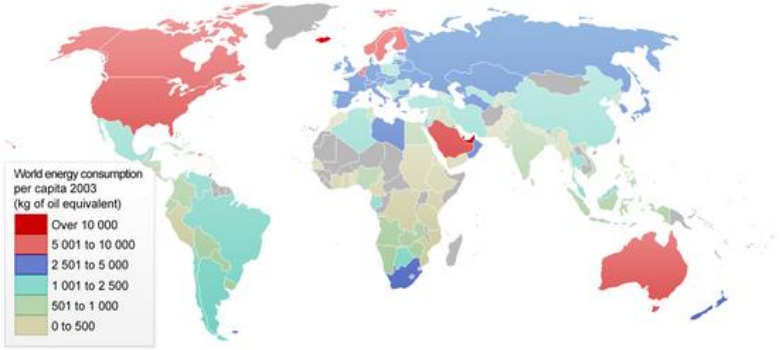
Energy - subject summary

9.5.1 Describe the uneven distribution of energy consumption and the reasons for this.

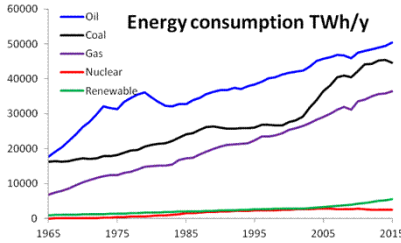
Which countries consume the most energy and what are the impacts of this?



1. The map shows that energy consumption is **unevenly** distributed, with the **highest rates** of consumption taking place in the **developed countries.** The **lowest rates** of consumption are in **developing countries**, for example the countries of **central Africa**.
2. Energy is important for **industry, transport and homes**.
3. **Social well-being** will be **negatively impacted without** energy as people will not be able to heat homes or turn lights on during the night.
4. If you do not have enough energy, **economic well-being** in the country can be **negatively impacted**. This is because industries cannot operate, meaning there are fewer jobs which could stop the country from developing. Furthermore, people cannot travel to jobs in other places, as the lack of energy makes travelling difficult.

Why is energy consumption uneven?

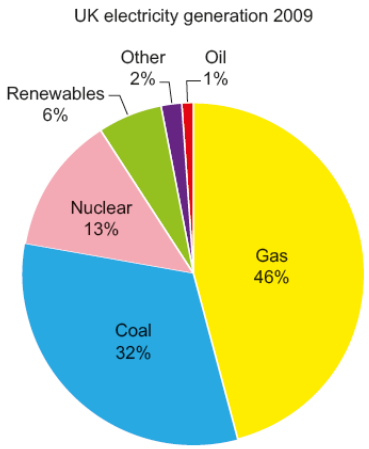
1. Some countries do not have energy reserves; whilst others do not have the technology to exploit their resources.
2. For some countries the only way to access energy resources is to **import** them, which is **expensive**.
3. **Consumption** of resources therefore **depends on wealth** and their **availability.**
4. **Developed countries** and **emerging countries** either have their **own supply** of energy resources or can afford to **import**, therefore, consumption is high, and quality of life is high.
5. However, in **developing countries** they **cannot afford** to **exploit** their resources or **import** from other countries, so consumption is still relatively low, resulting in a poorer quality of life.

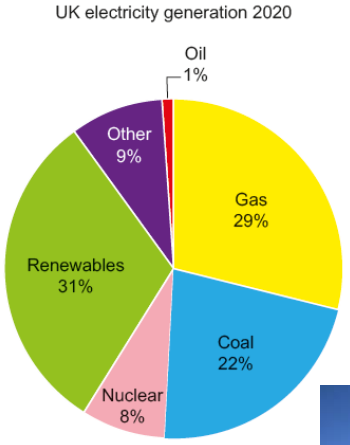


Consumption of energy is growing world-wide:
1. Generally, the **consumption** of energy is **growing world-wide**.
2. Most countries are developing and becoming richer.
3. As the countries become more developed consumption increases.
4. Non-renewable energy consumption is still increasing rapidly world-wide. The impact of this can be seen on the next page.

9.5.2 Explain how the global energy mix is changing and the factors which influence this.

How is the UK's energy mix changing?





Interpretation of the pie charts:

1. As can be seen from the pie charts, the UK's energy mix is **changing**.
2. From 2009-2020 there is a **decrease** in the use of **coal and gas** and a significant **increase in renewable energies** and nuclear energy.

Why is the UK's energy mix changing?

