SUPPLY CHAIN SUSTAINABILITY SCHOOL

Climate Change Adaptation

9th February 2022

SUPPLY CHAIN SUSTAINABILITY SCHOOL

Welcome & introductions

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SSEN Climate Academy

- This is the third of six sessions in the SSEN Climate Academy:
  - *Climate Change Adaptation*

- There are three more *Climate Change* sessions:
  - *Climate Change and Nature – 16 February*
  - *Climate Change and People – 23 February*
  - *Waste, Resource Efficiency and the Circular Economy – 2 March*

Session 3 - Agenda

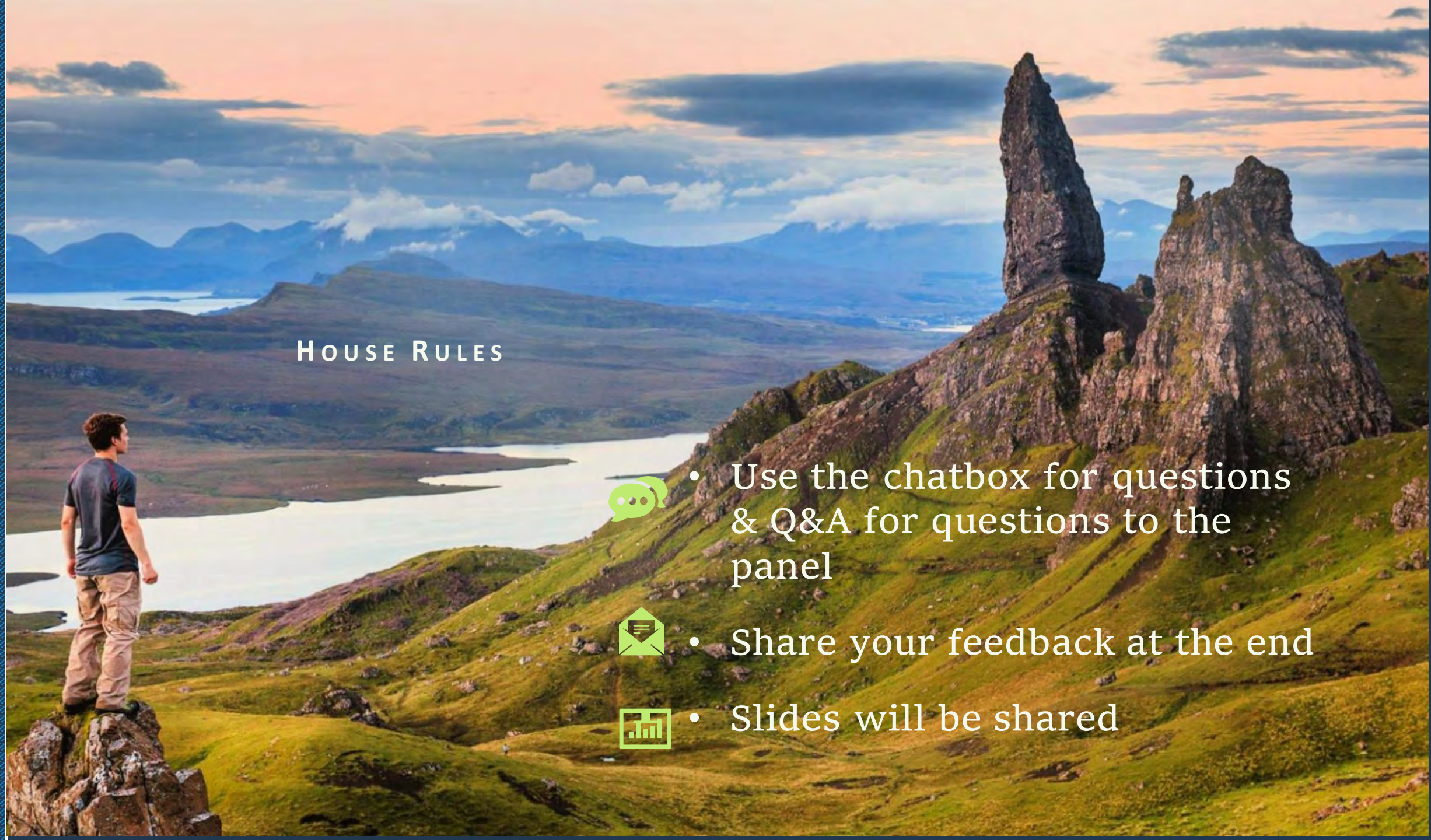
- ✓ Scene setting: Eliane Algaard
- ✓ Section 1: Understanding the Principles of Climate Change Adaptation
- ✓ Section 2: Data and Projections – the big picture
- ✓ Section 3: Impacts and what you can do

Learning Outcomes

- ✓ The difference between weather and climate
- ✓ What our ‘new normal’ could look like
- ✓ Why we need to adapt
- ✓ What changes are most relevant for SSEN Distribution
- ✓ How you can adapt to these changes

ELIANE ALGAARD
DIRECTOR OF ASSET MANAGEMENT, SSEN DISTRIBUTION

House Rules



- Use the chatbox for questions & Q&A for questions to the panel
- Share your feedback at the end
- Slides will be shared

