

Energy



TV



Girl



Raindrop



Car



Corn

Energy makes change.

Energy

TEACHER

What is Energy?

Energy makes change—it produces a change of some kind; it does things for us. We use energy to move cars along the road and boats over the water. Energy is used to bake a cake in the oven, and to keep ice frozen in the freezer. It provides power so we can listen to our favorite songs on the radio, and light our homes. Energy makes our bodies grow and allows our minds to think. Scientists define energy as the ability to do work.

Energy is found in many different forms such as **light, heat, motion, sound, and growth.**

Discussion Questions

1. What changes occur with the objects in the pictures (on page 1)?
2. Where does the girl get her energy? (*food that she eats*) How is she using energy? (*to move, see, hear, think, stay warm or cool*)
3. Where does the television get its energy? (*electricity*) What kind of energy does it make? (*sound, light, heat*)
4. Where does the car get its energy? (*battery and gasoline*) What kind of energy does it make? (*motion, sound, heat*)
5. Where does the rain get its energy? (*the sun and gravity drive the water cycle*)
6. Where does the corn get its energy? (*light from the sun*)

Activity

1. Look around the classroom and point out things that are using energy. (*computer, clock, lights, plants, animals*) Decide where each item gets its energy and how it uses it.

Light



Light Emitting Diode (LED)



Sun



Flashlight



Candle

Light makes change. Light is energy.

Light

TEACHER

Light is Energy

We use **light energy** every day. We use it to see things. Without light, our lives would be very different.

We use light energy for more than seeing. The energy in light helps plants grow. Doctors use special light to help in surgery. We can also use light to make products and electricity.

What is light? Light is energy that travels in **waves**. All the energy we get from the sun travels in waves or **rays**. Some of that energy is in light waves we can see—it is **visible light**.

Discussion Questions

1. How do the things in the pictures (on page 3) make light?
2. Why is light important to us?
3. What other things make light?
4. How is the light from the moon produced? (*Sunlight is reflected from the surface of the moon.*)
5. What is life like at home at night when the power goes off and you have no light?

Activities

1. Have the students close their eyes and imagine a world without light.
2. Turn down the lights in stages (and close the blinds) and notice the effect on what you can see.

Heat



Fire



Hairdryer



Iron



Grill

Heat makes change. Heat is energy.

Heat

TEACHER

Heat is Energy

We use **heat**, called **thermal energy**, every day. We cannot see heat, but we can feel it. Our bodies make heat, and our stoves and lights do too. We heat our houses, our food, and our water.

Sometimes there is too much heat and we move it. Refrigerators take heat away from the food inside. Air conditioners take heat from inside the house and move it outside. Swimming pools take heat from our bodies, so more people in a pool will make the temperature go up!

Discussion Questions

1. How do the things in the pictures (on page 5) make heat?
2. How is heat important to us?
3. What other things make heat? (*toaster, pets, clothes dryer, TV, oven, etc.*)
4. How do jackets help keep us warm? (*They hold in the heat from our bodies.*)
5. How do you keep your house warm in the winter? (*Turn on a heating system.*)

Activities

1. Have the students rub their hands together quickly to feel the heat produced by friction.
2. Have the students put one hand in the sun and one in the shade and feel the difference as the sunlight hits their skin and turns into heat.

Motion



Racing
Sailboats



Playing soccer



Drill



Ant

Motion is change. Motion is energy.

Motion

TEACHER

Motion is Energy

Look around you. Many things are **moving**. They are in **motion**. Motion is a change in an object's position. Clouds drift across the sky. Leaves fall from trees. A car speeds by. Birds fly. Hearts pound. Bells ring. Babies cry. Plants grow and so do you. The Earth moves, the air moves, and so does every living thing.

All of this motion takes energy. Nothing can move without energy. Cars get their energy from gasoline. The clouds move because of energy in the wind. The wind gets its energy from the sun. So do growing plants. All of your energy comes from the sun too.

Discussion Questions

1. Where do the things in the pictures (on page 7) get the energy to move?
2. What gives you the energy to move? (*The energy in the food you eat—which comes from the sun as plants absorb light.*)
3. What makes a ball roll down a hill? (*Gravitational potential energy—the force that pulls objects toward each other.*)

Activities

1. Have the students think of all the things moving within their bodies even when they are holding very still.
2. The forces of push, pull, and gravity are responsible for putting an object in motion. Take students to the playground. Have students identify the forces at work and types of motion as they play.

Sound



Drums



Phone



Radio



Bird

Sound is change. Sound is energy.

Sound

TEACHER

Sound is Energy

Energy is moving around you all the time—energy in the form of **sound waves**. Sound waves are everywhere. Even on the quietest night you can hear sounds. Close your eyes, hold very still, and listen for a moment. How many different sounds can you hear?

Sound is a special kind of kinetic, or motion, energy. Sound is energy vibrating through substances. All sounds are caused by **vibrations**—the back and forth motion of molecules. The molecules collide with each other and pass on energy as a moving wave.

