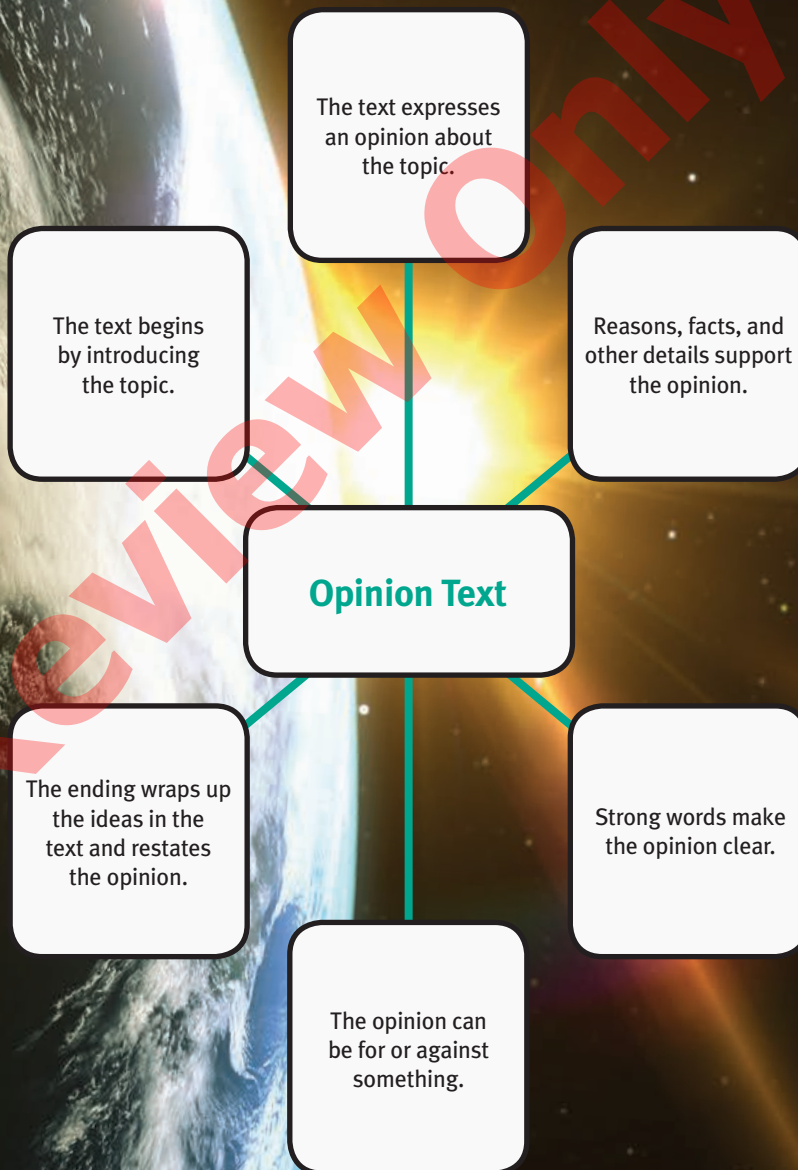
SCIENCE & TECHNOLOGY

Level **U/50**

Lexile® **930L**

Opinion Text

Look for the genre features noted below as you read this book. Use the features to help you understand the text.



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Powering Our Future

Every day, every minute, every second, electricity is used all over the world. When a light switch is flicked on, electricity powers the light. Electricity powers homes, schools, businesses, hospitals, airports, cars, buses, trains, and many other things people rely on in their daily lives.

Electricity is a form of energy. People convert different energy resources into electricity to power the modern world. People learned how to generate electricity in the late 1800s. Before then, they relied on fire for light and heat. They burned wood, wax, and plant and animal oils. These were the first energy resources.



▲ School hallways are lit with electricity.

▼ Computers are powered by electricity.



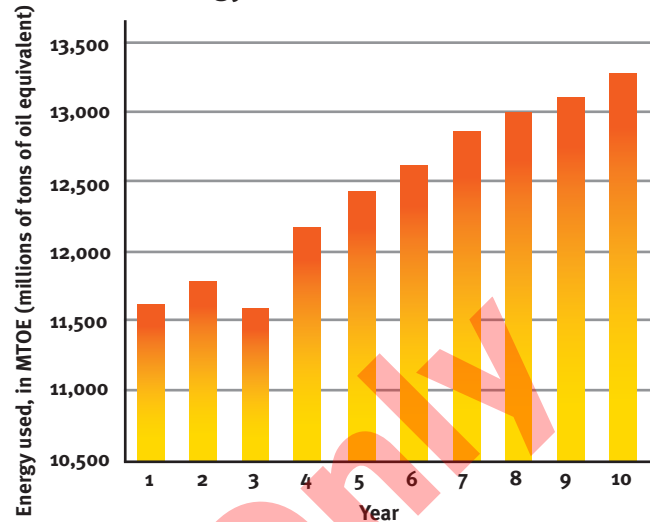


▲ Some cars are powered by electricity.

