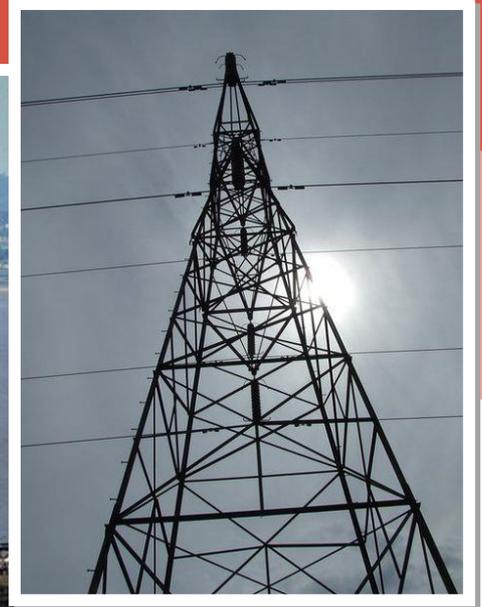


# ENERGY

[www.geolsoc.org.uk/energy](http://www.geolsoc.org.uk/energy)



**Left:** Hinkley Point Nuclear Power Station.  
**Right:** Pylon near Ashbocking, Suffolk.

**Every country faces the same energy challenge: to supply enough power for homes, transport and businesses as cheaply as possible, whilst safeguarding the environment by reducing emissions.**

**The UK's energy comes primarily from:**

**Fossil fuels:** coal, oil and gas – so called as they're literally the remains of living things from millions of years ago, preserved in the geological record. Oil and natural gas are formed when the remains of organisms settle at the bottom of seas or lakes and are buried in sediment. Coal is usually formed from trees and other plants deposited in boggy areas.

**Nuclear Power:** Nuclear power stations harness the energy produced when atoms, usually in the form of uranium as fuel rods, are split (also known as nuclear fission) in a controlled environment. Water is used to cool the reaction. The heat produced generates steam which turns turbines, generating electricity.

**Renewables:** In 2012, approximately 10% of the UK's electricity was generated from renewables – energy sources which replenish themselves quickly, so can be used indefinitely. They include solar, wind, tidal, hydroelectric and geothermal energy.

## DID YOU KNOW?

It's possible to use the heat generated and stored in the Earth as a source of energy. The geothermal energy in the Earth's crust originates from the formation of the planet (20%) and from radioactive decay (80%). By pumping water down into hot rocks and using the steam produced to drive turbines, electricity can be produced. There are potential geothermal sites in Cornwall, the Lake District, East Yorkshire, Northern Ireland and Scotland.

### Carbon capture and storage

Rather than releasing CO<sub>2</sub> into the atmosphere as fossil fuels are burned, we could capture and store it below ground. Geologists are working on finding and developing suitable storage sites – the possibilities include North Sea oil and gas reservoirs that are almost exhausted.

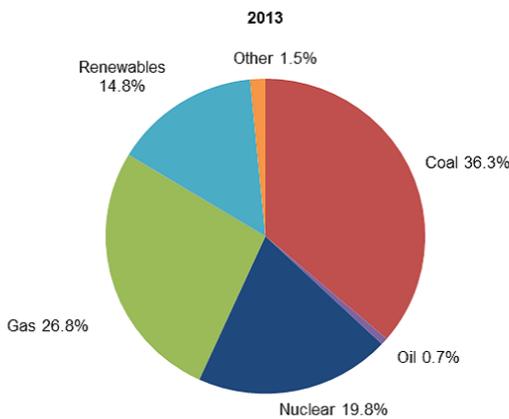
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UK sources of electricity 2013 (c. DECC, March 2014)

## The UK energy mix

When burned, the carbon stored in ancient organisms is released back into the air in the form of 'greenhouse gases', which contribute to climate change. This is why it's important to reduce our reliance on fossil fuels and use more 'low carbon' alternatives.

Renewables and nuclear power are likely to form a significant part of our future energy supply. The UK currently has 16 nuclear reactors (eg Hinkley Point, Sizewell) generating about 18% of our electricity. However, to meet demand, we will still need to rely on fossil fuels for decades to come.

## UK Energy Supply Timeline

Date	Major features
Late 18 <sup>th</sup> Century	With the Industrial Revolution, it is recognized that burning coal produces about three times the energy of wood. Rapid advances are made in mining and transport.
1950s	The world's first commercial scale nuclear power station is opened in the UK.
1970s	Most of the UK's electricity is derived from coal and oil.
2000s	By 2004, following the 'Dash for Gas', gas is the largest source of our electricity.
2014	In the past decade, renewable sources of power have been encouraged as the need for 'clean' energy is recognized.

## Shale gas and hydraulic fracturing: 'fracking'

Geologists are increasingly looking to 'unconventional' sources of fossil fuels in the UK, which could help avoid relying on imported fuel.

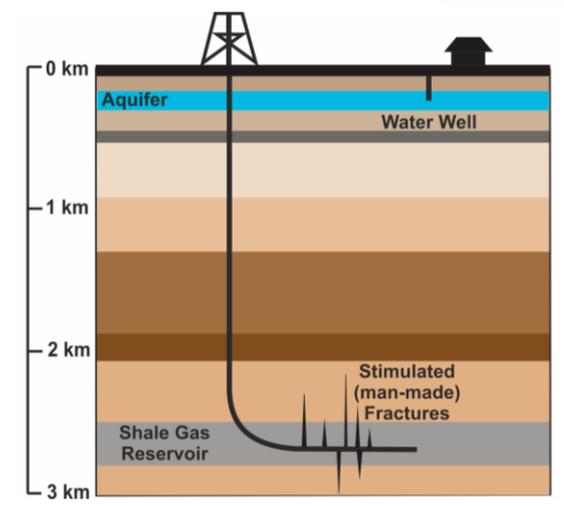
One such source is gas formed in shale rocks (fine grained mudstone)- while some migrates out to fill conventional reservoirs, much is trapped in the impermeable shales. This gas cannot be extracted by drilling in the usual way.

Fracking involves injecting water, sand and some added chemicals, at depths of 2-5 km, usually in combination with horizontal drilling. This opens up natural fractures in the shale so gas can be freed and extracted.

Fracking has been controversial in the UK, due to concerns about its potential impact on the environment.



'Coalbrookdale by Night' by Philip James de Loutherbourg, 1801. The picture has come to symbolize the birth of the Industrial Revolution in Ironbridge, England. It is held in the collections of the Science Museum in London.



Left: Hydraulic Fracturing  
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