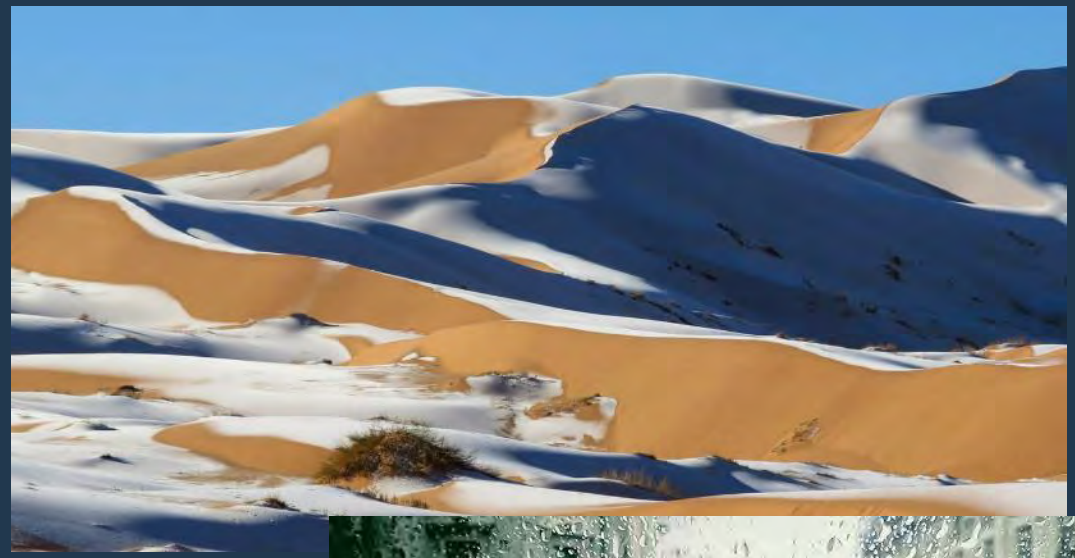
POLL QUESTIONS

SECTION 1: Understanding the principles of climate and climate adaptation

Weather and Climate - Introduction

- **Weather you experience on a daily basis**

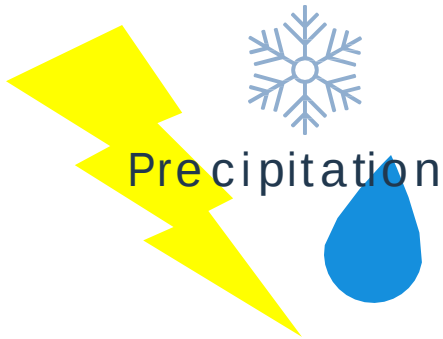
- **Climate is the average weather experienced over time**



Snow in Saudi Arabia, unusual weather!

Rain in London, typical conditions for our temperate maritime climate

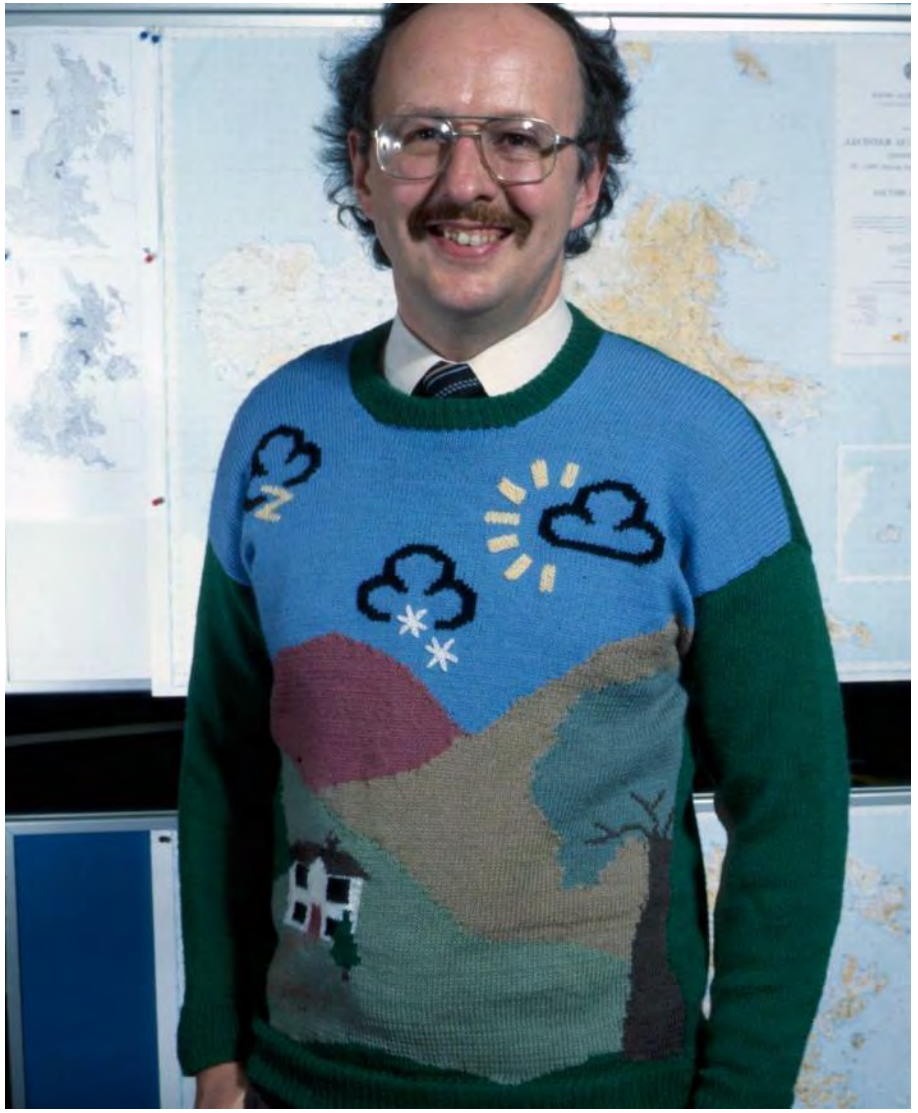
What is Weather & Climate?

