

Renewable and non-renewable energy resources

All life on earth is sustained by energy from the sun. Plants and animals can store energy and some of this energy remains with them when they die. It is the remains of these ancient animals and plants that make up **fossil fuels**, fuels such as coal, gas and oil which are mined from the earth and burned to produce energy. They are formed from broken down animals and plants that died a very long time ago.

Fossil fuels are **non-renewable** because they will run out one day. Burning fossil fuels generates **greenhouse gases**, naturally occurring gases in the atmosphere such carbon dioxide, methane and nitrous oxide. They are believed to have increased through burning more oil, petrol, and coal. Relying on them for energy generation is **unsustainable**, hence the need to find more **renewable, sustainable** ways of generating energy. **Renewable** or **infinite** energy resources are sources of power that quickly replenish themselves and can be used again and again.

Some resources can be thought of as both renewable and non-renewable.

- **Wood** can be used for fuel and is renewable if trees are replanted.
- **Biomass**, which is material from living things, can be renewable if plants are replanted.

Nonrenewable energy sources

Type of fuel	Where it is from	Advantages	Disadvantages
Coal (fossil fuel)	Formed from fossilized plants and consisting of carbon with various organic and some inorganic compounds. Mined from seams of coal, found sandwiched between layers of rock in the earth. Burnt to provide heat or electricity.	Ready-made fuel. It is relatively cheap to mine and to convert into energy. Coal supplies will last longer than oil or gas.	When burned coal gives off atmospheric pollutants, including greenhouse gases.
Oil (fossil fuel)	A carbon-based liquid formed from fossilized animals. Lakes of oil are sandwiched between seams of rock in the earth. Pipes are sunk down to the reservoirs to pump the oil out. Widely used in industry and transport.	Oil is a ready-made fuel. Relatively cheap to extract and to convert into energy.	When burned, it gives off atmospheric pollutants, including greenhouse gases. Only a limited supply.

Type of fuel	Where it is from	Advantages	Disadvantages
Natural gas (fossil fuel)	Methane and some other gases trapped between seams of rock under the earth's surface. Pipes are sunk into the ground to release the gas. Often used in houses for heating and cooking.	Gas is a ready-made fuel. It is a relatively cheap form of energy. It's a slightly cleaner fuel than coal and oil.	When burned, it gives off atmospheric pollutants, including greenhouse gases. Only limited supply of gas.
Nuclear	Radioactive minerals such as uranium are mined. Electricity is generated from the energy that is released when the atoms of these minerals are split (by nuclear fission) in nuclear reactors.	A small amount of radioactive material produces a lot of energy. Raw materials are relatively cheap and can last quite a long time. It doesn't give off atmospheric pollutants.	Nuclear reactors are expensive to run. Nuclear waste is highly toxic, and needs to be safely stored for hundreds or thousands of years (storage is extremely expensive). Leakage of nuclear materials can have a devastating impact on people and the environment. The worst nuclear reactor accident was at Chernobyl , Ukraine in 1986.
Biomass	Biomass energy is generated from decaying plant or animal waste. It can also be an organic material which is burned to provide energy, e.g. heat, or electricity. An example of biomass energy is oilseed rape (yellow flowers you see in the UK in summer), which produces oil. After treatment with chemicals it can be used as a fuel in diesel engines.	It is a cheap and readily available source of energy. If the crops are replaced, biomass can be a long-term, sustainable energy source.	When burned, it gives off atmospheric pollutants, including greenhouse gases. If crops are not replanted , biomass is a non-renewable resource.
Wood	Obtained from felling trees, burned to generate heat and light.	A cheap and readily available source of energy. If the trees are replaced, wood burning can be a long-term, sustainable energy source.	When burned it gives off atmospheric pollutants, including greenhouse gases. If trees are not replanted wood is a non-renewable resource.

How long will fossil fuels last?

Estimates from international organizations suggest that if the world's demand for energy from fossil fuels continues at the present rate that oil and gas reserves may run out within some of our lifetimes. Coal is expected to last longer.

Fossil fuel	Time left
Oil	50 years
Natural gas	70 years
Coal	250 years

Renewable energy sources

Type of energy	Where it is from	Advantages	Disadvantages
Solar	Energy from sunlight is captured in solar panels and converted into electricity.	Potentially infinite energy supply. Single dwellings can have own electricity supply.	Manufacture and implementation of solar panels can be costly.
Wind	Wind turbines (modern windmills) turn wind energy into electricity.	Can be found singularly, but usually many together in wind farms. Potentially infinite energy supply.	Manufacture and implementation of wind farms can be costly. Some local people object to on-shore wind farms, arguing that it spoils the countryside.
Tidal	The movement of tides drives turbines. A tidal barrage (a kind of dam) is built across estuaries, forcing water through gaps. In future underwater turbines may be possible out at sea and without dams.	Ideal for an island such as the UK. Potential to generate a lot of energy. Tidal barrage can double as a bridge, and help prevent flooding.	Construction of barrage is very costly. Only a few estuaries are suitable. Opposed by some environmental groups as having a negative impact on wildlife. May reduce tidal flow and impede flow of sewage out to sea.
Wave	The movement of seawater in and out of a cavity on the shore compresses trapped air, driving a turbine.	Ideal for an island country. More likely to be small local operations, rather than done on a national scale.	Construction can be costly. May be opposed by local or environmental groups.

Type of energy	Where it is from	Advantages	Disadvantages
Geothermal	In volcanic regions it is possible to use the natural heat of the earth. Cold water is pumped under ground and comes out as steam. Steam can be used for heating or to power turbines creating electricity.	Potentially infinite energy supply. Used successfully in some countries, such as New Zealand and Iceland.	Can be expensive to set up and only works in areas of volcanic activity. Geothermal and volcanic activity might calm down, leaving power stations redundant. Dangerous elements found underground must be disposed of carefully.
Hydrological or Hydroelectric Power (HEP)	Energy harnessed from the movement of water through rivers, lakes and dams.	Creates water reserves as well as energy supplies.	Costly to build. Can cause the flooding of surrounding communities and landscapes. Dams have major ecological impacts on local hydrology.
Biomass	Decaying plant or animal waste. An organic material, which can be burned to provide energy, e.g. heat, or electricity. An example of biomass energy is oilseed rape (the fields of yellow flowers you see in the UK in summer), which produces oil. After treatment with chemicals it can be used as a fuel in diesel engines.	It is a cheap and readily available source of energy. If replaced, biomass can be a long-term, sustainable energy source.	When burned, it gives off atmospheric pollutants, including greenhouse gases. Biomass is only a renewable resource if crops are replanted.
Wood	Obtained from felling trees, burned to generate heat and light.	A cheap and readily available source of energy. If the trees are replaced, wood burning can be a long-term, sustainable energy source	When burned it gives off atmospheric pollutants, including greenhouse gases. If trees are not replanted then wood is a non-renewable resource.