

Geography

What do we need?

Years 5 & 6

Lesson 2



The
Coombes
CE Primary School

Unit/Lesson focus: the aim of this unit of learning is to understand aspects of human geography: considering why human settlements developed where they did.

Credit – www.twinkl.co.uk

Unit Learning Objectives:

L.O.: To explain what settlers need

L.O.: To explain how electricity is generated and distributed in the UK

Lesson 2

L.O.: To explain how electricity is generated and distributed in the UK

I can explain how electricity is generated in the UK.

I can also identify the main stages of electricity distributions.

I can even use maps to show UK electricity distributions.



Vocabulary focus:

electricity

(noun)

Electricity is a form of energy that can be carried by wires and is used for heating and lighting, and to provide power for machines.

***electricity (noun) = power, mains, current,
energy***

Example Sentences

*We stayed in a cabin with **electricity** but no running water.*

*Our new car is powered by **electricity**.*

Vocabulary focus:

generate

(verb)

To **generate** a form of energy or power means to produce or make it.

***generate (verb) = produce, create, make,
form***

Example Sentences

*Solar panels **generate** the house's energy.*

*Using a ground source heat pump is a more environmentally friendly way to **generate** heating for your home.*

Vocabulary focus:

distribute

(verb)

If you **distribute** things, you hand them out or deliver them to people.

distribute (verb) = dispense, supply, give out, hand out

Example Sentences

*The protesters **distributed** leaflets sharing their views.*

*As they had too many belongings, they decided to **distribute** some of their furniture to their friends when they moved into their smaller flat.*

Vocabulary focus:

pylon

(noun)

Pylons are very tall metal structures which hold electric cables high above the ground so that electricity can be transmitted over long distances.

pylon (noun)

Example Sentences

*We are used to seeing electricity **pylons** but would we ever get used to seeing wind turbines?*

*He prefers flying his helicopter in the daylight hours so that he can more easily avoid the electricity **pylons**.*

Vocabulary focus:

power station

(noun)

A **power station** is a place where electricity is produced.

power station (noun)

Example Sentences

*How many homes can one **power station** provide electricity for?*

*“The artist has created a grainy painting of a **power station**,” observed Jack.*

Vocabulary focus:

gigawatt (GW)

(noun)

A **gigawatt** is a unit of power that equals one thousand million watts.

gigawatt (noun)

Example Sentence

*One **gigawatt** is roughly the output of one large power station.*

How does the electricity get to our classroom?

Power station



Pylon



Wire



Light switch



Lightbulb



Video link: <https://vimeo.com/133054605>

The National Grid



Watch this video which shows how power demands varied around the UK at different times of day.



Look at the meter in the bottom left corner:

- The units are gigawatts (GW)
- The icons show the time and temperature.



The peak usage (58GW) is the equivalent of everyone in the UK turning on a microwave all at the same time!

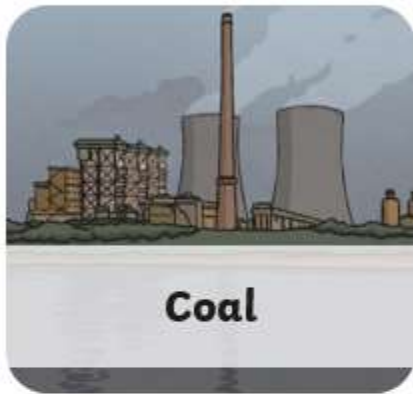
Now watch the video again. Each time it stops, answer these questions:

- What is happening?
- What can you tell me about the power usage?
- Can you explain why that is happening?