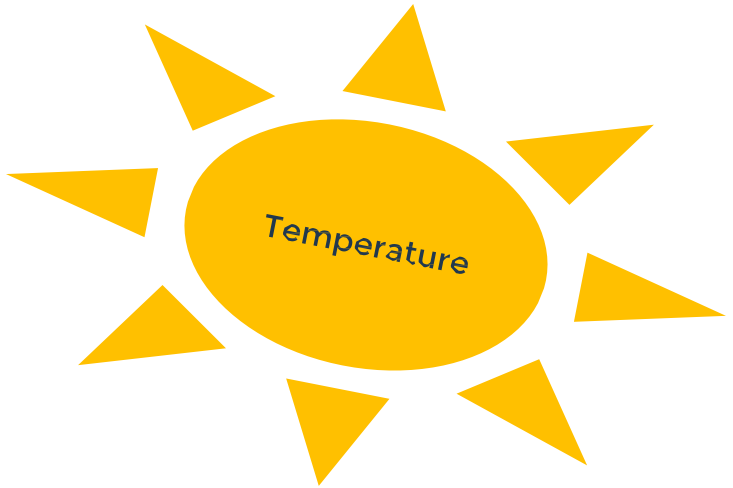


Precipitation

Topography

Pressure





Different Climates

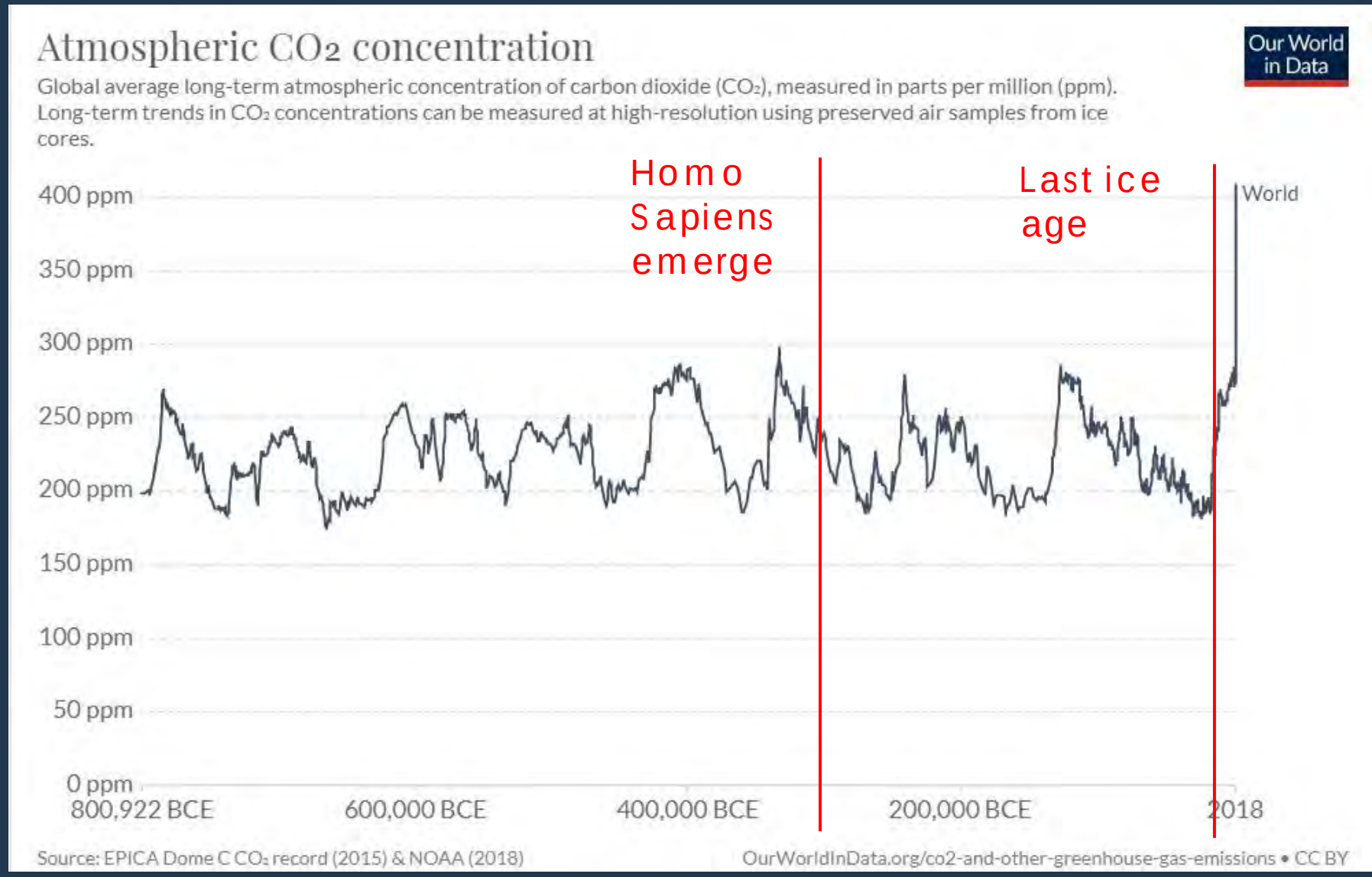
In the UK & Ireland a temperate oceanic climate predominates

The Arctic and Antarctic experience a polar climate

The Sahara experiences a desert climate

Climate Change adaptation isn't new!

