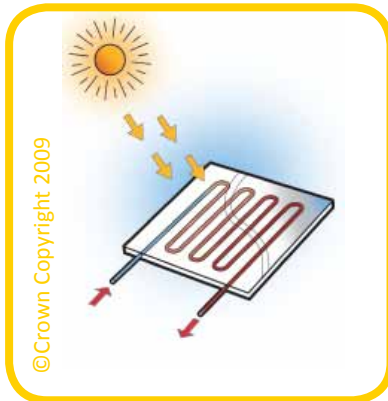


SOLAR ENERGY



SOLAR ENERGY

Solar energy is energy from sunlight. Sunlight helps all living things grow and makes it possible for plants, animals and people to live on Earth. Solar energy is a type of renewable energy; it will never run out. It is not like fossil fuels such as coal, oil and natural gas, which are called non-renewable energy.

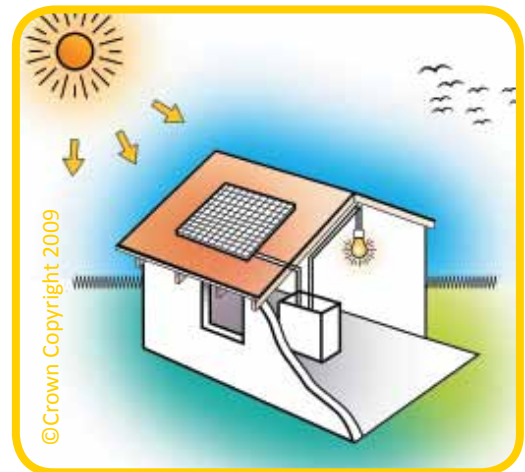


Solar heating

The sun's heat is used to warm water for washing and heating. The cold water is pumped into the solar collector on the roof where the sun warms it up. It is then pumped back down into the building where it is stored in a tank so the hot water can be used when it is needed.

Solar electricity

Solar Photovoltaic (PV) panels collect solar energy and convert it into electricity. The PV cells can be linked to a rechargeable battery which collects energy in the day to be used at any time, even at night when there is no sun.



There are no big solar power stations in the UK at the moment, but in countries where there is a lot of sunshine such as Spain or Australia, there are large 'farms' of solar panels which can generate enough energy for a whole town. However, there are quite a lot of people in the UK who have small solar panels on their roofs to create electricity for their home.

Advantages of solar power	Disadvantages of solar power
• The sun gives out 'free' power all the time. • It is silent, causes no pollution and does not harm wildlife. • PV panels are low maintenance because there are no moving parts to service and can be installed easily because there are hardly any wires. • It is useful in remote places, and works on a small or large scale.	• Solar power does not work at night so electricity needs to be stored. • At the moment, PV cells are expensive (but getting cheaper). • Solar panels do not work as well in countries which do not have a lot of sunlight every day.

WIND ENERGY

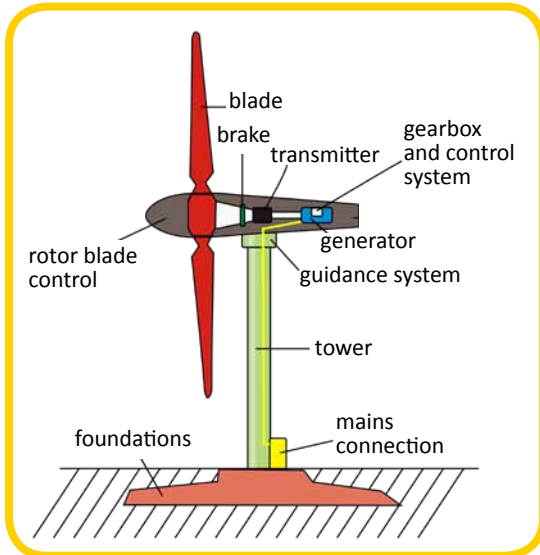
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WIND ENERGY

Wind power is one of the cleanest and safest of all the renewable methods of generating electricity. Humans have used wind energy to power machinery in windmills for hundreds of years.



The force of the wind turns the blades of the wind turbine which turn a motor inside. As the motor turns it powers a generator which produces electricity. Each large wind turbine can power 3000 households. Wind turbines can be built on land and in the sea (offshore).

Wind energy already supplies electricity for 5.4 million households in the UK, with 436 current wind farms and this figure is growing as more are constructed.

The first offshore wind farm in the UK was built in 2000. They are more expensive than land wind farms but contain much larger wind turbines which generate more power. The wind at sea also blows more steadily than on land.