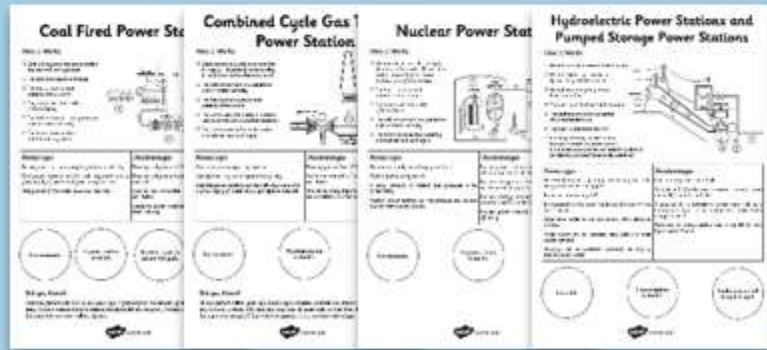
Types of Power Station



There are four main types of power station operating in the UK:



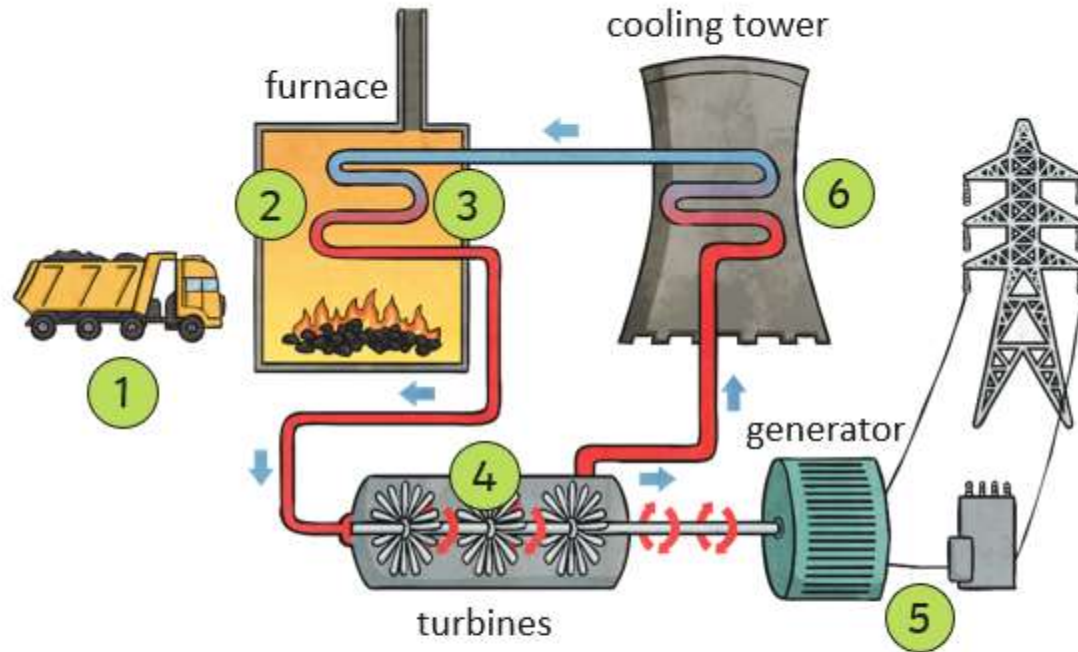
Use the **Power Generation Fact Sheets** to find out about each type.



What is different about pumped storage power stations?



Coal Fired Power Stations



1. Coal is brought to the power station and crushed into a powder.
2. The coal is burned in a furnace.
3. The heat is used to heat water to create steam.
4. The steam turns the blades of the turbines.
5. The turbines connect to a generator which creates electricity.
6. The steam is cooled into water in cooling towers.

Coal Fired Power Stations

Advantages	Disadvantages
<ul style="list-style-type: none">• Burning coal is a cheap way to generate electricity.• Coal power stations can be built anywhere with a good supply of water and good transport links.• Many areas of the world have coal reserves.	<ul style="list-style-type: none">• Burning coal produces CO₂.• Burning coal produces sulphur dioxide, a gas found in acid rain.• Coal is not renewable. There are limited supplies worldwide.• Coal-fired power stations need lots of coal to keep them running.

Non-renewable.

17 power stations in the UK.

