

## Reflect

Take a moment to think about three common objects: a flashlight, a computer, and a toaster. A flashlight provides light. A computer stores information and displays it on a screen. A toaster cooks food. They each do a different job. But these items have something in common: Each uses at least one type of energy. You have probably heard of the word energy, and you use energy every day, but what exactly is energy?

### What is energy? What are some different forms of energy?

Sometimes, it is easier to explain what energy does than to define what it is. Unlike matter, energy is not something you can see. Energy is the ability to do work or cause change. All matter has some form of energy. Whenever a flashlight is lit, a computer is turned on, or a toaster cooks food, you can be sure that energy made it happen.



Because of its position above the ground, this ball has a large amount of potential energy.

There are two main forms of energy: the energy of motion and the energy of position. The energy of motion is called **kinetic energy**. Any object that is in motion has kinetic energy. Think about a ball rolling down a ramp. The ball is moving, so it has kinetic energy. On the other hand, the energy of position is called **potential energy**. If a ball is placed at the top of a ramp and is at rest, it has a lot of potential energy. If the ball is at rest at the bottom of the ramp, it still has potential energy. However, it has less potential energy than it did at the top of the ramp, it is often helpful to think of potential energy as stored energy, or what could happen.

These two main forms of energy—kinetic and potential energy—cover most types of energy, such as mechanical, thermal, electrical, light, and sound energy. You will learn more about these types of energy next.

**kinetic energy:**  
energy of motion

**potential energy:**  
energy of position

## Look Out!

Sometimes energy may seem to disappear. For example, what happens to the energy in a moving car when the car stops moving? In fact, the energy does not disappear; it simply changes its form from kinetic to potential energy. Energy can be moved from one object to another, and it can be changed from one form to another. However, energy can never be created or destroyed.



Moving water has kinetic energy.

## Reflect

### How can we use different energy forms?

**Mechanical energy** is the energy that an object (or group of objects) has because of its motion and its position. As such, mechanical energy includes both the kinetic and potential energy of an object. As different parts of the object alternate between motion and rest, the form of energy in the object cycles between potential and kinetic. One example of mechanical energy can be seen when a person is riding a bike. The mechanical energy of the bike helps the person travel from one place to another. Other examples include a spinning top, a moving car, and flowing water. In a world full of motion, mechanical energy is all around us!

**Thermal energy** is the energy that can be felt as heat. Thermal energy comes from the movement of tiny particles in matter. The faster the particles move in matter, the more thermal energy the matter has and the more heat we feel. Thermal energy is sometimes called heat energy. Using an oven to bake a cake or using fire to roast marshmallows are examples of applying thermal energy.



Electrical energy travels through the wires of this toaster and generates thermal energy to toast bread.

Many household appliances, like washing machines, refrigerators, and dishwashers, need electrical energy in order to work. **Electrical energy** is a form of energy caused by the movement of **electrons**. In machines and things powered by electrical energy, electrons move along a path called a circuit.

**electrons:** tiny particles that have electrical charge

Conductors are materials that allow these electrons to flow easily. Copper and aluminum wires are good conductors. You will learn more about circuits and conductors in a later lesson. The important thing to remember now is that electrical energy is often used to generate other forms of energy.

Two other types of energy are light energy and sound energy. **Light energy** can travel through empty space, air, and even some objects like windows. People can see some forms of light energy. To sense or detect other forms of light energy, we need special tools. **Sound energy** travels through matter by vibrating the particles. Sound energy cannot travel through empty space like light energy can. Sometimes, we can hear sound energy. Think about a television. You can see the light energy from the screen and hear the sound energy from the speakers.

## Look Out!

You might wonder why sound is considered a type of energy. Remember, any matter that is in motion has energy. Sound is produced when an object vibrates, and vibration is a type of motion.

## What Do You Think?

Look at the pictures below. The picture on the left shows thermal and light energy. The center picture shows mechanical energy. The picture on the right shows electrical, light, and sound energy. What are some objects you depend on every day that use these forms of energy?



## Try Now

Take some time to explore different types of energy. You will need a working flashlight to complete the activity.

1. Hold your hands together with your palms touching. Describe how your hands feel. Are they cold or warm?
2. Rub your hands together as fast as you can for about 20 seconds. Describe how your hands feel now. Are they warmer? Why do you think this is so?
3. Observe the flashlight while it is turned off. Does it have potential energy? How do you know?
4. Turn on the flashlight. What forms of energy can you observe? (Use caution when handling the flashlight because the bulb can get hot!)



### Looking to the future: How do we store energy?

We use many types of energy every day. As the number of people living on Earth grows, our need for energy grows, too. Scientists are always looking for new ways to use different types of energy or to change from one type of energy to another, more useful type. But what happens when we find it? How do we “store” that energy for use in the future?

Make a list of ideas and thoughts about how we store energy today.

## What Do You Think?

Energy is the ability to do work or cause change. Energy comes in different forms and may change from one form to another.

Study the photographs below, and read the descriptions of how energy is being used. Match each description with the correct photograph. Write your answer in the space below each photograph.

### Energy in Action

- Electrical energy is changed into thermal energy and light energy.
- Electrical energy is changed into mechanical energy.
- Mechanical energy is changed into thermal and light energy.
- Mechanical energy is changed into sound energy.



### Uses of Energy Close to Home

To help your children learn more about uses of energy, spend some time looking around the house for examples of energy in action. Have them make a list of objects they use every day that require or use energy.

Ask them to rate the importance of each object on a number scale, with one being the most important. Some common examples include lamps, computers, appliances, clocks, sports balls, and toys that move such as remote control cars. Discuss how each object uses energy and which form(s) of energy it uses.

Take your child on a walk outside and ask them to look for other examples of energy they can observe. Birds flying, water flowing, and crickets chirping are some examples you might encounter. Ask them to describe the different forms of energy in each example they find outside. Encourage them to be specific and to describe the importance of each form of energy to the organism that uses it. For example, they may explain that a bird is using mechanical energy to move across the sky because it needs to find food. They may also explain that a bird is using sound energy to communicate with other birds in order to mate.

Here are some questions to discuss with your child:

- What form of energy do you consider most important in your life? Why?
- What are some ways that you can reduce the amount of energy you use?
- How might you be affected if you could not use certain forms of energy, like electrical energy?
- Do other organisms use the same forms of energy as humans? Give some examples.