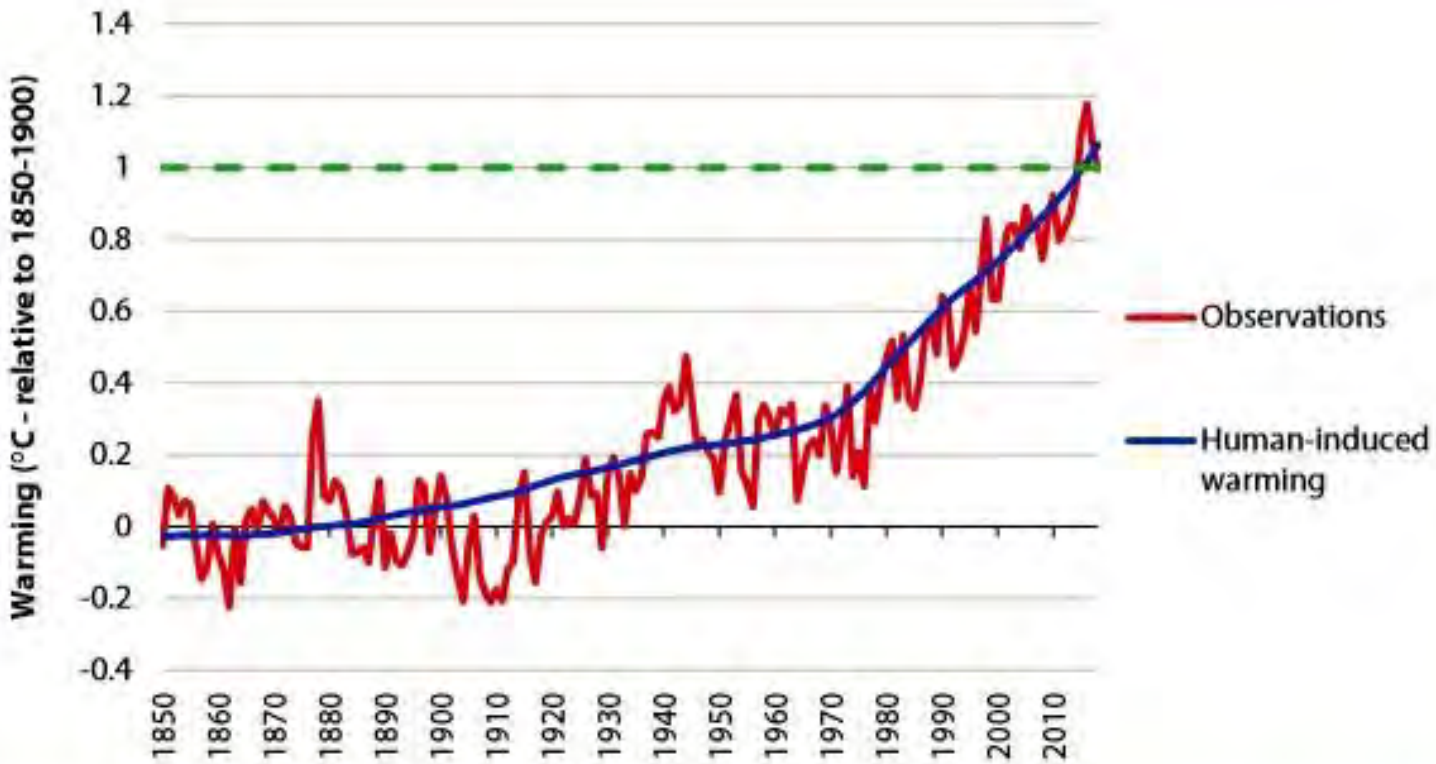
Scene Setting: Going back in time



Our climate has been in a natural rhythm for at least the last 800,000 years

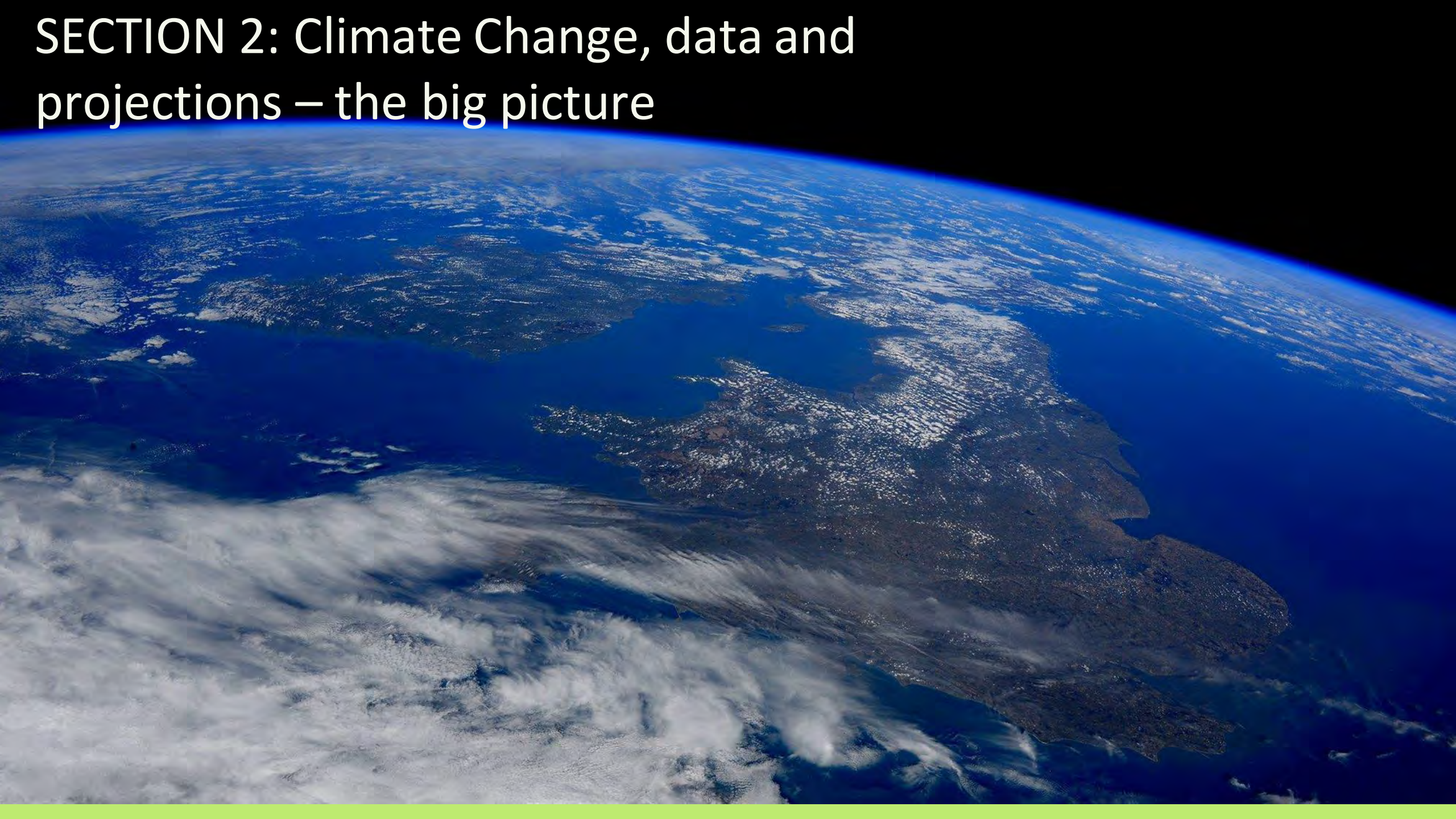
Scene Setting: The last 200 years

Figure 2.1. Observed and human-induced warming