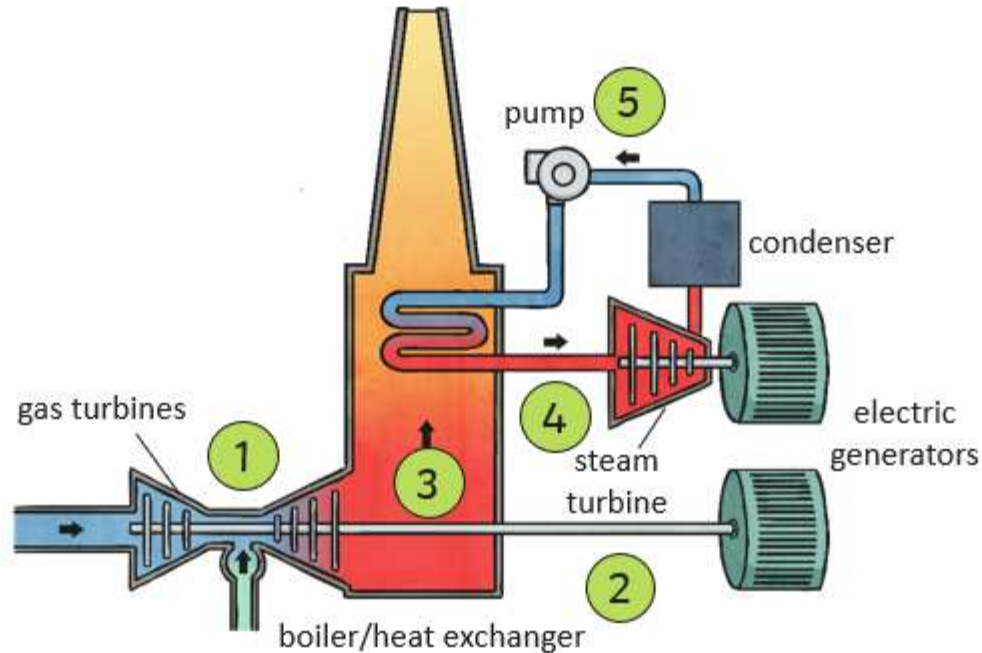
Should be viable for around 180 years.

Many coal-fired power stations in the UK are old and need emissions equipment updating.

Did you Know?

Coal was formed over 300 million years ago. It formed from the remains of plants that died in swampy areas. As there were no bacteria present, the plants did not rot down. Chemical changes over time changed the plants into coal over millions of years.

CCGT Power Stations



1. Gas is burned in a turbine to heat the air supply. The force of the expanding air pushes the turbine blades around.
2. The turbines connect to a generator which creates electricity.
3. The hot gases are used to heat water to create steam.
4. The steam turns the blades of a steam turbine connected to another generator.
5. The steam is cooled back into water in condenser and used again.

CCGT Power Stations

Advantages	Disadvantages
<ul style="list-style-type: none">• Gas is easy to transport by pipeline.• Lots of electricity can be generated quickly.• Gas-fired power stations can be built anywhere with a good supply of water and a gas pipeline network.	<ul style="list-style-type: none">• Burning gas produces CO₂.• Gas is not renewable. There are limited supplies worldwide.• The UK currently imports most of its gas. This means we are reliant on other countries for our supply.

Non-renewable.

