KS3 Geography Knowledge: Climate Change

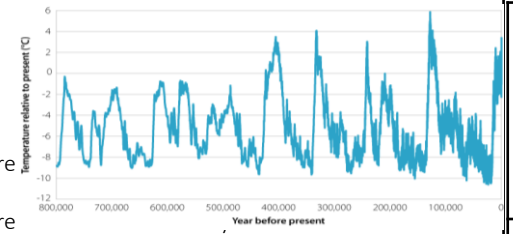
LONG TERM CLIMATE CHANGE

How have global temperatures changed over the past 800,000 years?

Over the past 800,000 years the earth's climate has fluctuated with periods of warm weather and periods of colder weather.

More specifically.....

300,000 years ago, average global temperatures were warmer than today, where as approximately 420,000 years ago, average global temperatures were



HISTORICAL RECORDS

Historical documents show that temperature changes have resulted in periods of history where the earth was colder than today (glacials) and warmer than today (interglacials). *During the Little Ice Age, Napoleon's army froze to death.*

PAINTINGS

Paintings from 1677 show that the Thames was previously frozen over!

Geological time scale

Is a calendar of rocks through time. It can be used to identify time periods or climate patterns from a rock or fossils.

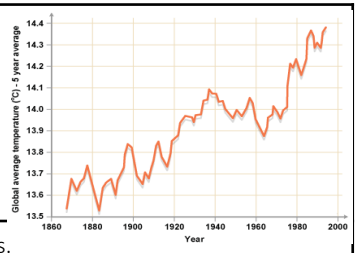
RECENT GLOBAL WARMING

How has global temperature changed since 1860?

More specifically...

More recently the earth's temperature has shown a rapidly warming trend, with average temperatures continuing to grow.

In 1883, the average temperature was 13.5°C, whereas in 1960 the average temperature had risen t 14.0°C. By 1985, the average temperature had risen to almost 14.4°C.



THERMOMETER RECORDS

- Average global temperatures have risen by 0.8°C in the last 100 years.
- Most of the warming has occurred recently.
- In the last 35 years, average temperatures have risen by 0.5°C.
- The 20 warmest years on record have all come since 1995.
- The five warmest years on record have come since 2010, with 2016 being the warmest year yet.

SATELLITE IMAGES

Arctic ice cover has decreased since the 1970s. It has reduced by approximately 4% and has halved in thickness in many places.

SEA LEVEL RISE

Rises in temperature and melting ice sheets has resulted in a rise in sea levels.

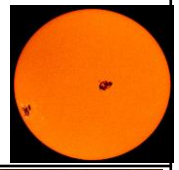
NATURAL CAUSES OF CLIMATE CHANGE

Solar output

A sunspot is dark patch on the sun that appears from time to time. Every 11 years the number of sunspots changes from very few to lots to very few again.

Lots of sunspots = warmer *Very few sunspots = cooler*

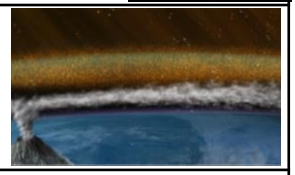
- *During 1645–1715 there were very few sunspots. During this time, there was a very cold period known as the 'Little Ice Age'.*



Volcanic Activity

Violent volcanic eruptions blast lots of ash, gases (e.g. sulphur dioxide) and liquids into the atmosphere. Major volcanic eruptions lead to a brief period of global cooling. This is because the ash, gases and liquids can block out the sun's rays, reducing the temperature.

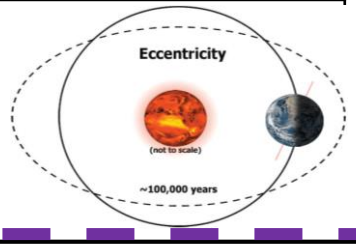
- *Pinatubo 1991 eruption = world temperatures fell by 0.5°C for a year.*



Orbital Change

Orbital change refers to changes in how the earth moves round the sun. It affects how close the earth is to the sun and therefore how much energy we get from the sun. When the earth is very close to the sun, it is warmer. When the earth is further away from the sun, it is cooler.

