

ENERGY RESOURCES

2018

YEAR OF RESOURCES



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Left: Geothermal pool in Rotorua, New Zealand

Middle: Coal can be burnt to produce heat and electricity

Right: Wind turbines use the wind to produce electricity

Natural resources are any kind of natural substances that are needed by humans. Coal, oil, gas, wind, water and sunlight are all natural resources that can be used as energy in the form of heat and electricity. They are therefore known as energy resources.

RENEWABLE & NON-RENEWABLE?

These are two key words when talking about energy. '**Renewable**' just means that something won't run out, it is unlimited. If something is **non-renewable** then once it is used, it is gone for good. If you use a candle for light, after a while it will run out of wax so it's non-renewable. The sun can be used for light forever and nothing you do will use it up - it is renewable.

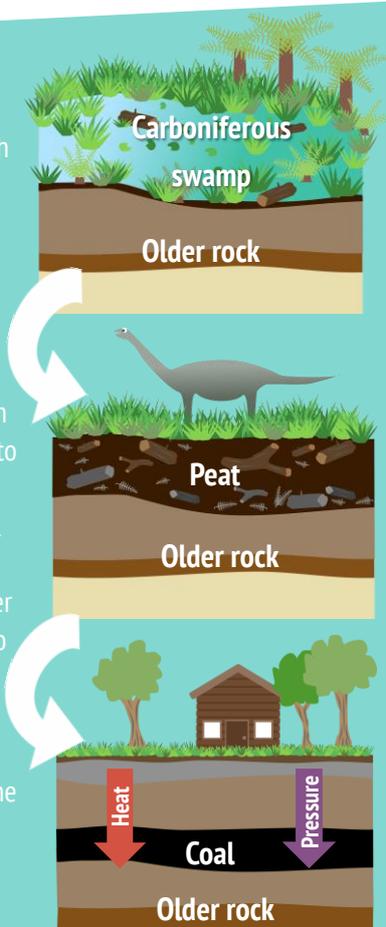
FOSSIL FUELS

Coal, crude oil and natural gas are **fossil fuels**. They all form underground. People have been using fossil fuels to produce heat and electricity for the past 250 years.

Fossil fuels are very **efficient**. This means that burning a small amount of oil, gas or coal releases a lot of energy. It's quite cheap to generate heat and electricity from fossil fuels and they can be transported easily. The issue with fossil fuels is that they are **non-renewable** - once we've used them up, they're gone for good. Burning fossil fuels also releases **carbon dioxide** gas. Too much carbon dioxide in the Earth's **atmosphere** is causing it to heat up in a process known as **global warming**.

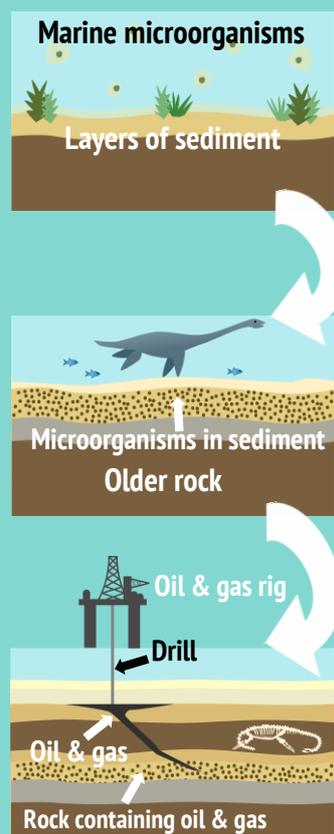
COAL

Most of the coal we have on Earth today was formed during a time called the **Carboniferous period** 360–299 million years ago (long before the dinosaurs!). The Earth was warmer and more humid at this time and covered in tropical swamps! Ancient land plants such as **ferns** and **cycads** would fall into these swamps and form thick layers of squashed plant material at the bottom. The plant layers were buried by mud, silt and other plants, and eventually turned into a brown spongy material called **peat**. Over millions of years layers of sediment continued to build up on top of the peat. As the peat was buried deeper and deeper, increasing **heat** and **pressure** turned it into coal.



All of Earth's crude oil and natural gas is formed from tiny, **microscopic**, marine plants and animals. Millions of years ago, these **microorganisms** sank to the bottom of the ocean and were gradually buried with other **sediments** (sand and mud). Over time, more and more layers of sediment built up and the microorganisms were buried deeper and deeper. **Pressure** and **temperature** increases as you go deeper into the Earth, turning the sediments into rock and the microorganisms into oil and gas. Oil and gas are lighter than solid rock so they move upwards through tiny gaps and cracks. Sometimes oil and natural gas escapes through vents on the Earth's surface into the **atmosphere**. Other oil and gas deposits get trapped under layers of rock or clay and can be taken out using long, powerful drills.