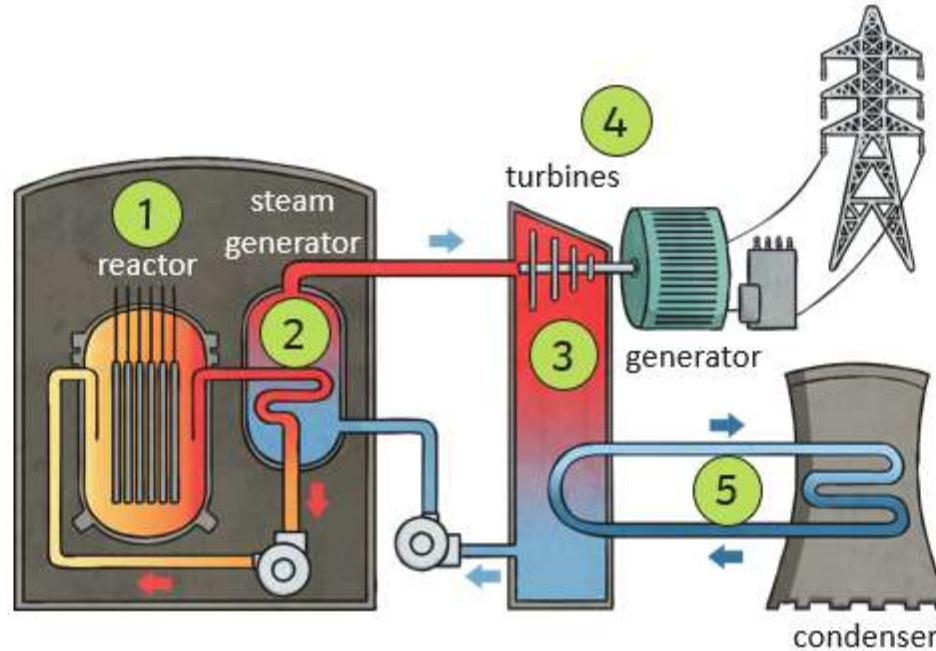
36 power stations
in the UK.

Should be viable
for 80-100 years.

Did you Know?

Oil was formed million years ago. Dead organic material (animals and plants) built up on the ocean floor and in rivers. It mixed with sand and mud. Lots of layers built up over time. Heat and pressure changed the layers into kerogen. If this mixture is gaseous, it will turn into natural gas.

Nuclear Power Stations



1. Uranium atoms are split into lighter elements in the reactor. This is called nuclear fission. Nuclear fission produces lots of heat energy.
2. The heat is used to heat water to create steam.
3. The steam turns the blades of the turbines.
4. The turbines connect to a generator which creates electricity.
5. The steam is cooled into water by a condenser and used again.

Nuclear Power Stations

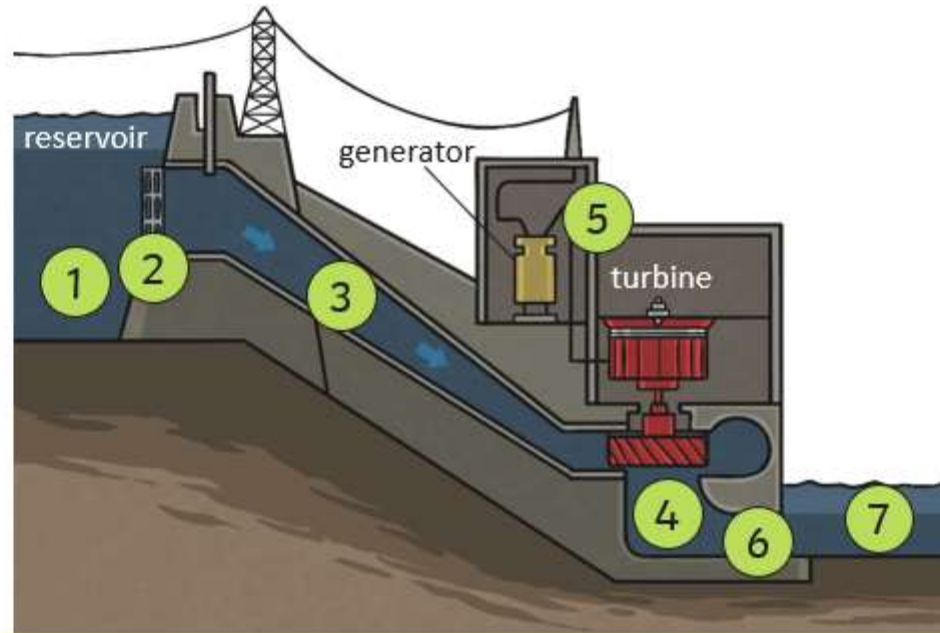
Advantages	Disadvantages
<ul style="list-style-type: none">• Uranium is readily and cheaply available.• Nuclear fuel is easily stored.• A small amount of nuclear fuel produces a lot of electricity.• Nuclear power stations do not produce any carbon dioxide from nuclear fission.	<ul style="list-style-type: none">• Nuclear power stations may be unpopular with people who are concerned about how safe they are.• Nuclear energy is not renewable. When uranium runs out it cannot be replaced.• Nuclear energy produces radioactive waste which must be buried in sealed containers for a long time.• Nuclear power stations cannot be switched on and off easily.

