

Introduction to Energy

The wind is energy, but what is **energy**? Energy is many things. Energy is light. Energy is heat. Energy makes things grow. Energy makes things move. Energy runs machines. Energy is the power to change things. Energy is the ability to do **work**.

Energy is Light

We use light energy to see. Most of our light comes from the sun. In our homes and schools we use electricity to power lights. Flashlights use batteries to produce light.



Energy is Heat

We use energy to make heat. We burn fuel to cook our food. The food we eat helps our bodies stay warm.

When it is cold outside, we use energy to heat our homes. A campfire makes heat, too. Factories burn fuel to make the products they sell. Some power plants burn coal to make electricity.



Energy Makes Things Grow

All living things need energy to grow. Plants use light from the sun to grow. Plants change the sun's energy into **sugar**. The sugar is stored in their roots and leaves, and provides nourishment for the plant. This process is called **photosynthesis**.

Animals cannot change light energy into food. Neither can people. We eat plants and use the energy stored in them to grow.



Energy Makes Things Move

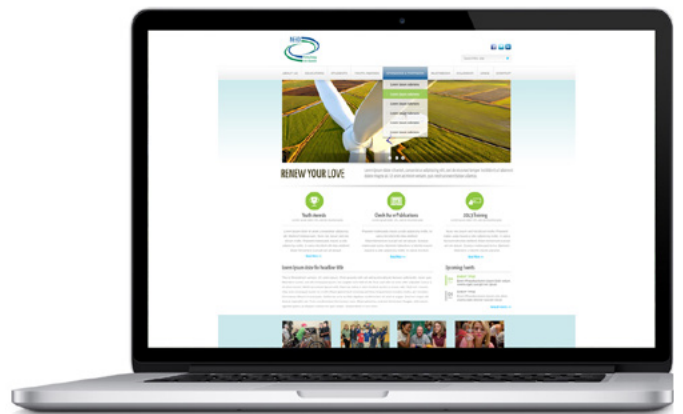
Look around you. Many things are moving. They are in motion. Clouds drift across the sky. Leaves fall from trees. Birds fly. Plants grow and so do you. The Earth moves. The water moves. The air moves. Every living thing moves, too.

It takes energy to make things move. Cars use the energy in gasoline to move. Many toys run on the energy stored in batteries. Sailboats are pushed by the energy in the wind.

Energy Runs Machines

It takes energy to run our TVs, video games, computers, and microwaves. This energy is **electricity**. We use electricity every day. It gives us light and heat. It runs our toys and appliances. What would your life be like without electricity?

We make electricity by burning coal, oil, gas, and even trash. We make electricity from the energy that holds atoms together. We make electricity with energy from the sun, the wind, and falling water. Sometimes, we use heat from inside the Earth to make electricity.



Energy is the Power to Change Things

When we use energy, we don't use it up. We change it into other forms of energy. When we burn wood, we change its energy into heat and light. When we drive a car, we change the energy in gasoline into heat and motion.

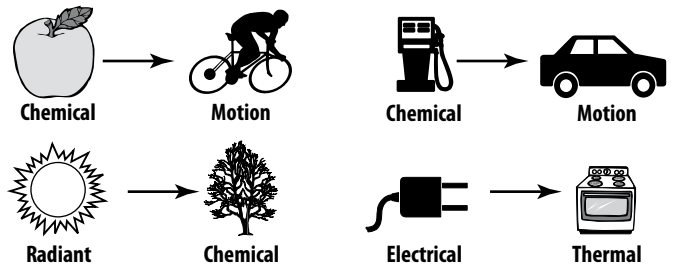
Energy is the Ability to Do Work

Work means many things. Many adults leave the house every morning to go to work. They go to their job. Physical exercise is often called working out. Your teacher gives you homework to do. You might think that work is the opposite of play. But in science, work has a special meaning. Work is using **force** to move an object across a **distance**. To do work, there must be energy. Energy is the ability to do work.

