

Energy and electricity

Nothing would happen without energy. Energy is needed to:

- keep our bodies working
- make machines work
- heat homes, schools and offices.

Energies in action

- heat energy
- light energy
- sound energy
- electrical energy
- kinetic (movement) energy.

Stored energy

Some energy has to be stored so that it is ready for use when we need it.

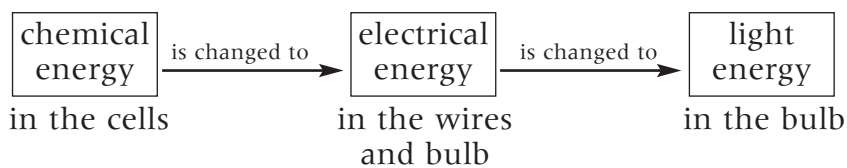
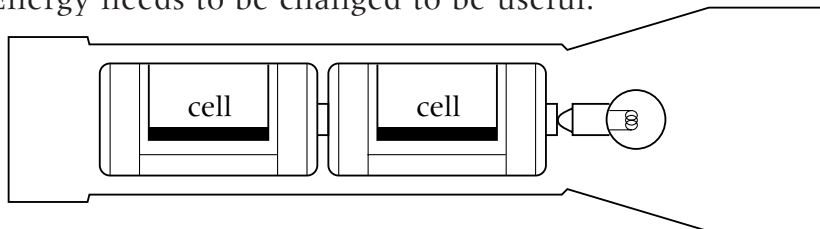
- Chemical energy is stored in food, fuels and cells.
- Gravitational potential energy is stored in high up things.
- Strain energy is stored in stretched or squashed things.
- Nuclear energy is stored inside atoms.

How is energy measured?

Energy is measured in **joules (J)** or **kilojoules (kJ)**. A kilojoule is 1000 joules.

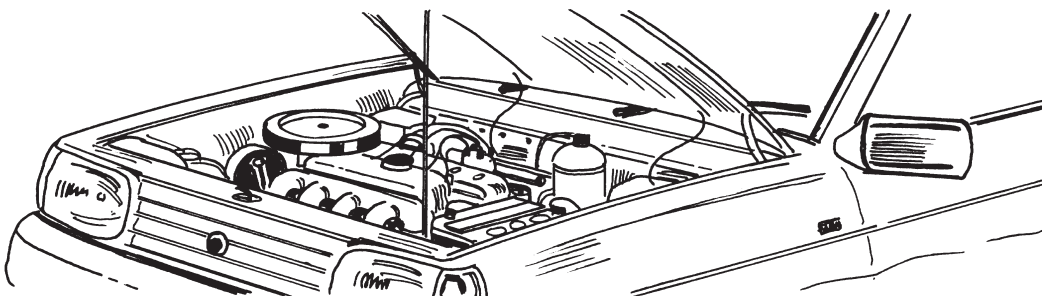
Energy changes

Energy needs to be changed to be useful.



An energy flow diagram.

Many energy changes take place in everyday life. Often wasted energy is produced in the forms of **heat** or **sound**.



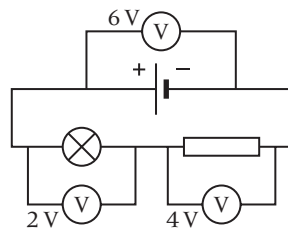
A car engine produces kinetic energy, which is useful. It also produces heat and sound.

Energy cannot be made or destroyed, but can only be changed from one form to another. This is the **law of conservation of energy**.

Voltage

A circuit must have a cell or power supply to provide a **voltage**. The voltage pushes the **electrons** around the circuit and gives them energy. This electrical energy is **transferred** to other components in the circuit, which convert it to other forms of energy. For instance, a light bulb transfers electrical energy to heat and light energy.

The voltage of a cell can be measured using a **voltmeter**. The units for voltage are **volts (V)**. The voltage across a component is a way of measuring how much energy the component is transferring. The voltage across all the components in a series circuit adds up to the voltage across the cell.

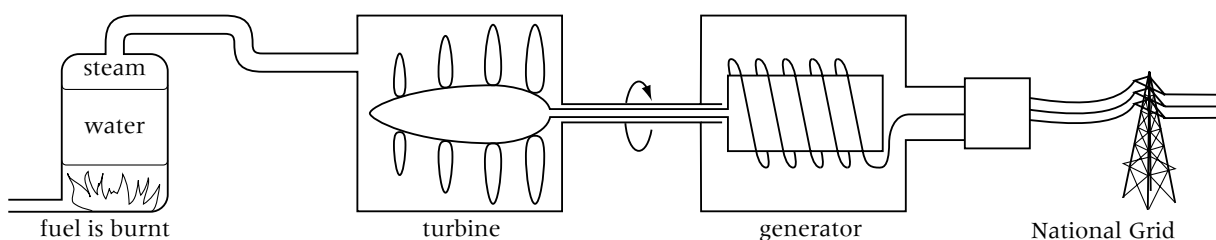


Electricity and cells

Electricity is supplied to homes and factories as **mains electricity**. This travels along cables connected to the **National Grid**.

Generating electricity

Fossil fuels are transported to power stations where they are burnt to release heat energy. This heats water, turning it to steam. The steam drives **turbines** which turn **generators**. The electricity generated flows along cables into the National Grid.



Nuclear fuel is made from a radioactive metal called uranium. The energy in nuclear fuel did not come from the Sun.

Electricity can be generated from renewable resources such as wind and moving water. These will become more important as fossil fuels run out.

Sometimes we need a source of portable electricity when we are not close to the mains. This can be supplied by **cells** (sometimes called **batteries**). These store **chemical** energy which can be changed to electrical energy. Cells go flat when they run out of chemical energy. Some cells can be **recharged**.

Wasting energy

Energy cannot be made or destroyed, but it can be changed to different forms. Not all energy is turned into a form that we want. Often it is turned into heat that we do not need. This is wasted energy. A car engine produces kinetic energy, which is useful. It also produces heat and sound which are wasted forms of energy.

The percentage of useful energy produced by something is known as its **efficiency**. The human body is 25% efficient.