Non-renewable.

11 power stations
in the UK.

Many of the
existing power
stations in the UK
will need to shut
down in the next
10 years.

Pumped Storage Power Stations



1. Water is stored in a reservoir behind a dam.
2. When the electricity is needed, a pipe called a penstock is opened.
3. Water flows under great pressure down to a turbine.
4. The water turns the blades of the turbine.
5. The turbine connects to a generator which creates electricity.
6. The water is returned to the river.
7. The water is stored in a lower reservoir. It is pumped back up to the top reservoir at times of low electrical demand (for example, overnight).

Pumped Storage Power Stations

Advantages	Disadvantages
<ul style="list-style-type: none">• Once the plant is built, operating costs are very low, so the energy produced is virtually free.• It does not produce any CO₂.• It is sustainable – the water supply that fills the reservoir never runs out.• Dams store water so we can control when electricity is made.• Power output can be increased very quickly to meet sudden demand.• Electricity can be generated constantly as long as there is enough water.	<ul style="list-style-type: none">• Dams are very expensive to build.• Valuable land is flooded when a reservoir is made. Homes and wildlife habitats can be lost.• A good site for a hydroelectric power plant, such as a mountainous region, is not always near towns where energy is needed.• There are not many suitable sites in the UK for new hydroelectric schemes.

Renewable.

7 power stations
in the UK.

Smaller sites
are still being
developed.

Task:

Where are the Power Stations?



Use your atlas and the Power Stations in the UK Activity Sheet to identify the locations of UK power stations.

★ Power Station

★ Power Station

Use the key below and your atlas to mark the location.

Key:

Coal Fired	Nuclear

Power Stations:

Coal Fired
Newcastle, Teesside Eboli Gravelly, Shropshire Oxbur, Oxfordshire Ores, North Yorkshire Longsight, Greater London, E19

★★ Power Station

★★ Power Station

Use the key below and your atlas to mark the location.

Key:

Coal Fired	Nuclear

Then, use your atlas to mark the location of the following power stations:

Coal Fired	Nuclear
Newcastle, Tyne Eboli, Essex Gravelly, Shropshire Oxbur, Oxfordshire Ores, North Yorkshire Longsight, Greater London, E19	Humberston, West Yorkshire, Scotland Hartwood, County Durham Wylfa, Anglesey Sellafield, Cumbria

★★★ Power Station

★★★ Power Stations in the UK

Choose a map symbol for each type of power station.

Key:

Coal Fired	Nuclear	CCGT	Pumped Storage

Then, use your atlas to mark the location of the following power stations on your map.

Power Stations:

Coal Fired	Nuclear	CCGT	Pumped Storage
Newcastle, Tyne Eboli, Essex Gravelly, Shropshire Oxbur, Oxfordshire Ores, North Yorkshire Longsight, Greater London, E19	Humberston, West Yorkshire, Scotland Hartwood, County Durham Wylfa, Anglesey Sellafield, Cumbria	Peterhead, Scotland Cookham, Berkshire Luncarty, Northern Ireland Suddley, Gloucestershire Barking, London Sarnahan, Sussex	Dring, Leicestershire, Wales Croston, Lancashire, Scotland

UK Power Stations



Look at [this map](#) from UK Energy Watch.

What do you notice about the location of nuclear power stations?

Why do you think that is?

Which power station is closest to our school?



Reflection:

Lesson 2

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