Over time, the use of electricity spread around the world. People began to rely on **fossil fuels**, such as oil, natural gas, and coal, to generate electricity. People began searching for more of these energy resources.

Today, the need for electricity grows every day. So the need for more energy sources also grows. In the past decade alone, the worldwide use of fossil fuel and other energy resources increased about 14 percent. As a result, scientists are trying to find new ways to meet the growing demand.

World Energy Use Over a 10-Year Period

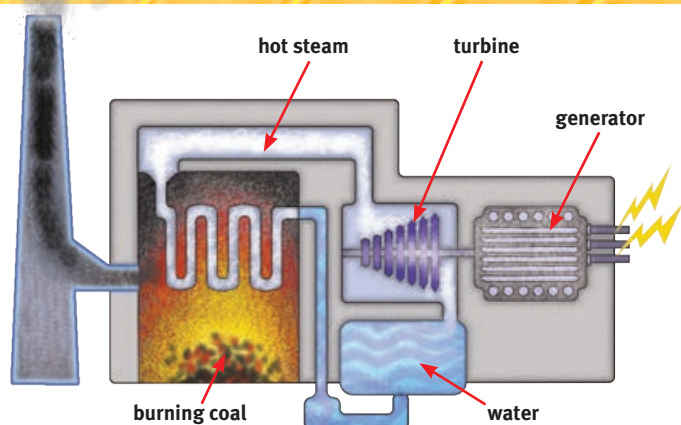


Source: BP Statistical Review of World Energy, 2017

The first chapter in this book tells about several new ways of collecting energy. The second chapter discusses different factors communities need to consider when changing to one of these new energy-collecting devices. The three opinion texts offer different opinions about which technology communities should choose. Read the chapters and opinions, and then form your own opinion.

How Do Fuel Sources Convert to Electricity?

Traditionally, people have burned fuel sources, such as wood, coal, or oil, to release the energy inside them as heat. This heat is used to boil water to make steam. This steam then turns a turbine and generates electricity.



Advances in Renewable Energy

For many years, the main sources of electricity have been coal, oil, and natural gas. These are **nonrenewable energy** sources. They take millions of years to form. They cannot be replaced at the rate at which people use them. They are also major sources of **pollution**. For these reasons, scientists are looking at using **renewable energy** instead.

Renewable energy comes from sources that never run out. Many renewable energy resources also produce much less pollution.

Space-Based Solar Power

Solar energy is energy collected from the sun. It is a renewable resource because the sun shines on Earth at all times. Washington Taylor is a physics professor at the Massachusetts Institute of Technology. He points out that 173 thousand terawatts (trillions of watts) of solar energy hit Earth continuously. That is about 10,000 times the amount of energy people use in one year.



- ▲ Coal is a nonrenewable energy source. It is mined from the ground. It takes millions of years to form.



- ▲ Solar energy is a renewable energy source. The sun's energy constantly radiates through Earth's atmosphere.

Solar energy is clean and quiet. It does not give off harmful gases. But there is one problem with solar energy. Earth-based solar panels are limited in how much they can collect. They cannot collect solar energy at night. They also cannot collect solar energy in cloudy weather.