Advantages of wind energy:	Disadvantages of wind energy:
• It is a renewable form of energy, which means it will never run out. • Wind energy is clean. It causes no pollution. • The land on which turbines are built can still be used for farming. • It costs no more than coal energy and is cheaper than nuclear energy. • Overall wind energy projects are simple, clean and cheap to maintain. Jobs are often created both in the short and long term in the building and maintenance of the turbines.	• Some people are concerned about noise, although wind turbines are quieter than many people think. • Wind turbines do not work in very weak or very strong winds. • Some people think that wind farms spoil the look of the landscape, although not everyone agrees.

Source: BIS

GEOTHERMAL ENERGY

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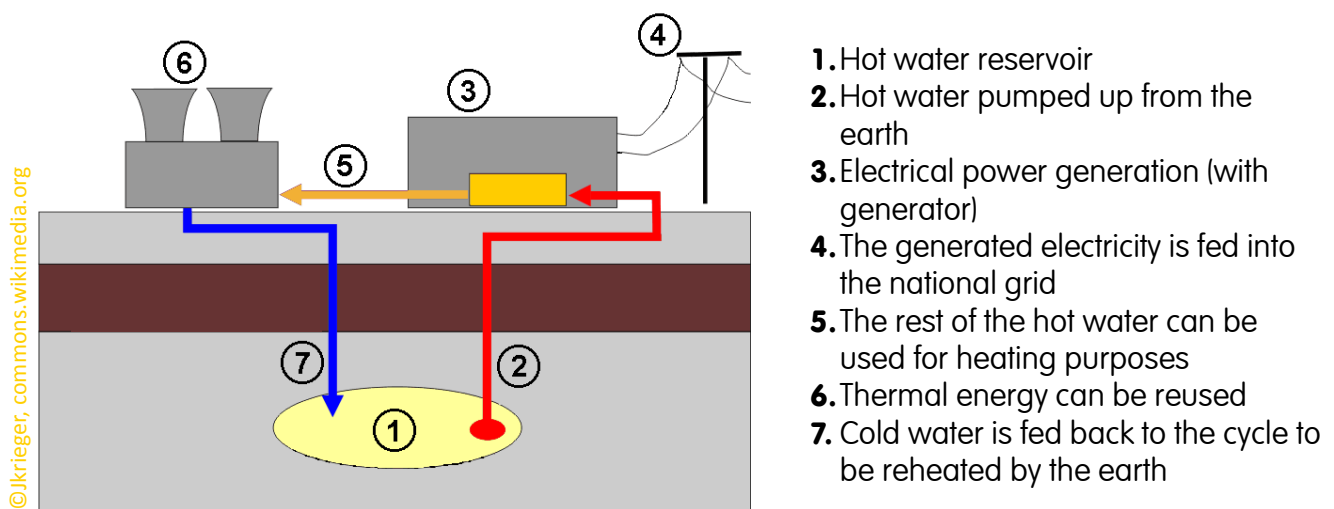
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GEO THERMAL ENERGY

There is a huge amount of heat at the earth's core which can be found by digging down towards the centre. We call the earth's natural heat geothermal energy ('geo' means earth and 'thermal' means heat). Water heated by geothermal energy can be used for heating or for generating electricity.

Humans have used geothermal energy for thousands of years, using hot springs initially for cooking and building reservoirs around springs to create shrines and bathing complexes such as those built at Bath by the Romans.



There are two main ways of using geothermal energy. In some areas of the world, such as Iceland, naturally heated underground water rises to the surface as steam or hot springs. In other areas we drill holes to get to it.



Hot springs in Iceland

There are not many places that can currently use geothermal energy in an efficient way. There are geothermal power stations in the USA, New Zealand and Iceland. In Southampton (UK) there is a district heating scheme based on geothermal energy.

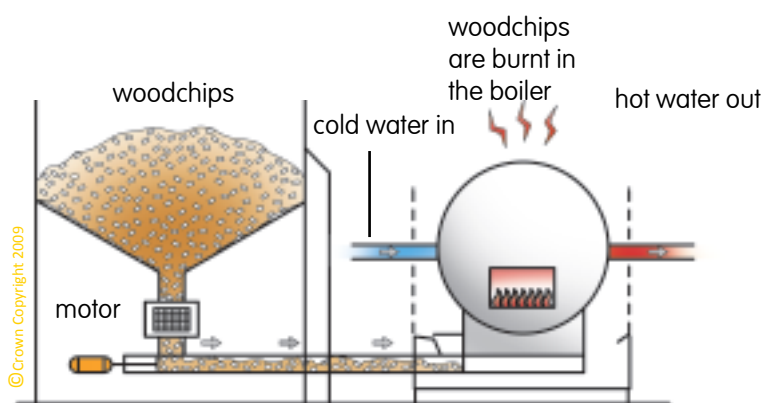
Advantages of geothermal energy	Disdvantages of geothermal energy
• Geothermal power plants produce renewable energy. No fuel is used • There is very little pollution. • Geothermal energy is quiet, and much of the technology needed is hidden underground.	• It can only be used in some areas around the world, where the earth's crust is thin. • Sometimes the hot water that is pumped to the surface contains pollutants such as sulphur.

