

# What is energy?

## Energy and matter

Energy is a difficult concept to define. Energy can not be seen. Energy has no shape, size, colour or weight. Energy needs to be defined by what it does. Energy changes matter.

Matter can change in a variety of ways. Matter can be made to move faster, slower or in a different direction. A car accelerating from traffic lights is changing its motion. Matter can change shape. Springs, balloons and elastic bands can be stretched and compressed. Matter can give off light, such as light globes. Matter can change temperature or phase. Matter can change chemically such as when we burn things or cook food.

## Detecting Energy

Energy can only be detected when it causes change to matter. When electricity is used to boil water, beat eggs, operate the washing machine and produce light, then changes have occurred. When we say energy is used we mean that energy is transferred. The electrical energy used to boil water is transferred to the water. Some of the heat is lost to the surroundings.

## Defining Energy

Scientists define energy as the ability to do work. Work is done when changes occur to matter, If matter changes its motion, shape, chemistry, temperature, position, or emits light, then work has been done – energy has been transferred.

## Energy Sources

The wind, waves, tides, rivers, sun, fuels, food, magnets, earth and vibrating objects are some sources of energy.

## Forms of Energy

Energy can exist in many forms including chemical, electrical, mechanical, nuclear, sound, light and heat. Fuels are a source of heat energy for cooking and driving. Wind is a source of mechanical energy for windmills. Radioactive materials such as uranium are a source of nuclear weapons and nuclear power stations.

## Questions

1. Explain why energy is difficult to define.
2. What is matter?
3. Explain how energy can be detected.
4. What is energy?
5. Name six sources of energy.
6. What are the six forms of energy?
7. In the situations in the diagrams, explain the **source** of energy and the **work** that is being done. For example in (a) the natural gas is providing the energy to heat the water.