OIL & GAS



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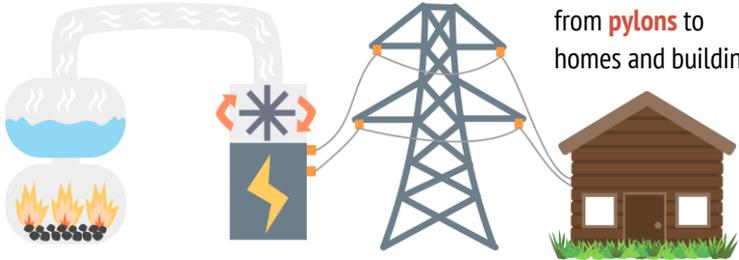
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HOW DO WE GET ELECTRICITY FROM FOSSIL FUELS?

1. Fossil fuels are burnt to produce heat
2. The heat boils water into steam
3. Steam spins a **turbine** generating electricity
4. Electricity travels from **pylons** to homes and buildings



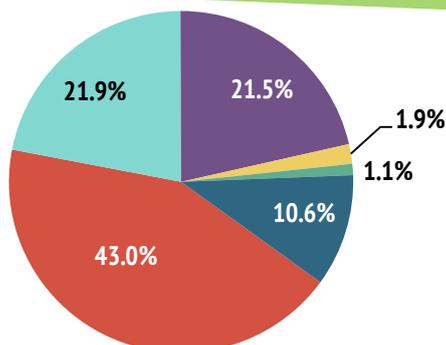
NUCLEAR POWER

Everything in the universe is made from elements. Some elements such as **uranium** and **plutonium** are unstable and **radioactive**. This means that they change over time, releasing energy as heat. In **nuclear power stations** uranium and plutonium are involved in **chemical reactions**. Here, atoms are split to release large amounts of heat energy. We can then use this heat to create steam to spin turbines and generate electricity.

We only have so many radioactive elements on Earth so like fossil fuels, nuclear power is **non-renewable**. Nuclear power is cheap to produce and doesn't release any harmful gases. However it does produce **radioactive waste**. This has to be carefully stored for a very long time; otherwise the **radiation** can be dangerous to the environment and people, as it can cause cancer. Though nuclear power stations are normally safe, accidents can have very serious consequences.



- Fossil Fuels
- Wind
- Nuclear
- Solar
- Hydro
- Other



This chart shows how electricity was produced in the UK in the summer of 2017. Electricity production has changed a lot over the last 10 years, only recently has wind been used more than nuclear power. At one point fossil fuels were used to produce all of the UK's electricity!

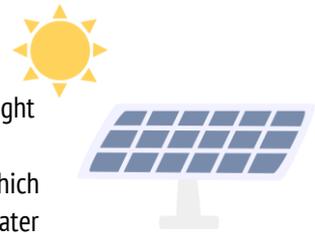
Data from the Department for Business, Energy and Industrial Strategy.

RENEWABLE ENERGY

Renewable energy is formed naturally and can be used again and again without running out.

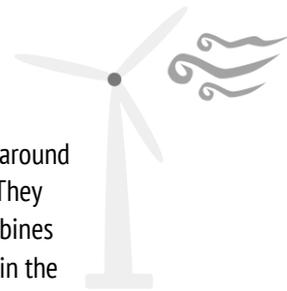
SOLAR POWER

Solar power uses the energy from sunlight to produce heat and electricity. **Solar thermal panels** are filled with water which heats up in the sunlight. This heated water is pumped through a tank and connected to water taps. Solar panels called **photovoltaic cells** are used to turn sunlight directly into electricity. Photovoltaic cells are made from the chemical element **silicon**. When silicon is exposed to lots of sunlight it generates an **electrical charge**. Because it isn't very sunny in the UK and Ireland, solar panels don't produce very much power and they are very expensive to build.



WIND POWER

You've probably seen big, white windmills around the countryside. These are **wind turbines**. They can be built on land or out at sea. Wind turbines produce more electricity than solar panels in the UK and Ireland because we have lots of windy weather! Some people find turbines unattractive and noisy, and they can be disruptive for wildlife.



HYDRO POWER

Hydro power is electricity produced from running water. There are two main ways to do this - **hydroelectric power** and **tidal power**. To use hydroelectric power, water is stored in a **reservoir** (lake) behind a **dam**. When the water is released it flows downhill and spins turbines in the dam generating electricity. **Tidal power** instead uses the movement from the tides to turn turbines and produce electricity. We have good conditions for tidal power in the UK but it can be damaging to coastal wildlife.



GEOHERMAL POWER

The inside of the Earth is very hot! We can use this **heat** as an energy resource known as **geothermal power**. Water can be pumped into hot rocks through pipes. When the water comes back up to the surface it can be used directly to heat people's homes, or the steam can be used to generate electricity using a turbine. However this can only be done in areas where the rocks are hot enough, such as in Iceland and New Zealand.

