SYSTEMS & SCALE

ELEMENTARY SCHOOL

STUDENT PAGES

(Reading)

Environmental Literacy Project

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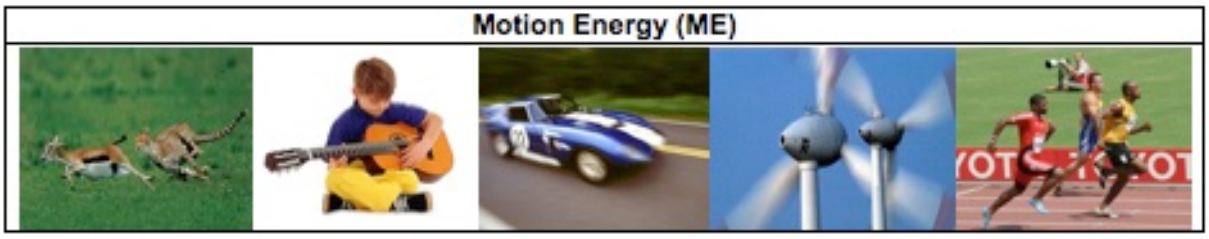
Reading: Forms of Energy



Look around you. Many things are moving. They are in motion. Clouds drift across the sky. Leaves fall from the trees. A car speeds by. Birds fly. Whenever there is motion, we "see" **motion energy**. Holland is using **wind energy**, because it is clean and does not cause global warming. Wind energy is a kind of motion energy, because wind is moving air. Sound has energy. **Sound energy** is a special kind of motion energy. It is caused by vibration – the back and forth motion of air molecules.

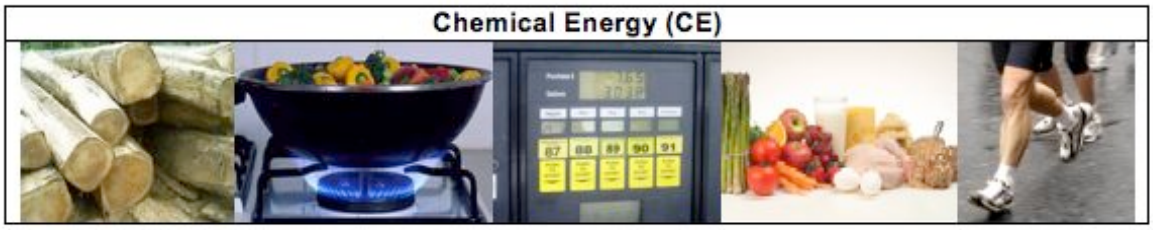
Can you think of other examples of kinetic energy that you see every day?

We use light every day. We use it to see things. Without light, our lives would be very difficult. Light helps our life more than just to help us see things. Sunlight helps plants grow. Doctors use special light to perform surgery. Light has **light energy**. When the lamp is turned on, it gives off light energy. When a candle is burning, the flame gives off light energy.

The light energy from the sun is sometimes called **solar energy**. The sun is a giant ball of burning gas. It gives off light all the time. It will keep shining and giving us energy for millions of years. Plants capture and use light energy to make their own food. Scientists have also invented ways to use light energy. *Solar collectors* on house roofs can

capture light energy and use it to heat the water in the house. *Solar cells* on cars and house roofs can also capture light energy and use it to make electricity.

Can you think of other examples of light energy that you see every day?

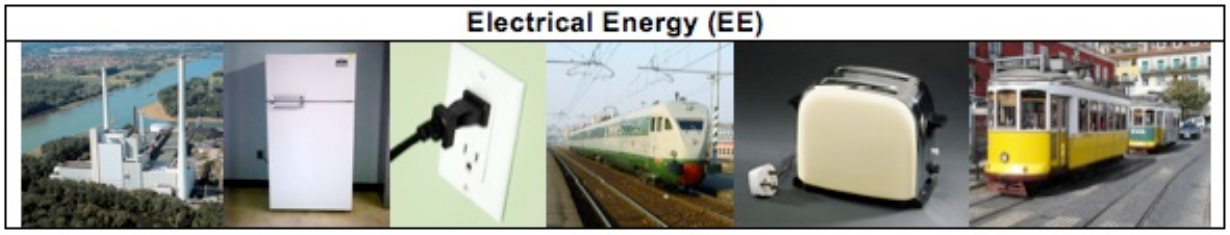


Chemical energy is the energy stored in some special materials. Foods, fuels and body parts of all living things are made of materials that contain chemical energy.

All living things are made of cells. The food we eat has chemical energy that helps power our cells. The chemical energy in food helps cells do their jobs in our bodies. Chemical energy helps muscles cells work when we run. It helps brain cells work when we think. Chemical is very important for our bodies.