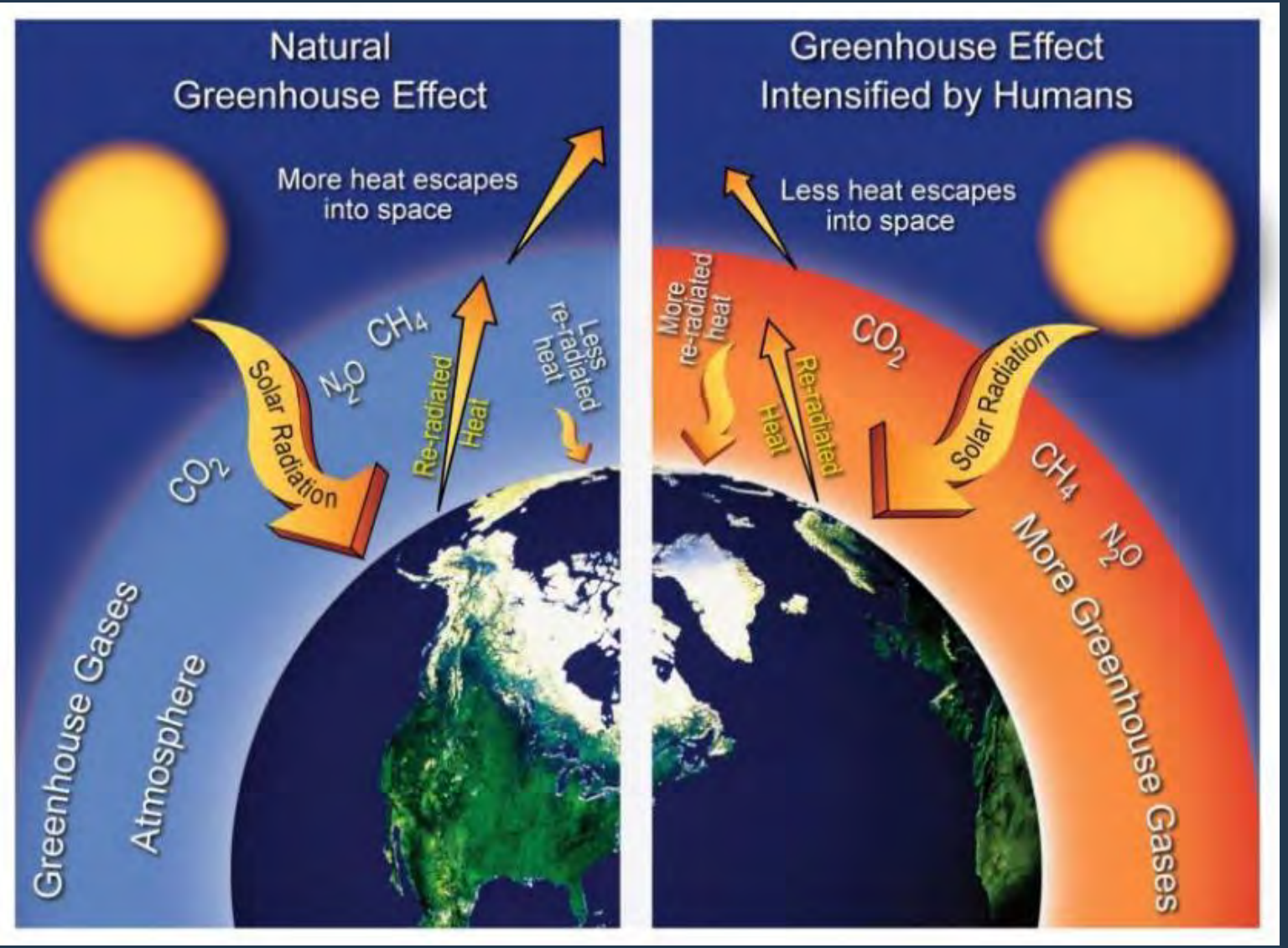


Source: HadCRUT4, NOAA, NASA and Cowtan & Way datasets; IPCC (2018) *Chapter 1 - Framing and Context.*
Notes: 'Observations' are the average of the four datasets above as in IPCC-SR1.5 including for the full year of data for 2018.