Sound waves can travel through gases, liquids, and solids. The sounds you hear are usually moving through air. When a sound wave moves through air, the air molecules vibrate back and forth in the same direction as the sound. The vibrations push the air molecules close together, then pull them apart.

Discussion Questions

1. How do the things in the pictures (on page 9) make sound?
2. How is sound important to us? (*communication, music, entertainment*)
3. What makes some sounds pleasant and some unpleasant? (*pitch, volume, personal choice*)
4. How does your throat make sounds? (*The muscles in your chest push air past your vocal chords, making them vibrate.*)

Activities

1. Have the students feel their throats while humming to feel the vibrations.
2. Have the students explore the range of sounds they can make with their voices.
3. Have the students tap different objects with a pencil and notice the difference in the sounds.

Growth



Puppies



Baby



Child



Woman

Growth is change.
Energy makes things grow.

Growth

TEACHER

Growth is Energy

Every living thing is growing all the time. Sometimes living things grow bigger. Sometimes they do not get bigger, but they still grow. They grow new cells to replace old ones.

It takes energy to grow—**chemical energy** stored in simple sugars. The energy to make these sugars comes from light energy. Most of this light energy comes from the sun. Plants absorb the light energy and store it in their leaves, stems, fruits, and roots as chemical energy. They use the energy to grow. When we eat the plants, we absorb the chemical energy. When we eat animals we absorb their chemical energy that came from the plants they ate.

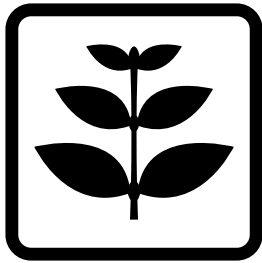
Discussion Questions

1. How do the things in the pictures (on page 11) get their energy to grow?
2. Can you get energy straight from the sun to grow? *(No, but plants can.)*
3. What happens if you eat more food than you need? Not enough food?

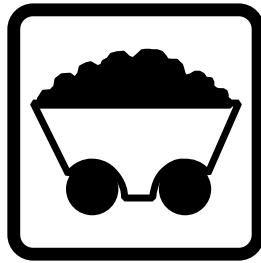
Activities

1. Have the students draw an energy flow from a carnivore (meat eater) back to the sun.
2. Look on packages of food at the calories. Calories are a measure of the energy in the food.

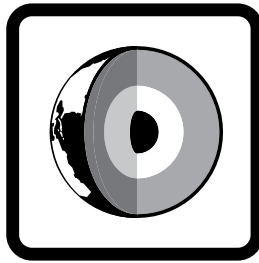
Energy Sources



BIOMASS



COAL



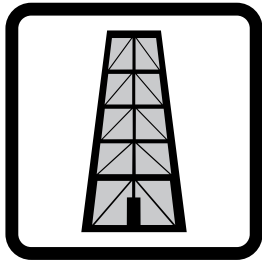
GEOTHERMAL



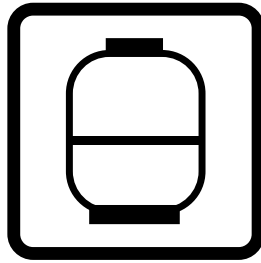
HYDROPOWER



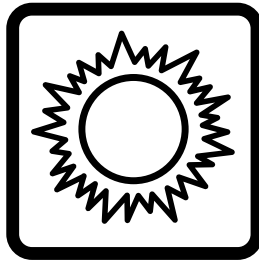
NATURAL GAS



PETROLEUM



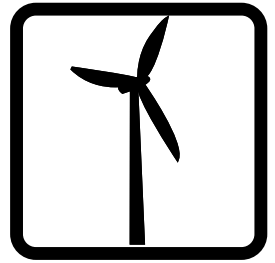
PROPANE



SOLAR



URANIUM



WIND

We use many energy
sources to do work.