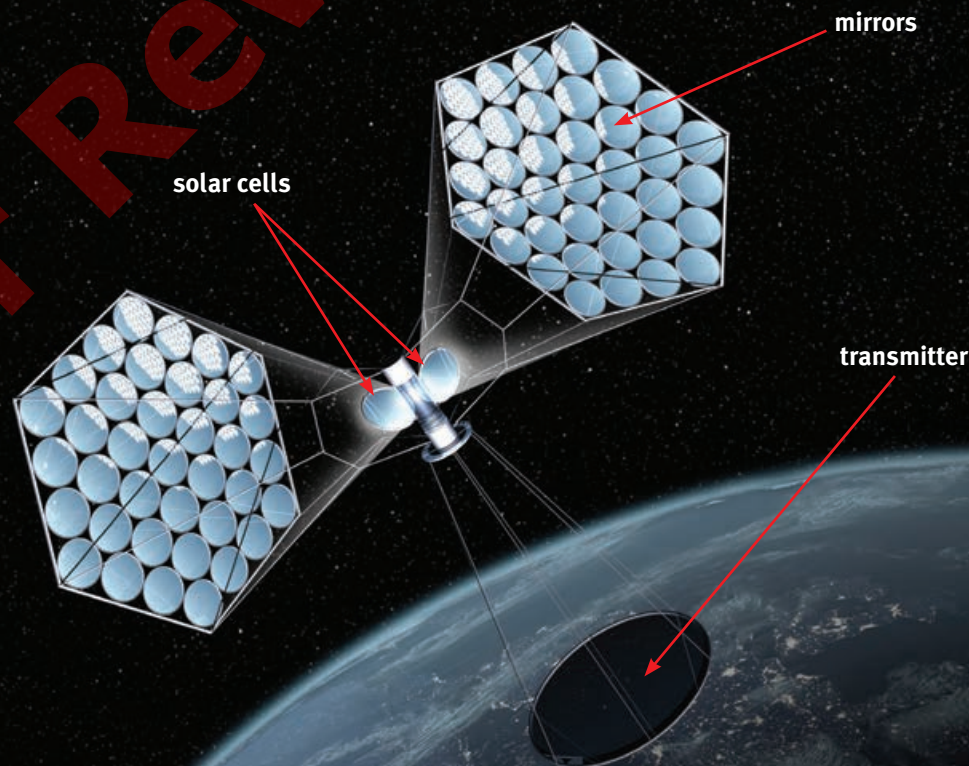
One solution may be space-based solar panels. These solar panels could be more effective than the ones on Earth. Why? In space, there is no weather—and no day or night.

Scientists predict that a **satellite** with solar panels could provide power to any place on Earth. It could even provide enough gigawatts (billions of watts) of energy to power an entire city, reports the U.S. Department of Energy.

A few countries have plans in place to use space-based solar power. But no solar-power satellites are currently in operation.

▼ **Sunlight hits the mirrors on the satellite. The mirrors reflect the sunlight onto the solar cells. The solar cells convert the sunlight into another form of energy. The transmitter sends this energy to Earth.**

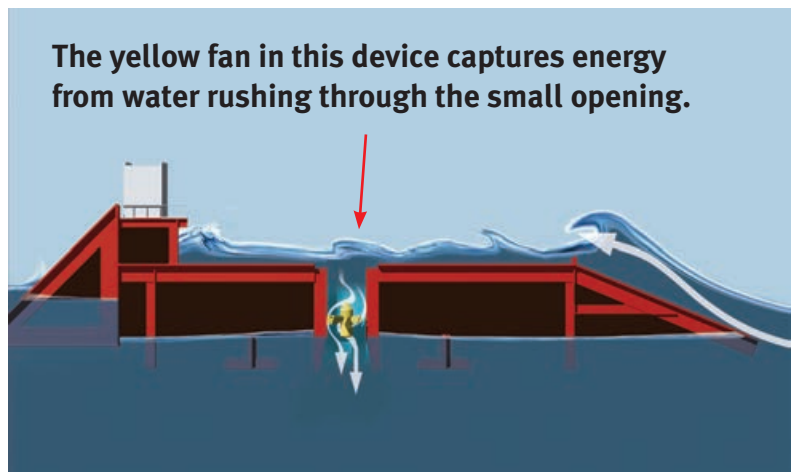
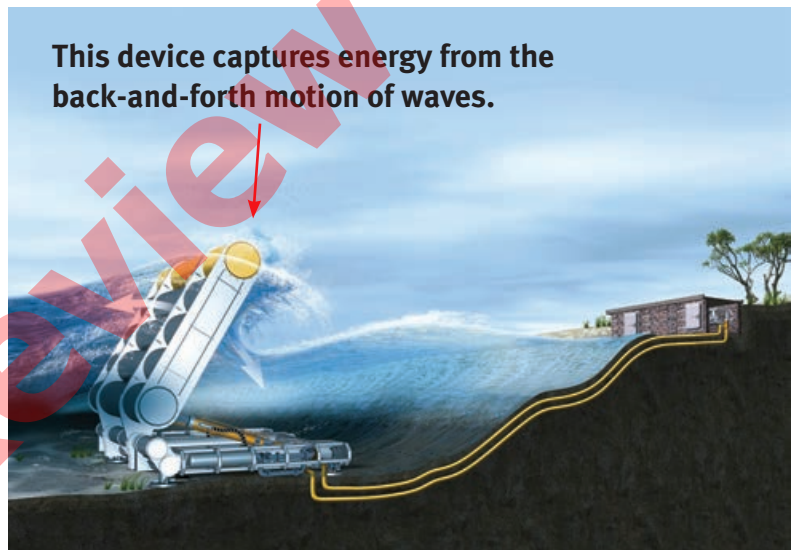
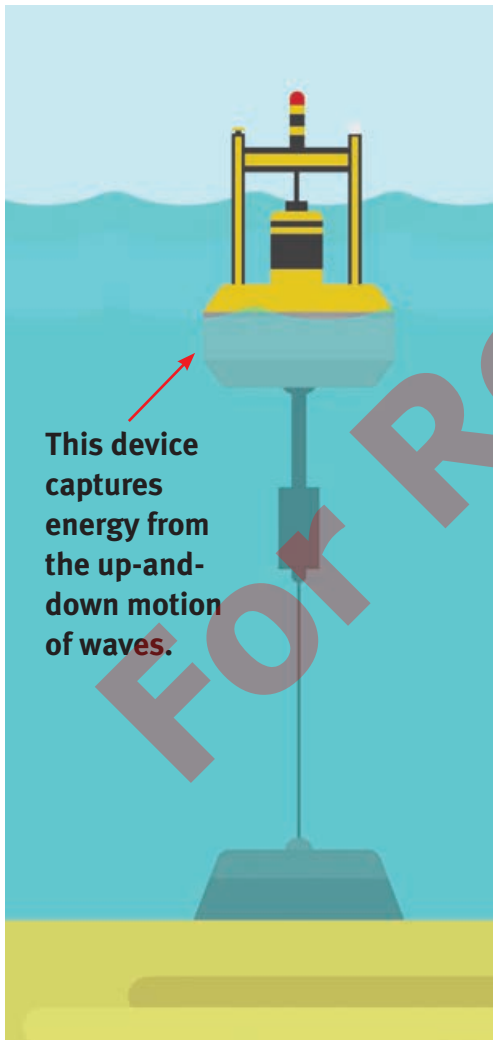
Space-Based Solar Power



