

## ENERGY AND RECYCLING: Energy Generation

Energy can be generated in a number of ways, some of which are renewable and some of which are non-renewable.

**Non-renewable energy** comes from a non-renewable source (i.e. a source that will one day run out or is not easily replaced). The main sources are fossil fuels and nuclear power.

Fossil fuels were formed from rotting plants or animals living millions of years ago during a time called the Carboniferous Period. We get our energy by burning these fossil fuels, but they also produce carbon emissions that harm our planet.

- **Coal:** Coal is a fossil fuel that is mined from deep below the Earth's surface. Once it is burnt, it produces energy. This reaction also causes the release of carbon dioxide into the atmosphere.
- **Gas:** Natural gas (which you cannot see, taste or smell) is found deep beneath the land and sea and can be burnt to produce energy.
- **Oil:** Oil is sometimes called 'liquid gold' as it is a precious resource and is only found in certain places. Oil is found deep beneath the Earth's surface and has to be drilled and pumped out. Oil can be separated into its different components and used as different products or fuels.

**Nuclear power:** Uranium is a metal that is found beneath the Earth's surface. Everything in the entire universe is made up of atoms; each atom has a nucleus surrounded by electrons. If you split a uranium atom it releases energy, which can be used to heat water. As this water gets hotter it produces steam, which can be used to generate electricity.

Although nuclear power is sometimes referred to as renewable (as it does not generate carbon emissions as do coal, gas and oil) it does produce radioactive waste, which remains radioactive for centuries.



### Did you know?

- The UK has committed to get 15% of its energy from renewable sources by 2020 (in the EU Renewable Energy Directive).

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## ENERGY AND RECYCLING: Energy Generation cont'd

**Renewable energy** is energy that comes from a renewable, natural source. Renewable means that there is no danger of the source running out, as it can be replaced and does not produce carbon emissions. The main sources are:

**Sunlight:** The Sun is our nearest star and is extremely powerful. It is the Earth's main source of energy – solar power. Besides giving the heat and light to allow growth of vegetation which in turn provides food for animals, which both in turn provide food 'fuel' for us to grow, move, keep warm etc, it also provides other sources of power. The heat from the sun – the solar power can heat solar panels which can directly heat water. Many of these can be found on houses in hot Mediterranean countries. The sun's power is also used in solar furnaces (which heat water to produce steam) and also solar cells known as photovoltaic cells. These can be found on calculators but with large quantities of these cells joined into panels, create electricity which can heat houses, run refrigerators or pump water.



**Wind:** Wind power is actually also produced by the Sun and the effect it has on the Earth. As the Sun heats different parts of the world at different times, hot air rises and cool air moves into its place. This difference in temperature creates wind. Wind turbines collect or harness wind power (called kinetic energy) in the motion of the blades. As these blades turn, a kinetic current is produced, which can be converted into electrical energy by a generator. This energy can then be used in homes and other buildings. When lots of wind turbines are placed together they are called 'wind farms'.

**Water:** There are many ways that the movement in water can be harnessed and used to generate electricity. Water flowing downhill can be trapped by large man-made hydro-electric dams, which use the water flow to drive turbines. Waves in the sea can drive generators and tides can have their movement trapped behind tidal barriers, which can be used to turn turbines and generate electricity.

**Hydrogen:** An electrical current can be made by splitting water into hydrogen and oxygen. Hydrogen can be used in specially designed cars as an alternative to petrol or diesel.

**Geothermal:** Deep in the Earth there are pockets of heat. By piping the steam and heat up to the surface, the power can be used to heat above ground water sources.



### Did you know?

- African countries benefit from sunshine all year round, and are increasingly introducing solar panels in their homes, schools and hospitals.