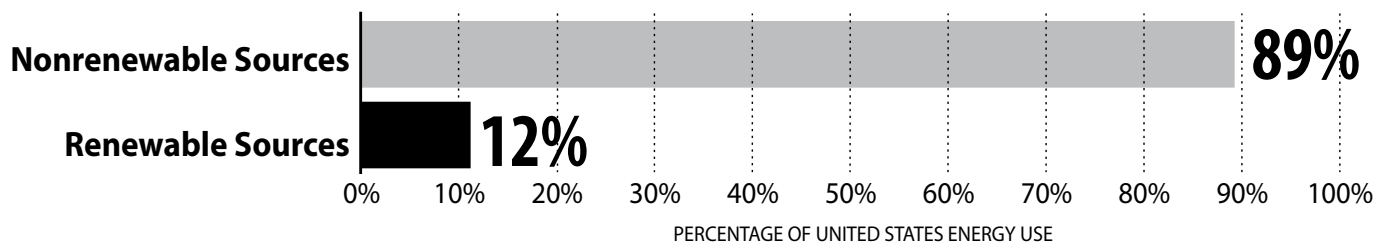
Think about playing soccer. A soccer ball cannot move by itself. You must kick it.

The food you eat gives your body energy. Your muscles use this energy to kick (a force) the ball. The soccer ball (the object) rolls down the field (a distance) to score a goal. You have just done work!

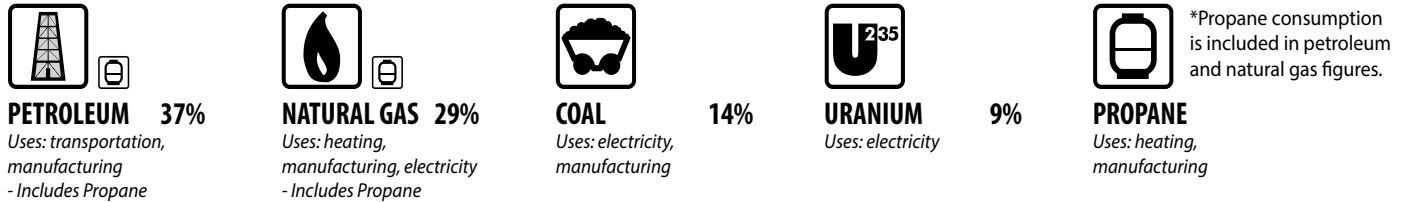
Energy Transformations



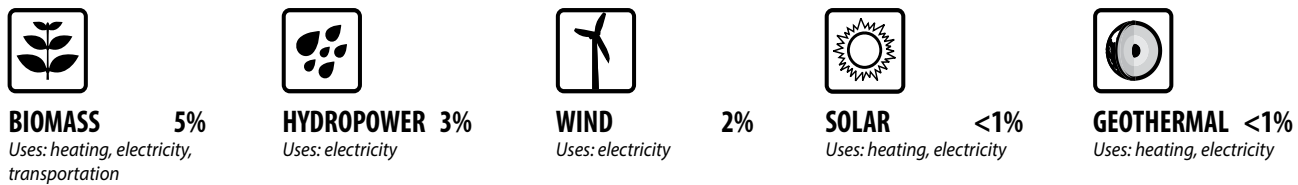
U.S. Consumption of Energy by Source, 2017



Nonrenewable Energy Sources and Percentage of Total Energy Consumption



Renewable Energy Sources and Percentage of Total Energy Consumption



Data: Energy Information Administration

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

Energy Sources

In the United States we use ten energy sources to do work. We put these sources into two categories: nonrenewable and renewable.

The **nonrenewable energy sources** we use are petroleum, coal, natural gas, propane, and uranium. These sources are found in the Earth. It takes a very long time for the Earth to produce these sources. Once we use them, we can't use them again or get them back quickly. We use nonrenewable energy sources to move our cars, heat our homes, and make electricity.

Renewable energy sources can be used over and over again. It does not take very long to replenish the supply of these resources, so we will never run out. Renewable energy sources are biomass, hydropower, solar energy, wind energy, and geothermal energy. Day after day, the sun shines, the wind blows, and the rivers flow. We use renewable energy sources mainly to make electricity.

Nonrenewable sources are relatively inexpensive and we can use them 24 hours a day. Some renewable sources like solar and wind are free to use, because no one owns the sun or the wind. The machines and parts needed to turn these sources into energy we can use can be expensive, however. Every source of energy has advantages and disadvantages to using it.