BIOMASS



BIOMASS

Biomass is plant and animal matter such as straw, sewage, waste food and wood chips. We can burn these natural materials to produce heat and electricity. This is called biomass energy. We can also use them to create fuel called biodiesel which we can use in vehicles instead of petrol and diesel.



The wood chips are burned in a boiler to heat water, which can be used to heat buildings or make electricity. Household waste, animal and factory waste, and straw can also be used as fuel.

Trees grown specifically for fuel are felled, cut into wood chips and dried. In order not to increase the amount of carbon dioxide in the atmosphere it is important that more trees are planted.

Landfill

Some of our waste is recycled, but most of it is dumped in landfill sites. As the plant and animal material in the waste decays, it gives off methane gas. The gas can be collected and used as a fuel to heat water and make steam. This turns a generator which makes electricity.



The UK produces 228 million tonnes of waste every year. Only 11% of the UK's waste is used to make electricity at the moment.

Advantages of Biomass	Disadvantages of Biomass
• It does not use up limited resources such as coal. • It stops landfill gas from going into the air, where it could damage the atmosphere. • It does not rely on the weather, so it can provide energy all the time.	• Waste materials have to be collected, which can be costly and cause pollution. • Burning fuels does cause some air pollution. • Growing crops to use for biomass takes up a lot of land, which could otherwise be used to grow food, and requires a lot of local water. It also decreases biodiversity through loss of habitat.

HYDRO POWER

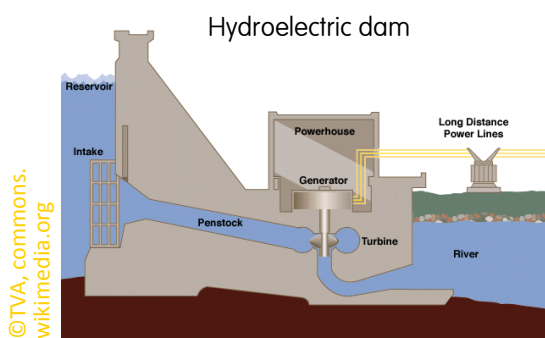
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HYDROPOWER

Hydropower means energy from moving water. Electricity can be generated using three sources of moving water: waves, tides and rivers.



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There are 200 hydroelectric power plants in the UK.

Hydroelectric energy is electricity generated by building dams across rivers which force water to turn generators.

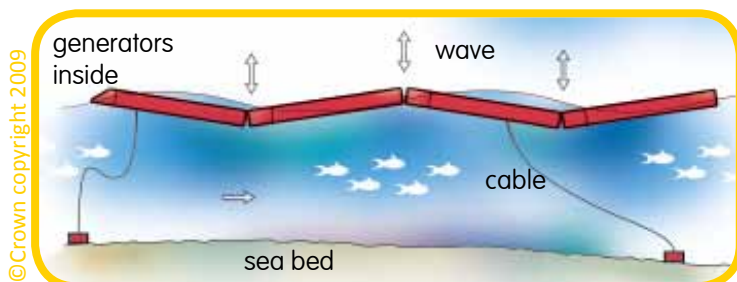
Dams can be built in mountainous areas where there are fast-flowing rivers. On flatter land rivers flow more slowly so large artificial dams have to be built to create reservoirs.

Advantages of hydroelectric energy	Disadvantages of hydroelectric energy
• It is renewable because rain keeps falling and rivers flow continually. • It is reliable because the water can be stored until it is needed. • It creates no pollution. • Once built, the supply of electricity is relatively cheap.	• Dams are very expensive to build. • There are few good sites and land for homes may be lost when they are built. • Wildlife habitats can be lost when land is flooded to make reservoirs. River life can also be affected by dams.

Source: BIS

Wave and tidal energy are both still undeveloped. At the moment, there are no tidal energy projects that generate electricity in the UK. In fact, there are only 40 sites across the World that are suitable for large tidal barrages.

There are only two wave generators in the UK, one in Scotland (Pelamis) and one in Cornwall (Wavehub). It is a renewable source as waves will not run out but it is not always reliable because sometimes the waves are too big or too small to generate electricity. The UK has a big coastline so there is potential to expand wave power.



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The Pelamis wave machine is 120 metres long and made up of four large tubes which move up and down with the motion of the waves.

A tidal barrage is a giant dam built across a river or a bay on the coast. As the tide comes in or out water rushes through, turning a generator to create electricity.



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