SECTION 2: Climate Change, data and projections – the big picture



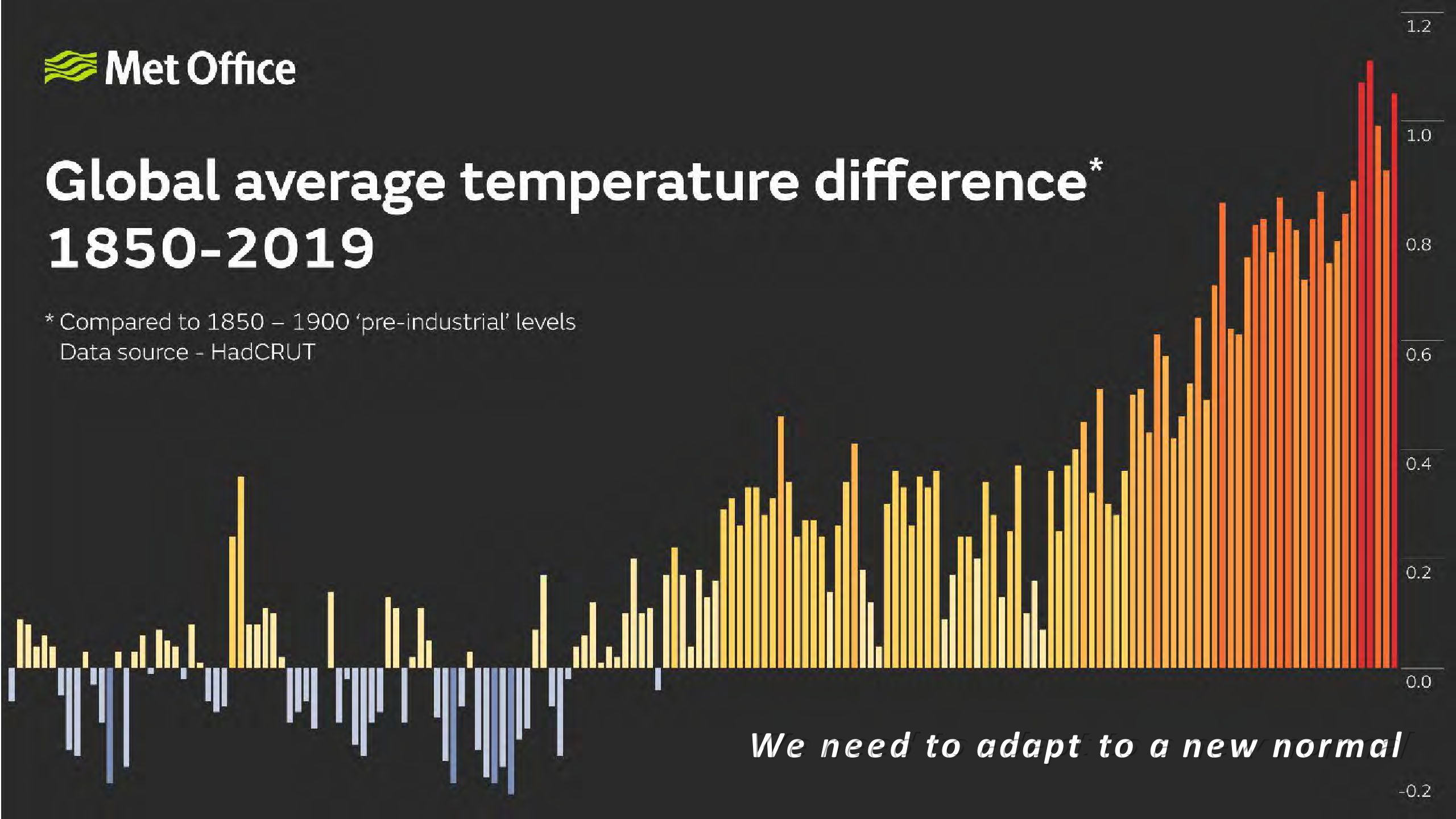
Recap – the Greenhouse Gas Effect



Met Office

Global average temperature difference* 1850-2019

* Compared to 1850 – 1900 'pre-industrial' levels
Data source - HadCRUT



Climate Change Projections

By 2070 Met office predictions estimate the following

Temperature

- 0.9°C to 5.4°C warmer in summer
- 0.7°C to 4.2°C warmer in winter
- Hot summers expected to become more common
- More "hot spells" – 2 or more days over 30C. Rising from 0.2 occurrences per year to 4.1 by 2070

Precipitation

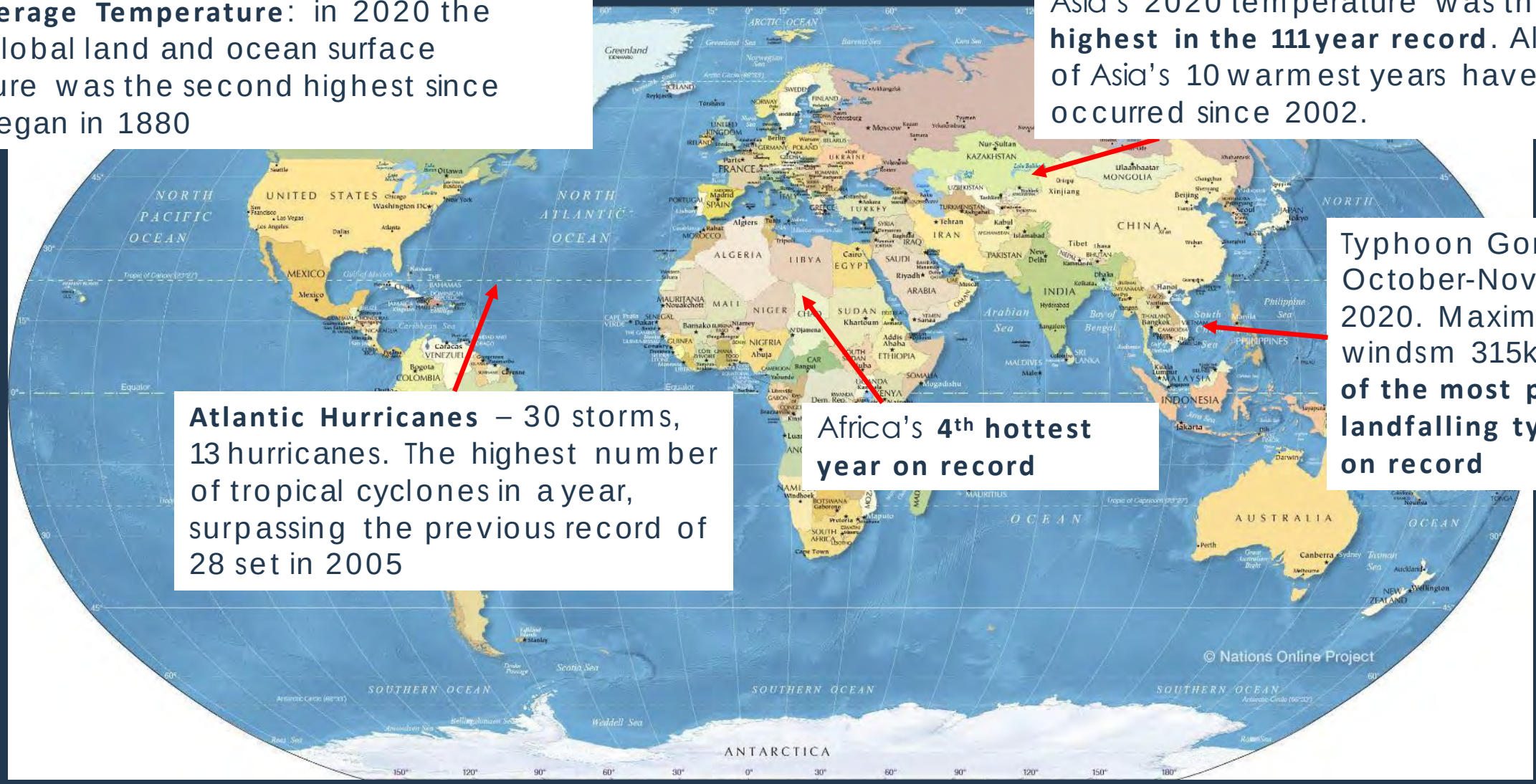
- -47% to +2% in summer
- -1% to +35% in winter
- Future increases in the intensity of summer rainfall events

Scientists estimate that average global temperatures were 6-8 °C cooler during the last ice age

Our climate is likely to become warmer and wetter, with more extreme rainfall events in summer

Significant Climate Anomalies - 2020

Global Average Temperature: in 2020 the average global land and ocean surface temperature was the second highest since records began in 1880



Asia's 2020 temperature was the **highest in the 111year record**. All of Asia's 10 warmest years have occurred since 2002.

Typhoon Goni, October-November 2020. Maximum windsm 315kmh. **One of the most powerful landfalling typhoons on record**

Atlantic Hurricanes – 30 storms, 13 hurricanes. The highest number of tropical cyclones in a year, surpassing the previous record of 28 set in 2005

Africa's **4th hottest year on record**

How might things change?