- *Eccentricity: how the earth orbits the sun. Every 100,000 years the orbit changes from circular to elliptical (egg-shaped). This affected how earth is to the sun.*



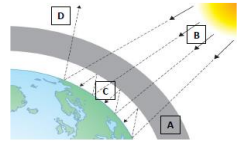
HUMAN CAUSES OF CLIMATE CHANGE

The Greenhouse Effect

A) Humans produce greenhouse gases, which create a blanket around the earth.
B) Sunlight travels to earth as shortwave radiation.
C) Sunlight bounces off the earth's surface as long-wave radiation.

This reflected sunlight is trapped in the earth's atmosphere by the greenhouse gases = earth heats up.

A) Some heat does manage to escape.



How does human activity = greenhouse gases?

Methane

Humans are to blame because....

Cows produce a methane when they fart, belch and poo. Methane is a GHG that traps longwave radiation in the earth's atmosphere.

The world's population is rising and countries are becoming more developed = there are more people and more families that have money to spend on food (e.g. meat) = rising demand for meat = more animals farmed = more methane produced.

Carbon dioxide CO_2

Humans are to blame because...

CO_2 is the GHG that people are most worried about. CO_2 adding to the atmosphere fastest.

- Fossil fuels (coal, gas, oil) are burnt to make energy = carbon dioxide is released into the atmosphere.
- Humans drive cars, which release carbon dioxide, nitrous oxide and methane into the atmosphere.

Rising population and more developed countries = increased demand for electricity = more carbon dioxide produced.

EFFECTS OF CLIMATE CHANGE

Sea level rise due to melting ice sheets = flooding in low lying countries (Bangladesh). 80% of people exposed to river flooding live in developing countries.

Extreme weather (drought) = crops will die = famine. A famine occurred in Somalia (2008-9) where 258,000 died due to a lack of food.

Pests & diseases: mosquitoes love hot weather. Global warming will = 90 million people will be exposed to malaria by 2030.

Extreme weather events = increase in refugees as people are forced to leave their homes due to famine or flooding.

Habitats will be lost due to extreme weather associated with climate change.

Pests & diseases: an increase of 2°C will mean more pests = more crops will die. *E.g. wheat yields losses will increase by 46% in countries such as China.*

Extreme weather (hurricanes). In 2017 there were 83 storms and 42 hurricanes. This was above average. Climate change will result in more hurricanes in the future.

KS3 Geography Knowledge: Climate Change

CASE STUDY OF HOW CLIMATE CHANGE AFFECTS LICS: BANGLADESH FLOODS

Location:	Southern Asia, along the Tropic of Cancer. It neighbours Burma, India and the Indian Ocean.
How has climate change increased flooding ?	• It's low altitude (<10m above sea level) and long coastline (580km) makes it vulnerable to sea level rise. • The Himalayas lie to the north of Bangladesh. The ice and snow melts in the summer, which then rushes down into the rivers in Bangladesh. This occurs more due to increased temperatures. • Bangladesh is prone to cyclones and monsoonal rains which bring a huge amount of rain. Due to climate change, these storms will occur more often.
Primary effects	• 1000s of homes were destroyed • Rice fields were underwater, crops died. In 2020, 0.15 million hectares crop lands were damaged in two successive floods • Salt water got into the ground water, which meant drinking water was contaminated. • Storm surges contaminated drinking water • Land lost to the sea, due to sea level rise. Predicted that by 2050 over 17% of Bangladesh will be lost • Roads and transport links are destroyed
Secondary effects	• 1000s of people were evacuated • Farmers lost their livelihood and land • Waterbourne diseases such as cholera spread. 5000 people in the 2020 floods suffered from diarrhoea and water-borne disease. • Mass migration. People leave the area and move to the near by cities. In 2020 it was recorded that in Bangladesh, 4.4 million people have been displaced due to disasters such as flooding) • Trade was reduced = less income/GDP

What has the UK pledged to do bout climate change under the Paris agreement?