Ocean Wave Energy Devices

Like solar energy, **ocean wave energy** is renewable. Waves occur when wind blows across the ocean's surface. New waves are always forming. The strength of ocean waves can change, but they all move with speed and force. This constant movement makes waves a good source of renewable energy.

Scientists have designed many different types of machines to capture and store ocean wave energy. Some machines float below the ocean's surface. These machines capture energy from the up-and-down motion of waves. Other machines capture energy from the back-and-forth motion of the waves on the ocean's surface. Some machines cause water to flow a certain way. These machines collect energy from that flowing water.





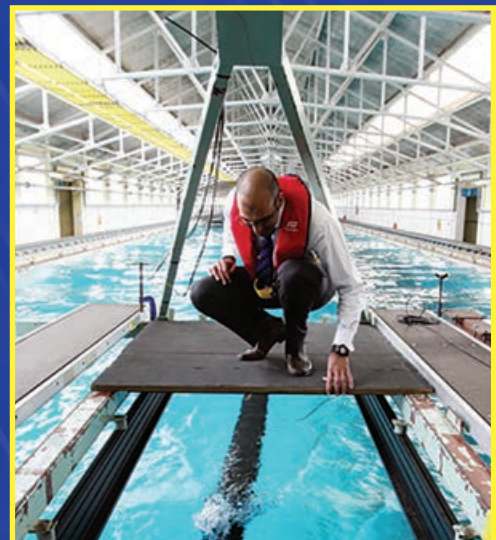
Ocean wave power can supply electricity to countries around the world. For example, the Ocean Energy Council reports that Chile, a coastal country in South America, could collect about 25 percent of the energy it needs from the waves near its coast.

Larger countries with longer coastlines could collect even more energy. The Electric Power Research Institute estimates that 1,170 terawatt hours of power per year could be collected along the coasts of the United States. That could support nearly one-third of the electricity used in the United States each year.

Careers in Science

Ocean Wave Energy Engineer

Ocean wave energy engineers design machines that convert wave movement into electric power. They use math and physics. They must understand tides, currents, and the patterns of movement of ocean waves. They spend some days in an office working on a design. Other days, they are in a laboratory testing their designs. And other days, they are out on the ocean, doing research. Many people in this career have a master's degree in science and engineering or a Ph.D.