1. **Coal and gas** are beginning to **run out** which means the government has had to look for alternative methods of getting energy.
2. Due to the reduced amount of coal and gas, **extracting** these non-renewable resources is much more **difficult**. This means the cost of these have gone up, meaning they are becoming too **expensive** for people.
3. Coal and gas produce **CO_2** when burnt. The government in the UK is committed to reducing the amount of CO_2 produced, as this is a greenhouse gas, which is contributing towards **climate change**.
4. **People** in the UK have become more aware of the **environmental impacts** of using non-renewable energies (fossil fuels). Therefore, they are **choosing** to use **alternatives**.
5. There have been significant **improvements in the efficiency and reliability of renewable energies**, meaning they are now a good alternative to fossil fuels. For example, one wind turbine can provide enough power for 332 homes for a year.

Key terms:

1. **Imports** – Goods brought into a country.
2. **Energy consumption** – The amount of energy or power used.
3. **Non-renewable energies** – Energy, which is finite, is not sustainable and takes a long time to replenish.
4. **Renewable energies** – Energy, which is infinite, sustainable and is easily replenished.
5. **Fossil fuels** – Another name given to oil, gas and coal (non-renewable energy sources). They are known as fossil fuels because they have developed due to the decomposition of fossilised plants and animals over millions of years.
6. **Well-being** – When a person feels comfortable, healthy and happy.
7. **Extraction** – To remove a product/ resource from the ground.
8. **Disposable income** – The amount of money people have left to spend on themselves, after they have paid for all their bills.
9. **NIMBY** – This is an abbreviation for 'Not In My Backyard;' this can often refer to people who support things such as renewable energy, but only if they are not placed near their homes. This behaviour often makes it difficult to get planning permission to build things such as wind turbines.

Energy - subject summary

9.5.3 Assess the challenges and opportunities linked to renewable and non-renewable energy sources.

Non-renewable energy:

1. Non-renewable energy sources are **finite** which means they will **run out** one day.
2. This energy has normally been produced by the decomposition (breaking down) of fossilised plants and animals.
3. This process takes millions of years.
4. Most non-renewables are referred to as fossil fuels and burning them produces **greenhouse gases** (CO_2).

Coal

Gas

Types:

The three main non-renewable energy sources are **oil, gas and coal**. However, **nuclear energy** is also included as a non-renewable. Fracking is a new method of extracting gas from the ground.

Opportunities:

1. These energies have been used for a long time, so they are **efficient** as technology has been made to maximise their energy output. This means they produce a **large amount of energy**, using a small amount of fuel.
2. **Oil** can be turned into petrol and diesel. These are the most **effective** way to power **transport** efficiently.
3. **It is easy to transport** this type of energy. For example, gas pipes from Russia and Scandinavia deliver gas to the UK. Fuel tankers can transport non-renewable energy sources, meaning they are easy to import.
4. A significant amount of **jobs** created in the extraction of these resources. This produces huge amounts of taxes for the local area e.g. offshore oil and gas, off the coast of Aberdeen in Scotland.

Challenges:

1. The cost of **extracting** fossil fuels can be **expensive**. As the reserves run out, extraction becomes more difficult which means costs increase.
2. The burning of **fossil fuels** produces **CO_2** and greenhouse gases which cause **climate change**.
3. Accidents such as **oil spills** or **nuclear disasters** can leak toxic chemicals into water sources, soils and the atmosphere, **killing animals** and posing a significant **risk to human health.**
4. **Nuclear waste** is **expensive** to **dispose** of as it is highly dangerous. This pushes up the cost of producing electricity.
5. The UK is **reliant** on **importing** much of its gas and oil from places like Russia. This can be an issue when the countries have disagreements, leading to some believing that **Russia could 'turn off our lights.'**
6. **Reducing coal mining and oil/ gas** extraction will lead to the **loss of jobs**, and an increase in unemployment in certain areas.

KPIs:

9.5.1 Describe the uneven distribution of energy consumption and the reasons for this.
9.5.2 Explain how the global energy mix is changing and the factors which influence this.
9.5.3 Assess the challenges and opportunities linked to renewable and non-renewable energy sources.
9.5.4 Assess the social, economic, environmental impacts of energy production in a chosen country.

9.3.3 Assess the opportunities and challenges faced by people living in a city in an emerging country.

Renewable energy:

1. These are **infinite** resources, which means they will **not run out.**
2. The energy is **sustainable and is replenished**.
3. This type of energy production does not require fossil fuels, so therefore **greenhouse gases are not produced**.