The Paris Agreement

- **The Paris Agreement – an international agreement to tackle climate change and it's effects. 196 countries are involved.**
- Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC) in line with Article 4 of the Paris Agreement.
- The UK = pledged to Reduce their emissions by 68% by 2030 compared to 1990 levels
- To keep the global temperature increase below 2 degrees above pre-industrial levels. At best max 1.5 degrees below.
- Implemented a Climate Change Act in 2008 to make it law that Climate Change is combatted.
- The UK = target of 'Net Zero by 2050. (doesn't mean no carbon emissions but, the UK should offset what it does produce.

How can you make a difference?

Making a difference

- Speak up - Make your voice heard, share your opinions on climate change.
- Share your climate change knowledge so that people understand their impact.
- Join a charity, action group, school project to bring about change locally/globally - Take action and join a group that has a larger audience to get your voices heard.
- Join in community events – safely and peacefully. Join marches or protests (safely with permission) and take a stand against climate change
- Lobby the government. Contact your local MP or government representative asking them to act on climate change
- Make changes to your lifestyle Small changes can make a difference and reduce your impact.

In your Academy consider how you can improve the following:

The type of lighting – Waste and Recycling –Energy usage and type of energy used- Type of windows

What improvements could be made to reduce your academy's carbon emissions and contribution to climate change

CASE STUDY OF HOW CLIMATE CHANGE AFFECTS THE UK

Where is the UK located?	The UK is located in the west of Europe. It is made up of England, Scotland, Wales and Northern Ireland.
How has climate change increased flooding ?	• Extreme weather will be more common – floods, droughts, heatwaves…etc. • Sea level will cause coastal flooding
Negative effects	• Flooding due to extreme weather (precipitation and storms) and sea level rise. The number of people at risk of flooding is likely to double to 1.9 million by 2050. Current flooding costs the UK £1.9 million. • Sea level rise and storms = more coastal erosion. It is expected that sea levels will rise by 1 – 2m by 2080. The most at risk areas will be soft rock coastlines, such as South Wales, North-West Scotland, Yorkshire and the Thames Estuary. • Water shortages due to extreme weather (lack of precipitation). Many places will have a lack of water. • Increases in temperature can lead to heatwaves, such as the 2003 heatwave, during which temperatures reached 38.5° C = 2045 deaths. This will become normal summer weather by the 2040s. • Climate change in other countries (Kenya, Peru, Indonesia) will affect crop yields in these countries. The UK will suffer as it will be more difficult to import food from these countries.
Positive effects	• A warmer, wetter climate will increase crop yields in the UK. • Tourism will increase due to warmer weather = more jobs and income for the UK.

How is the UK responding climate change?

Improving public transport	The UK government has invested £840million in public transport across 10 UK cities. London have improved buses = more people use the bus & less drive = less greenhouse gases. ➢ *Live information boards at bus stops tell bus users when their bus will arrive making it easier.* ➢ *Bus lanes give buses priority on the roads = shorter journey times.* Cycle hire schemes in UK cities encourage people to cycle rather than drive = less greenhouse gas emissions.
National Parks	Planting trees and preventing deforestation = more trees = more photosynthesis = more carbon dioxide removed from the atmosphere = less global warming. Many governments have created national parks to protect trees. *The Gola Forest (Sierra Leone - Africa) is a national park that protects 71,000 hectares of trees.*
Renewable energies	Generating energy from natural renewable sources (*solar panels, hydro-electric power, wind turbines*). They do not produce greenhouse gases.
International agreements	Many of the governments around the world meet to discuss climate change and how they can work together to reduce global carbon emissions. I*n 2016 world leaders met at the Paris Climate Summit where 196 countries signed a climate agreement, where they promised to:* ➢ *Reduce greenhouse gas emissions and keep global temperature increase below 2°C.* ➢ *HICs to support LICs by providing $100 billion per year*
Local Responses	➢ Solar panels: *Using the sun to create energy, therefore less fossil fuels are burned.* ➢ Insulation and double-glazed windows Traps heat in the house = less heating is needed = less energy used = less fossil fuels burned. ➢ A shower instead of a bath: Less water is used = less heating is needed for water = less energy used = less fossil fuels burned ➢ Switch off electrical goods: Prevents the overuse of energy. . ➢ Turn down heating: Less energy is used = less fossil fuels are burned. ➢ Use low energy light bulbs: Less energy is used = less fossil fuels are burned.