



Session 2 – Future Forecast 2050

Summary

In this session, we will delve into the concept of climate change, exploring its meaning and implications for the future climate. We will investigate the causes behind climate change and examine the ongoing efforts of scientists at the Met Office to better understand these shifts in our climate.



50 minutes



Materials required

- YouTube access
- Climate Change slides
- 2050 slides

Activity Steps

01 What is Climate Change?

Tell the group that in the previous session we discussed the components of our Earth's climate system. We also mentioned that humans are changing the climate system. We're now going to discuss the phrase 'climate change'. Ask the group, what might our climate look like in the future? Take suggestions.

Since our Earth formed around 4.5 billion years ago, our climate has always undergone change, from freezing ice-ages to warm interglacial periods, like the one we live in now. Until recently, natural factors have been the cause of these changes. However, the change the Earth's climate system is currently experiencing is different in several key ways.

Show slide 2. Tell the group that since the beginning of the Industrial Revolution, the average temperature of the planet has risen by just over 1°C. This might not sound very much, but this is a rapid change in terms of our global climate system. Previously, natural global changes have happened over much longer periods of time. For example, the rise of around 5°C between the last glacial period and the current inter-glacial one happened over about 5,000 years.

Show slide 3 – Global projections video. (the darker reds and even pinks show areas where the world has warmed more -i.e. absolute, rather than percentage change. The last ice age ended around 11,000 years ago and since then, the Earth's climate has been relatively stable. It stayed this way until around the middle of the last century when the Earth began to undergo this rapid warming. Also, whilst the average temperature change across the world has been a little above 1°C, in some places it has been much higher. For example, warming in the Arctic is currently two to three times higher than this global average!

So, we know that temperatures are changing across the globe. But what about the UK? Well, here in the UK, we have also seen a rise in temperatures. **Show slide 4** – Met Office climate news articles.

The 8 warmest years on record have all occurred since 2003 – this means that majority of them have happened within your lifetime! 2022 was the first year in the UK when [40°C was recorded](#) and 2023 was the [second warmest year on record for the UK](#).

Show slide 5 - UK climate stripes. This image visually shows the warming trend through time, with each year shown as a stripe of colour. Cooler years are blue, while warmer years are red. We can see that through time, the colours are changing from cooler blues to warmer reds. So, we know that the UK is getting hotter. We also know that this is happening quickly. What else do we know about climate change?



15 minutes



Slide

https://www.ipcc.ch/report/ar6/wg1/downloads/faqs/IPCC_AR6_WGI_FAQ_Chapter_02.pdf (pg 12)



Slide

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02 What are the causes of climate change?

Tell the group that the climate has changed over very long timescales, transitioning between ice ages and interglacials. These changes are primarily caused by the position of the Sun relative to the Earth. However, present-day climate change, which is happening now, is caused by humans mainly through increasing the volume of greenhouse gases in our atmosphere.

Show slide 6 - CO₂ increases at Moana Loa This graph shows the increase in carbon-dioxide within our atmosphere over the last 60+ years. This is an observational dataset taken from a monitoring station on Moana Loa, a volcano on the Island of Hawaii. You can see that the concentration has increased through time to the present day. This graph takes us up to June 2024. Ask the group, what do we think will happen in the future? Take some suggestions.

If you guessed that concentrations will continue to increase, then you have made the same forecast as the scientists at the Met Office.

Tell the groups that we know that these increasing greenhouse gas levels are leading to increased temperatures. But why is this important for us to understand? Whilst at first, having a warmer climate may sound like a good thing for our fun trips to the beach here in the UK, a changing climate may bring many problems, for example, health risk in extremely warm conditions and trouble growing crops.

This news may sound daunting, but don't worry, there is hope for the future. Scientists, like those at the Met Office, are studying these changes to understand what is happening and what may be likely to happen in the future. Scientists also talk to policy makers – including people in government. This helps us all work together to make more informed decisions to mitigate climate change, by reducing our emissions, and to adapt to the existing changes in our climate.

NB

Depending on time, you could reference COP (Conference of Parties)– but this will be discussed further in Session 3.



15 minutes

Word Bank

Aerosols - Aerosols - a collection of airborne particles, typically less than 100th of a millimetre in size, that occur in the atmosphere.

Anthropogenic - caused or produced by humans.

Atmosphere - is the mass of air that surrounds the Earth. It contains nitrogen (78%) oxygen (21%) and traces of other gases. The atmosphere plays an important part in protecting life on Earth.

Climate change - Climate change refers to a large-scale, long-term shift in the planet's weather patterns and average temperatures.

Climate model - a mathematical representation of the climate system based on its physical, chemical and biological components, in the form of a computer programme. The computer climate models used at the Met Office Hadley Centre are detailed three-dimensional representations of major components of the climate system. They are run on the Met Office supercomputer.

Climate - average weather and its variability over a period of time, ranging from months to millions of years. The World Meteorological Organization standard is a 30-year average.

CO₂ - carbon-dioxide, a gas in Earth's atmosphere. It occurs naturally and is also a by-product of human activity, such as burning fossil fuels and land-use change. It is the principal anthropogenic greenhouse gas.

COP - COP is the annual assemblage of the United Nations Climate Change Conference of the Parties. Nations from across the world come together to discuss global progress towards limiting climate change. This includes reviewing progress on meeting the goals of the Paris Agreement.

Earth Climate System - the Earth climate system is a complex system of five main components: the atmosphere; the hydrosphere (oceans, lakes and water); the cryosphere (ice sheets, glaciers etc), the land surface and the biosphere (e.g. living creatures and plants). These five components are influenced by external forcings, two of which are the sun and human activities.

Fossil-Fuels - biomass lain down in the Earth millions of years ago, forms coal, oil, and natural gas. When these fossil fuels are burnt they produce carbon-dioxide.

Global warming - a rise in the Earth's temperature, often used with respect to the observed increase since the early 20th century.



Greenhouse gases - gases in the atmosphere, which absorb thermal infra-red radiation emitted by the Earth's surface, the atmosphere and clouds. Examples include water vapour, carbon-dioxide, methane and nitrous-oxide.

Paris Agreement - The United Nations describe the Paris Agreement as a legally-binding international treaty on climate change. It was established at COP21 in Paris, in 2015. The goal of the agreement is to limit global warming to well below 2°C, and preferably 1.5°C of global warming.

Projections - Computer models are used to simulate decades into the future. These models highlight that increasing greenhouse gas concentrations in the atmosphere lead to increasing global temperatures.

Uncertainty - the degree to which a value is unknown. In the context of climate change, uncertainty arises from imperfect understanding of the physics of the atmosphere; imperfect representation of the real climate in climate models, owing to limited computer power; and unknown future greenhouse gas emissions.

Weather - We use the term weather to describe the conditions of the atmosphere over hourly or daily timescales, and we take measurements of 'variables' such as temperature, rainfall, cloud cover, sunshine, and wind speeds.