Wind

Solar

Types:

The most commonly used renewables are **wind, solar,** biomass (burning certain plants e.g. oil rape seed) and **hydroelectric power** (produced by water turning turbines in a dam). Tidal energy is also used at some coastal locations, where there is large tidal movement.

Opportunities:

1. They will not run-out, meaning countries such as the UK can be **self-sufficient** and will not need to rely on imports from other countries.
2. **No greenhouse gases** are produced during operation, meaning a reduced impact on climate change.
3. Once they have been built set up **energy bills will come down** in the long term because they require little upkeep.
4. **New jobs** can be created in industries producing these renewable technologies, reducing unemployment in the UK.

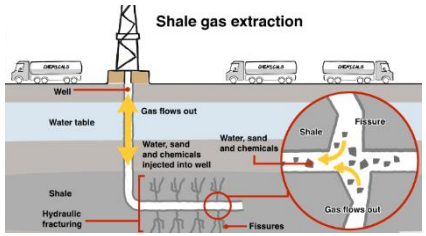
Challenges:

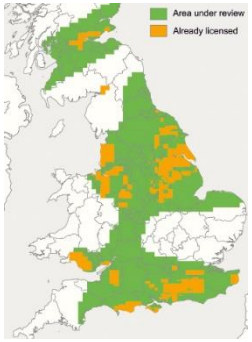
1. Both wind and solar energy are **unreliable**, meaning that little energy is produced during certain times e.g. on a calm day or at night. This means that countries will still need to use some fossil fuels (non-renewables).
2. Wind turbines are said to be **ugly** and this can create **NIMBYism**, as people are worried that the value of their property will decrease. If they are placed offshore at the coasts, people worry that tourist numbers will reduce meaning lost income for hotels etc.
3. The **initial cost** of installing some renewables can be **expensive**, meaning a short-term increase in energy bills.
4. Wind turbines can be **dangerous for animals**, for example they can impact migrating birds. Birds and bats have been killed by the rotating blades.
5. Hydro-electric power requires the damming of a river and the creation of a reservoir. The reservoir can displace communities, flood farmland and destroy habitats. The dam can also impact the migration of fish, such as salmon, down or upstream.
6. The use of biofuels, can result in huge areas of forest being destroyed to grow crops such as oil rapeseed, resulting in the **destruction of habitats**.

9.5.4 Assess the social, economic, environmental impacts of energy production in a chosen country.

Fracking in the UK:

Fracking has not fully started in the UK, but there are several areas which have already received licenses for it to begin.





What is fracking?

1. Fracking is a process whereby gas trapped in shale rock is released.
2. A drilling pipe is placed into the ground.
3. Water mixed with sand is pumped into the drilling pipe at high pressure.
4. This widens cracks in the ground, allowing trapped gas to escape.

Opportunities of fracking in the UK:

1. Blackpool is one area where large fracking sites could be established. Fracking sites around Blackpool could earn **Blackpool Council £1.7m per year**.
2. The UK has enough shale gas that we would **no longer need to import gas** from abroad, this would **decrease energy bills by 2%,** meaning people could have more disposable income. It would also mean the UK would be **self-sufficient**.
3. Many **jobs** will be **created** in the areas where fracking sites are established. For example, in the north west of the UK, where there are high levels of unemployment. This means the government will make more through taxes.

Challenges:

1. Fracking is known to cause **mini earthquakes** in areas where the sites are located, some of these can be quite high on the Richter scale. There is a fear that this could damage people's properties and result in an **increase in insurance costs** in the areas impacted.
2. The water, which is pumped into the ground, can get into the water table. This **pollutes the water** and makes it dangerous to human health. It could also result in poisoning wildlife.
3. Countryside areas (**rural areas**) will be **destroyed**, for example Roseacre Wood, near Blackpool. This will **ruin views** for locals and potentially reduce tourist numbers which could result in lost income for businesses nearby. Also, habitats would be lost.
4. There will be an increase in **noise and air pollution** from the heavy machinery and vehicles. The air pollution could lead to **breathing disorders** in the local area.
5. With the visual, noise and air pollution, **house prices** near the proposed sites would **decrease**. This would result in homeowners losing huge sums of money. In Roseacre Wood, a **10% reduction** is predicted from the average house value of £300,000. This is a £30,000 loss.
6. With fracking, gas will still be used, releasing **greenhouse gas emissions (CO_2)** and contributing to climate change.