Energy Sources

TEACHER

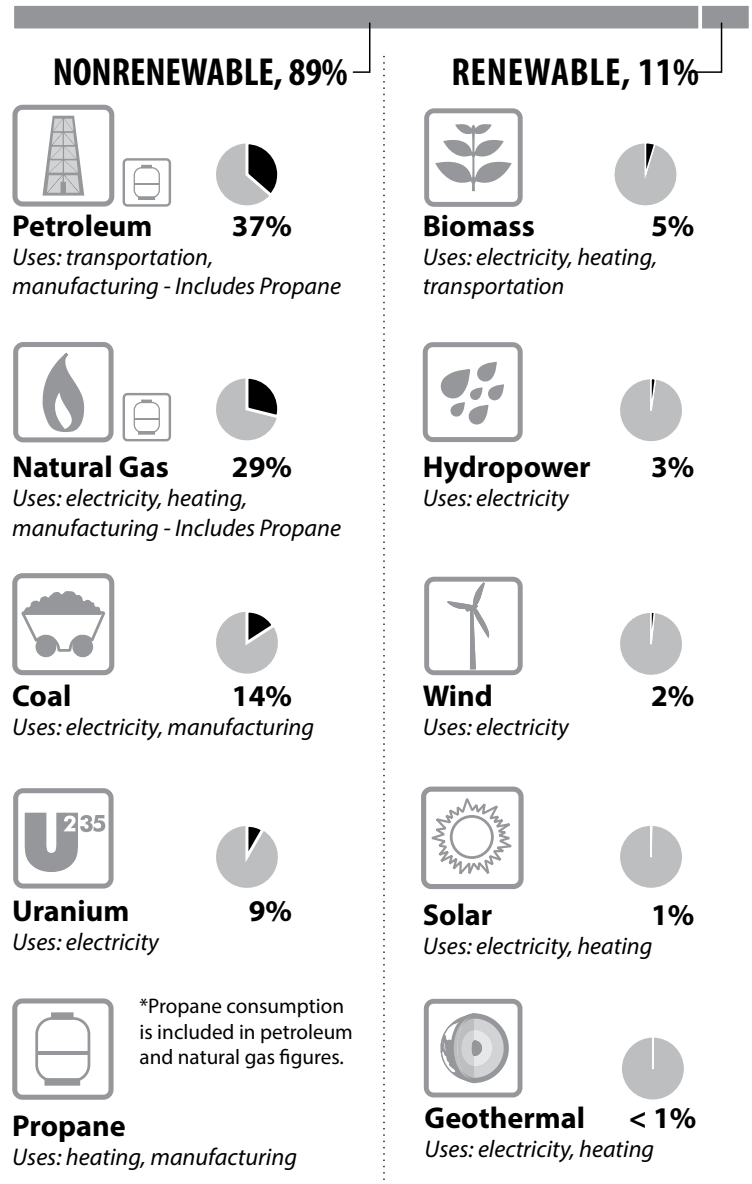
We use many different energy sources to do work for us. Energy sources are classified into two groups—nonrenewable and renewable. In the United States, most of our energy comes from nonrenewable energy sources. Coal, petroleum, natural gas, propane, and uranium are nonrenewable energy sources. They are used to make electricity, to heat our homes, to move our cars, and to manufacture all kinds of products.

These energy sources are called **nonrenewable** because their supplies are limited. Petroleum, for example, was formed hundreds of millions of years ago from the remains of ancient sea plants and animals that lived prior to dinosaurs. We cannot make more petroleum in a short time.

Renewable energy sources include biomass, geothermal energy, hydropower, solar energy, and wind energy. They are called **renewable** energy sources because they are replenished in a short time. Day after day the sun shines, the wind blows, and the rivers flow. We use renewable energy sources mainly to make electricity.

Electricity is different from the other energy sources because it is a **secondary source of energy**. We have to use another energy source to make electricity. In the United States, natural gas is the number one energy source for generating electricity.

U.S. Energy Consumption by Source, 2017



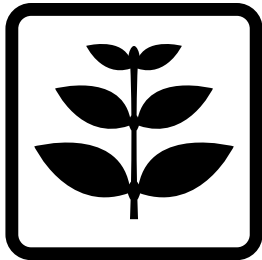
Data: Energy Information Administration

*Total may not equal 100% due to independent rounding.

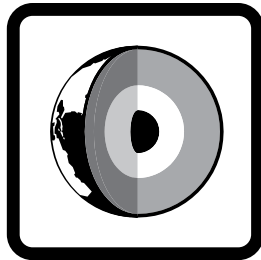
Renewable

Re - NEW - a - ble

Able to be NEW again



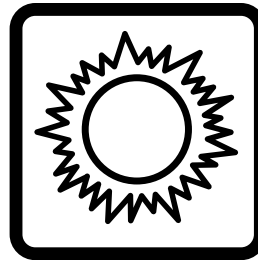
BIOMASS



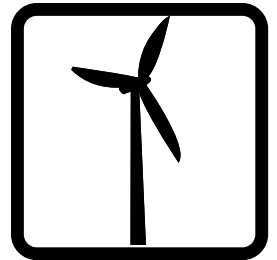
GEOTHERMAL



HYDROPOWER



SOLAR



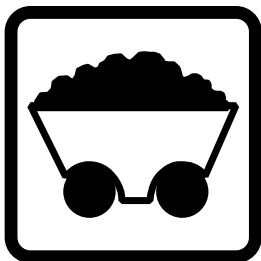
WIND

Some energy sources can
be made again quickly.

Nonrenewable

NON - re - NEW - a - ble

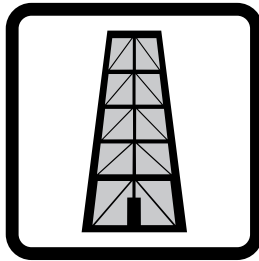
NOT able to be NEW again



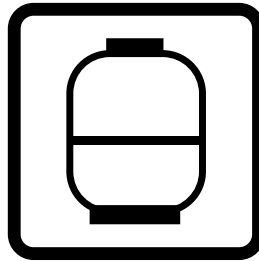
COAL



NATURAL GAS



PETROLEUM



PROPANE



URANIUM

Some energy sources take
millions of years to form.