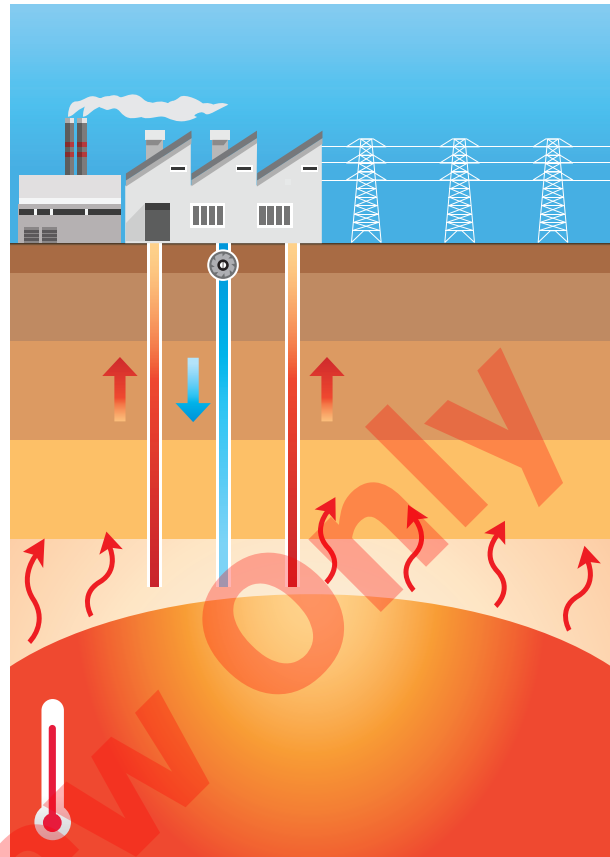
Geothermal Energy Plants

Geothermal energy is a renewable resource. It uses the heat and steam from Earth's interior to generate electricity. Earth's core and mantle are extremely hot. Scientists estimate the core is about 6,000 degrees Celsius (10,800 degrees Fahrenheit). Temperatures in the mantle range from 500°C to 4,000°C (932°F to 7,230°F). Water deep underground is heated to a high temperature, forming boiling-hot water and steam.

Geothermal energy plants on the surface drill deep into Earth's crust. They pull out the hot water and steam. Then they use the steam to power electric generators.

It is easiest to extract geothermal energy in places where there are earthquakes or volcanic activity. Even so, people are inventing new systems to find and use geothermal energy in other locations. The Union of Concerned Scientists calculates that geothermal energy could be used to power about six million homes globally each year.

This geothermal power plant is in Iceland. Many homes and businesses in Iceland are powered by geothermal energy. ►



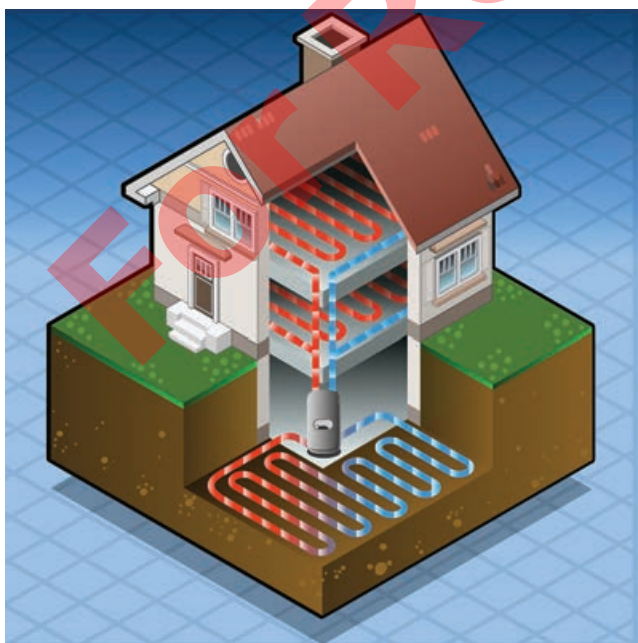
▲ **Hot water is pumped up to generators. The steam from the hot water spins a turbine, which generates electricity. The electricity is sent to homes and businesses through wires. The cooled water is sent back down.**



Heat Pumps

People in some areas today use geothermal energy to heat and cool buildings by using a heat pump system. Pipes are laid 1.2 to 1.8 meters (4 to 6 feet) below Earth's surface. At that depth, the temperature is always about 13°C (55°F). Water pumped through the pipes absorbs Earth's heat. Then a machine called a heat exchanger moves the heat from the liquid in the pipes to the air inside the building. It is an efficient way to heat the air to a comfortable room temperature.

In the summer, a reverse system goes into action. The water in the pipes absorbs heat from the air. Then the heat exchanger moves the heat to the water in the underground pipes.



▲ home geothermal heat pump system

Then and Now

Geothermal Energy



Two thousand years ago, people living in the ancient Roman city of Pompeii heated their water and their homes with geothermal energy. They connected pipes to the hot springs near Mount Vesuvius, a volcano.

Today, some people use a heat pump system to heat and cool their homes with geothermal energy.