- Temperature extremes
- Rainfall extremes
- Increased windspeeds/storms

Assessment of UK Climate Risk Report

Climate Change Committee Report (2021) identifies 8 priority risk areas which need immediate attention. This includes:

- ***Risks to people and the economy from climate-related failure of the power system***

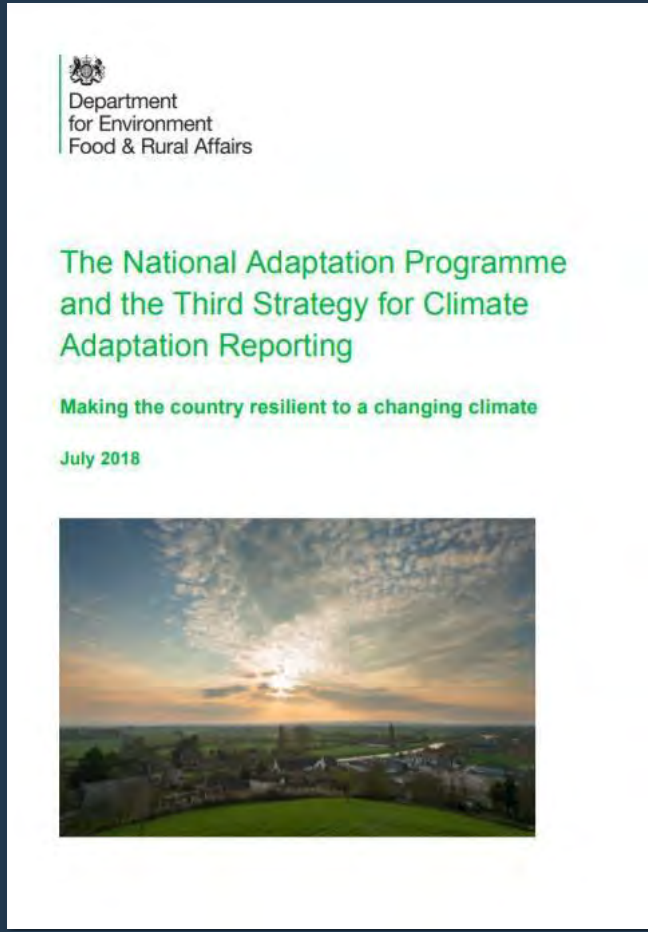
The report highlights:

- **The government is <u>not doing enough</u> to mitigate climate change risk**
- **Use of electricity is likely to rise**.
- **Variability in our weather is increasing**,
- **Weather dependent renewables** will play an increasing role
- The next 10 years will see **huge growth and investment in electricity generation**

The Climate Change Act – National Adaptation Programme

Published in 2018, the report highlights 6 key risks for adaption these included:

- **Flooding** and coastal change risks to communities, businesses and infrastructure is a high risk now and is expected to remain high in the future
- Risks to health, well-being and productivity from **high temperatures** is also a high risk now and is expected to remain a high risk in the future.
- Risks of **shortages in the public water supply** for agriculture, **energy generation** and industry
- **Risks to natural capital** including terrestrial, coastal, marine and freshwater ecosystems, soils and biodiversity

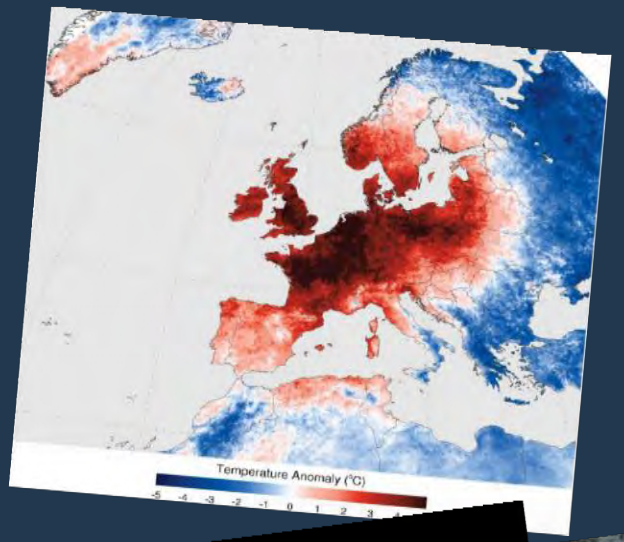


SECTION 3: Impacts and What You Can Do

Impacts and What You Can Do

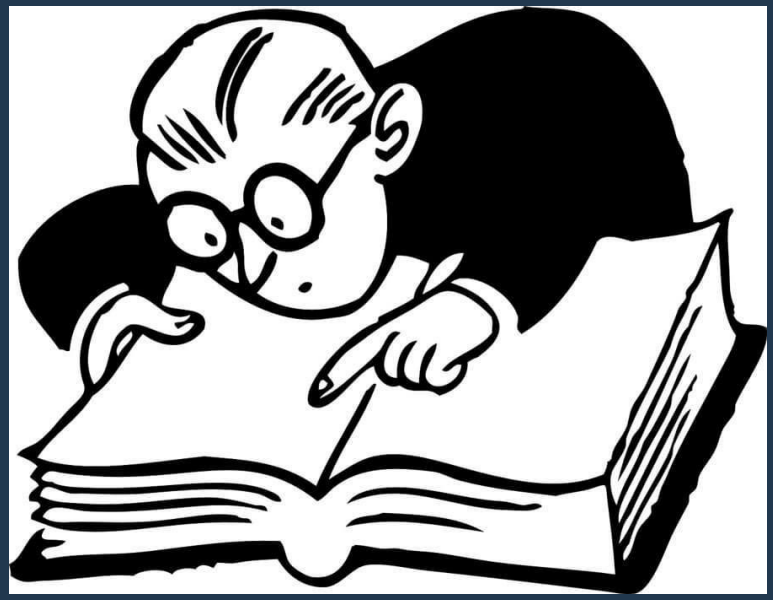
In this next section we are going to look at 4 climate change impacts most relevant to SSEN:

1. **Flooding**
2. **Drought**
3. **Storms**
4. **Heatwaves**



Terminology Corner!

- **Return Period:** the average amount of time between two events
- **Resilience:** how able something can cope with a change or extreme
- **Retrofit**: addition of new components to make something work better
- **Design Limit**: the point where machinery fails or can no longer function
- **Sustainable Urban Drainage (SuDS):** use of natural processes (i.e. not concrete) to store and disperse water



Flooding

Impact of Climate Change

- Higher temperatures mean more evaporation and more rain
- Increase in duration and intensity
- Flooding can be exacerbated by human development – more non-permeable surfaces mean water enters rivers and streams more quickly

UK & Ireland Context

- More extreme precipitation events are leading to flash flooding
- UK – 2019/20 flooding cost the economy £78 million
- January 2016 floods in Galway and Wexford cost >€8m to clear up

Why is flooding an issue for SSEN

- Climate Change Act Adaptation Report identifies substations as flooding risk.
- Location of assets in vulnerable areas
- Energy companies required to update flood defences - primary sub-stations must be defended against 1/1,000yr flood events.
- Inundation of assets may stop them operating
- Assets may be damaged by flood waters and need to be repaired
- Flooding may prevent or restrict access for staff/maintenance/fuels
- Cable faults

Flooding – how can we adapt?