Like food, fossil fuels are another special material with chemical energy. Fossil fuels come from plants and animals living millions of years ago. The plant and animals were buried underground. Over long periods of time, they turned into fossil fuels. There are three types of fossil fuels – oil, natural gas, and coal. We use fossil fuels everyday. Our cars are powered by gasoline. We use methane for cooking. We use propane to barbecue and heat homes.

Can you think of more examples of things that have chemical energy?



People use electricity everyday. Your family uses many electrical appliances at home. You may watch TV after dinner. Your parents may use a laptop for work. You may use a toaster to toast bread or use a microwave oven to warm your food. To make these machines work, you plug them into an outlet on the wall. What the machines get from the outlet is electricity.

We not only use electricity to power our homes, school, or other buildings, but also use it for transportation. Electric trains or subway trains have engines that run on electricity. These engines get electricity through a metal rail under the train, or from wires at the top of the train.

Electricity has **electrical energy**. Electricity is generated by different types of power plants. Wind power plants use wind to generate electricity. Nuclear power plants split uranium atoms to make electricity. Hydropower plants use the energy of moving water to make electricity. Fossil fuel fired power plants burn fossil fuels to generate electricity. In the United States, about 51% of our electricity comes from burning coal.

Do you know where your electricity comes from? What type of power plant sends electrical energy to your home?

Heat

When you run a car for a while, the front of the car becomes very hot. When a flame from a candle or a campfire is burning, you can feel the warmth. When you are exercising, you also feel very hot. Even when you are playing outside on a cold winter day, your body stays warm. Your body temperature always stays close to 98.6°. In all these events, **heat** or heat energy is released. **Geothermal energy** is the heat within the earth. Geothermal power plants use the steam or hot water from the earth to generate electricity. Heat is a special form of energy. Whenever changes happen, heat is *always* given off to the outside of the system. Unlike light energy and chemical energy, heat cannot be “caught” by any living organism to help their body function or to help them move.

Reading: Air is Mixture

We speak of air as light, “airy,” or even as nothing. But what is air made of? Today you will learn more about the different materials that make up air.

Air is a type of matter. Air takes up space and has weight. The air around us is made of mostly gases, but it also includes some liquids like water droplets, and solids like dust. This is why we call air a mixture.

A mixture is a material made from more than one thing. A milkshake is a mixture. It contains many types of liquids, like milk and strawberry syrup. It also has tiny solid pieces of ice in it.

Can you think of other things that are a mixture?

Like the milkshake, air is also a mixture of different materials. It is a mixture of gases. What makes up air changes from moment to moment and place to place, but about 78% of air is made of a gas called nitrogen. About 21 % of air is made of oxygen gas, and about .03% of air is made of carbon dioxide gas. There are other gases in air, such as hydrogen, helium, and argon. Water vapor is also a gas found in air.

There are other things found in air, including dirt, germs, bacteria, smoke, and many others. Most things you can see in the air, like dust or smoke, are made of solids.

Things can change the mixture of air around them. First you will read about the different gases that make up air. Then you will share your ideas about how plants, animals, decomposers, and flames change the air around them.

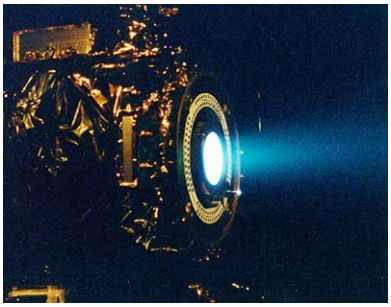
Reading: Gases That Make Up Air

Oxygen

All plants and animals need oxygen to live. Oxygen makes up 21% of the air in our atmosphere. This gas helps people stay alive. When people are in the hospital, they might wear an oxygen mask that gives them even more oxygen to breathe than they would get from normal air.

Carbon Dioxide

Carbon dioxide is a gas that all living things give off into the air. This gas makes up less than 1% of the air in our atmosphere, but it is a very important gas. When we burn gasoline in our cars, carbon dioxide gas is given off into the air. When we burn wood and candle, carbon dioxide is also given off.



Nitrogen

There is a lot of nitrogen gas in our atmosphere. Nitrogen makes up 78% of the molecules in the air around us. Some rockets give off nitrogen gas. Satellites that orbit Earth also use nitrogen gas to move around space.

Water Vapor

Water vapor is one of the three states of matter for water. It is the gas form of water. Water vapor molecules make up 0-3% of the air in the atmosphere. Water vapor gas is invisible but when these gas molecules condense they form tiny droplets that we can see as steam, fog, or clouds.