



Fact Sheet No. 3

WHAT IS ENERGY?

The sun sends out energy as solar radiation. Solar radiation can pass through space and the gases in the atmosphere. Solar energy heats anything that it hits.

Plants use solar energy in the chemical reaction called photosynthesis, to live and grow.

Over many millions of years, chemical and physical processes can change substances from dead animals and plants to coal, oil and natural gas, or fossil fuels. These processes are still not fully understood but we know the energy stored in these fossil fuels came originally from the sun. When we burn these fuels, they form carbon dioxide gas and water, and release heat energy. We use the heat energy to drive machines that are essential for our modern way of life.

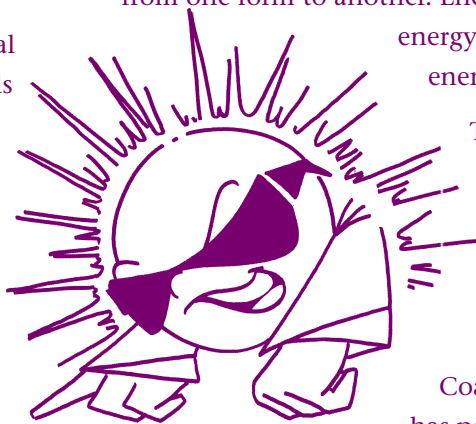
In the past few hundred years we have burned fossil fuels that took millions of years to form. They would take million of years to form again. We call these sources of energy non-renewable. However, if we can use solar energy directly, or use plant or animal products for fuel, then we have a renewable source of energy - as renewable as the sun that shines every day.

What is energy? Energy is the ability to do work. When we move something by pushing or pulling, we are doing work. Energy is necessary for anything to move or change. Energy is measured in joules (J). The work done, or energy used, during a certain time is called power. Power is measured in watts (W). A watt is the use of one joule of energy for one second.



A watt is a small amount of energy so we measure power in units of 1000 watts for one hour – kilowatts for one hour. Look inside the fuse box at your home or school. The little clocks you will see are electricity meters for measuring the energy being used in kilowatt hours, kWh.

Energy cannot be made or destroyed, but it can change from one form to another. Energy is either potential energy, (stored energy) or kinetic energy, (movement energy).



The water at the top of the Barron Falls has potential energy. This potential energy changes to kinetic energy as the water falls.

Coal stored at a power station has potential energy. When the coal burns, it releases heat energy that drives the electric power generators.

When petrol burns in a motor car engine, a rapid change in gas pressure drives the pistons to create mechanical power which turns the wheels.

Food releases energy used to build up our body and to move our muscles. Substances such as coal, petrol and food used as a store of energy are called fuels.

We can also describe energy as having different forms, for example atomic energy (nuclear energy), chemical energy, electrical energy, heat energy, light energy, mechanical energy, and radiation energy (including solar radiation).

All hot things send out radiation. Hold the palm of the hand close to, but not touching, your cheek. Feel the heat radiated from your hand.



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Radiation travels through space like waves. The distance between the crests of two waves is called the wavelength. Radiation of different wavelengths has different properties, for example (from shorter waves to longer waves) X-rays used in hospitals, ultraviolet rays that cause a suntan, light rays that allow us to see, infrared rays that carry heat, microwaves used for cooking and radio waves for television and radio.

The sun is very hot and emits solar radiation. The energy from solar radiation can be changed to heat energy as in solar heating, electrical energy using a photovoltaic cell as in solar cars, and to chemical energy by photosynthesis in green plants.

Visible radiation and short wave radiation from the sun can pass through the roof and walls of a greenhouse that are made of glass or polyethylene plastic. This energy is absorbed to warm the plants, soil and other contents of the greenhouse. As they get warmer, they will radiate heat as long wavelength infrared radiation. These longer wavelengths cannot pass through glass or polyethylene plastic, so the greenhouse remains warm.

After solar radiation warms the earth, the earth also radiates heat as long wavelengths. Carbon dioxide gas and water vapour prevent some longer wavelengths from passing, so the earth remains warm. Clear nights are, therefore, often cooler than cloudy nights.

The increase in use of non-renewable fossil fuels may have increased the amount of carbon dioxide and other gases in the atmosphere to produce what is called the global greenhouse effect. The temperature of the earth is believed to have increased and some scientists think this may lead to climate changes and widespread flooding of low-lying areas as the increased temperature causes the sea to expand.

It makes sense then to be cautious and conserve non-renewable fuels for use by future generations and to control the global greenhouse effect. So, we should try to decrease energy use, and to change to renewable sources of energy.

Read Fact Sheet number 12 to find out more about using energy wisely.

