Introduction

You have learned that **energy** is the ability to do work or cause change. There are many different forms of *energy*. We may use one form of energy to run our cars, another to heat our homes, and still another to send television pictures. People use large amounts of energy to help them perform work. Scientists are always looking for new available energy. In this unit, the different forms of energy will be introduced.

Kinds of Energy

The energy in moving things is **mechanical energy**. The movement of pistons in a car is *mechanical energy*. The energy of a hammer is mechanical energy. Wind and water can also be thought of as having mechanical energy.

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Electrical energy is caused by the flow of electric currents. Many of the appliances we use every day run on *electrical energy*—the energy of moving **electrons**, or moving charged particles. The energy in **magnets** is a result of the same force that causes electricity.

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Your body gets energy from the food you eat. This is a form of **chemical energy**. *Chemical energy* is energy stored in chemicals. Many chemicals have stored energy. When coal burns, chemical energy is released. The energy was stored in the coal when the coal was formed millions of years ago.

Heat energy is the energy of moving molecules; it is responsible for causing changes in temperature. The form of **matter** can be changed by *heat energy*. Remember that heat can change a **solid** to a **liquid** or a *liquid* to a **gas**. Almost all *matter* contains some heat energy.

Light energy is very common. Some *light energy* comes from the sun to Earth. Radio waves and x-rays are light energy since they spread out and pass through space.

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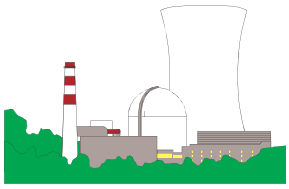
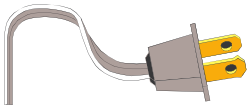
Sound can also be a form of energy. Sound can make objects move. Thunder is an example of **sound energy**. When you hear thunder, what you experience are small movements in the air. The small movements are detected by your ears and translated by your brain as sound. *Sound energy* is the energy of vibrating materials as detected by human ears.

Locked deep inside every **atom** is a powerful form of energy. **Atomic energy** or *nuclear energy* can be used to run power plants. It can also be used for destructive purposes, such as nuclear bombs. Nuclear energy is the energy that holds the **nucleus** of an *atom* together, and it is very great.



Nuclear energy can be used to run power plants.



The electricity we use comes from releasing the chemical energy in coal or oil.

Most energy that we use on a daily basis has its recent origins in chemical energy. The electricity we use comes from releasing the chemical energy in coal or oil. The cars and buses in which we ride convert chemical energy to mechanical energy. With chemical energy, it takes large amounts of matter to make large amounts of energy. This is not true of nuclear energy. The forces which hold together an atom are so great that a small amount of matter can release a large amount of energy. It is because of this that nuclear energy can be both useful and destructive.

Changing Energy—Energy Conversion

Energy does not exist in only one form. It also does not stay in only one form. It can change from one form to another. When you light a match, its chemical energy changes to heat and light. The mechanical energy in wind can be *converted* by a windmill to electrical energy.

When you light a match, its chemical energy changes to heat and light.

Conservation of Energy

Where does energy go when it is used? When runners compete in a long race, they use large amounts of energy. Most of the energy is changed into heat. Saw a piece of wood. Feel the blade and the wood. Both will feel warm. The mechanical energy was changed into heat.

Whenever energy changes its form, some of it is converted to heat. The more times a source of energy is converted, the more energy becomes heat. Usually this heat energy is wasted, but scientists try to find ways to keep from wasting this energy, such as using newer models of engines which give off less heat than older models. By giving off less energy as heat, more energy is available for motion. Scientists are also looking for ways to use the heat energy. In one experiment, the heat given off by people in a room was used to heat another part of the building.

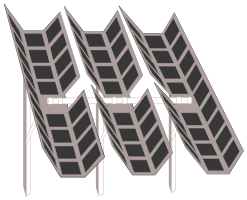
You have already learned that matter cannot be created or destroyed. What about energy? It can change form, but it is never destroyed. The **law of conservation of energy** states that energy is never created or destroyed—only changed from one form to another.

The Importance of Energy

Without energy, nothing would change. Of course, scientists of all types study change and its causes. In effect, scientists study energy. This is true of all scientists. Imagine that you are a marine biologist (who studies life in the oceans). You would not work for very long before you realized that all fish and corals and turtles—all life—would not exist without energy. An understanding of energy is a basic part of all sciences. It is fundamental to understanding how the universe works.

Summary

Mankind uses large amounts of energy. Energy can exist in various forms, such as mechanical, chemical, electrical, heat, sound, and nuclear. Energy can be converted from one form to another. When energy is used, heat energy is formed. Some amount of energy is always lost as heat. Energy can never be created or destroyed. An understanding of energy is fundamental to all branches of science.



solar panels