ENERGY
ALL AROUND
Energy All Around

by Buffy Silverman

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Think of the energy used to make your breakfast. A chicken used energy from its food to make eggs. Then the chicken laid the eggs. The eggs were stored in a refrigerator that uses electricity to stay cool. You turned on a stove that used energy to make heat to cook the eggs. Your body used energy to mix, chew, and digest the eggs.

Your body uses energy to do everything, including homework!
We get energy from many sources, including food and fuel.
What is energy? Scientists define energy as the ability to do work. For example, work occurs when something is moved, or when it is heated or cooled. Plants and animals need energy to grow, move, live, and reproduce.

Plants use the Sun’s energy to make food through a process called **photosynthesis**. All other living things depend on plants’ ability to turn the Sun’s energy into food energy.
Machines also do work. Bulldozers use energy stored in fuel to move.
Many scientists' work led to an understanding that energy cannot be created or destroyed. When we use energy, we change it from one form to another. All forms of energy belong to one of two groups: **potential energy** or **kinetic energy**.

*Potential energy is stored energy. Stretch a bow and it has potential energy. Release the bow and it shoots the arrow forward. The bow’s potential energy turns into energy of motion, called kinetic energy.*
In 1845, James Prescott Joule showed that heat, electrical power, and mechanical power are all forms of energy. He also showed that one form of energy can be changed into another. In 1847, Hermann von Helmholtz proved that when energy changes form, the total amount of energy stays the same.

Logs have potential energy stored inside them. Make a campfire and that energy is turned into heat energy.
Visit a beach on a summer day. The Sun’s rays heat up the sand. The heat energy in sand moves to your feet and warms them.
You run across hot sand and splash into cold water. Now your feet cool down. The heat from your feet moves into the cooler water. Heat energy flows from hot objects to cooler objects.

A thermometer measures the temperature of an object. This thermometer shows two different scales. Fahrenheit (F) is the official temperature scale in the United States, and Celsius (C) is the official temperature scale of most other countries.
A **solar** collector uses the Sun’s energy to heat water or air. Sun shines on a dark-colored collector. The dark surface absorbs light energy and turns it into heat. Water-filled pipes run through the collector. As the collector heats up, heat moves into the water and warms it. People use the hot water for washing and bathing.

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**Solar Energy**

Energy from the Sun is called solar energy. It is a renewable form of energy, which means that it can be replaced in a short time period.
solar collector
solar collector
Sun's energy
water pipes
Motion Energy

Everything that moves has motion energy. Wind, water, cars, airplanes, and people have motion energy. Imagine finding a rock on top of a hill. The rock has potential energy because of its height and the pull of gravity. You use energy to push the rock and set it in motion. Then the rock tumbles down the hill. If the rock crashes into a fence, it releases its energy all at once. It may knock the fence down!

Before they fell, the loose rocks had potential energy. As they were falling they had motion (kinetic) energy.
1. Motion energy from wind turns the blades on a wind turbine. The blades turn a shaft, which spins a generator inside the turbine. The generator makes electricity.

2. The electricity travels through a transformer (equipment that changes electrical power from one voltage to a different voltage), to a substation.

3. The substation increases voltage for transmission over long distances.

4. Electricity is transmitted to the grid for our use.
Water rushing down a river has enough energy to carry rocks and carve riverbanks. People use this motion energy to make electricity. A dam at a **hydropower** plant stops a flowing river. Water behind the dam collects in a reservoir. When water is released, it falls over a turbine and spins a magnet inside coiled wires. This motion makes electricity.
Hydropower is energy from falling water. Thousands of years ago, people used moving water to grind wheat into flour. Today, hydropower is used to generate electricity.
Most of the energy we use comes from fuels like petroleum, natural gas, and coal. These fuels are called **fossil fuels**. They formed from the remains of dead plants and animals. After being buried for hundreds of millions of years, the fossils turn into fuel. Chemicals in these fuels store energy.

Fossil fuels are called nonrenewable energy because they cannot be replaced in a short time period. When fossil fuels are burned, potential energy from ancient plants and animals is changed into heat energy.
1. 300 million years ago, many plants died in swamps.

2. Over millions of years, the plant remains were buried under water and mud. Ancient oceans dried up or receded.

3. Heat and pressure turned the dead plants into coal.
The food that we eat is also a kind of fuel energy. Like fossil fuels, our food comes from plants or animals. The amount of potential energy in food is measured in **calories**. Our bodies break down food to give us energy. Every second of every day, we use energy. Energy lets us grow, sleep, think, talk, run, and read. Like all living things, we need energy for everything we do.

*Your body breaks down and digests food to get energy to live and grow.*
We use a lot of energy when we run fast on a soccer field. The more we move, the more calories we burn!
Show What You Know

1. What is energy?

2. Why do your hands warm up when you hold a mug of hot cocoa?

3. How long does it take for coal to form?
**Glossary**

**calories** (KAL-uhr-eez): the unit that measures the amount of energy in food

**electricity** (i-lek-TRISS-uh-tee): form of energy caused by movement of an electric current

**fossil fuels** (FOSS-uhl FYOO-uhls): fuels formed from the remains of plants and animals that lived hundreds of millions of years ago; coal, oil, and natural gas are fossil fuels

**hydropower** (HYE-druh-POW-er): electrical energy generated from running water

**kinetic energy** (ki-NET-ik EN-ur-jee): energy resulting from motion

**photosynthesis** (foh-toh-SIN-thuh-sis): the process by which plants make their own food using the Sun’s energy

**potential energy** (puh-TEN-shuhl EN-ur-jee): the energy stored in something determined by its position or chemical structure

**solar** (SOH-lur): having to do with or coming from the Sun
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Websites to Visit

- www1.eere.energy.gov/kids/
- www.eia.gov/KIDS/ENERGY.CFM?PAGE=4

About the Author

Buffy Silverman writes science and nature books for children. She likes to use her energy hiking in the woods near her home.

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