- Working more in tune with natural processes – nature-based solutions
- Sustainable urban drainage systems (SuDS) can be used to store water and improve water attenuation. These systems can generate other benefits – e.g. to biodiversity.
- Better management of river catchments – collaboration.
- Siting of assets away from flood risk areas, or adapt them for new norms

Drought

Impact of Climate Change

- Warmer temperatures mean more evaporation.
- Impact of changing weather patterns (jet stream, ocean currents) may change the location and intensity of precipitation
- Wetter parts of the world are likely to get wetter and drier parts more dry

UK & Ireland Context

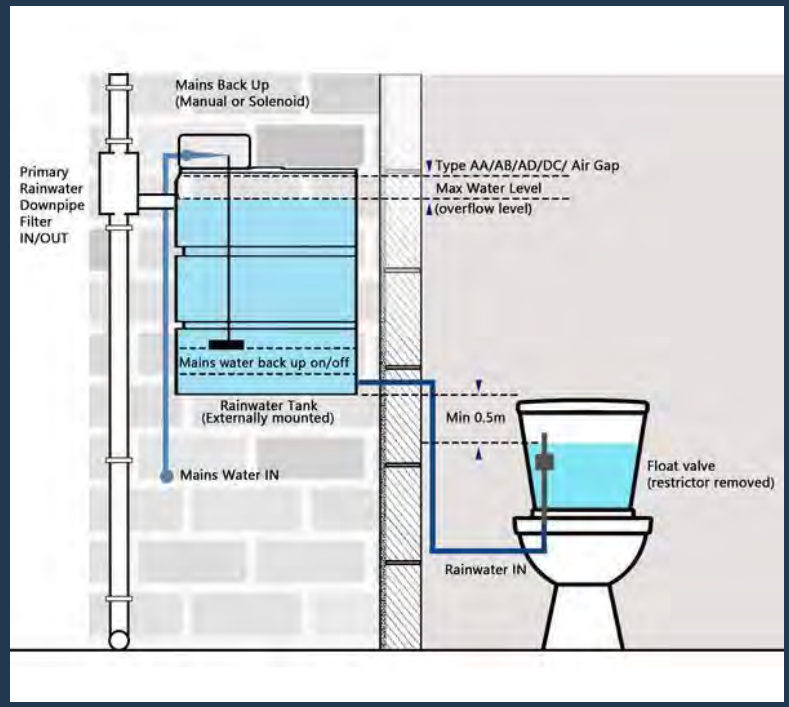
- Drought is defined as *a sustained below than average level of water availability*
- From an EU perspective; 11% of the EU's population has been impacted by drought, costing >€100m in the last 30 years

Why is drought an issue for SSEN?

- Hydropower - approx. 2% of UK's generating capacity and 6% in Ireland
- Direct impact on thermal plants reliant on local rivers
- Reduced water quality can pose problems – increased sediment/algae can clog filtration systems
- Prolonged hot/still weather may reduce capacity of some renewables (e.g. wind)
- Cable faults due to ground movement

Droughts – how can we adapt?

- Stop using water!
- Reduce our use of potable water – be more efficient.
- Consider alternate water sources – e.g. greywater recycling, rainwater etc..
- Increase the resilience of assets to water shortages



Drinking water is used to flush most toilets in the UK – something we could easily use rainwater for

A water-less wheel wash system

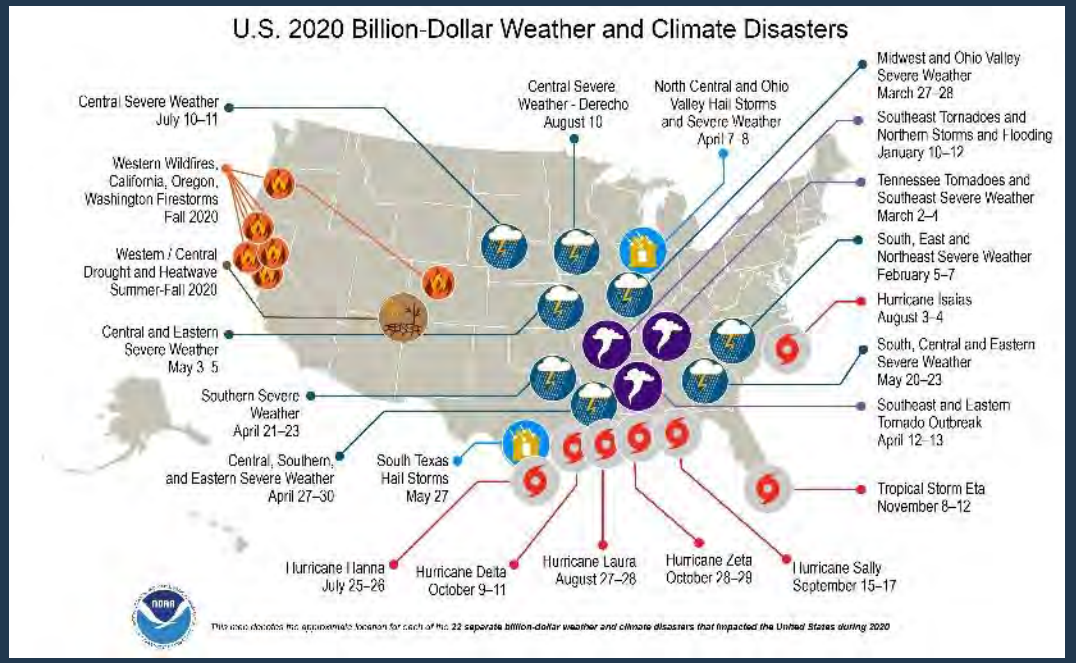
Storms

Impact of Climate Change

- The probability that more extreme storms will occur is increasing
- Storms have the ability to cause damage to property, at their most extreme they can be a danger to life
- Storms are associated with weather extremes such as high windspeed and precipitation. By the coast they may also cause large waves and tidal surges.

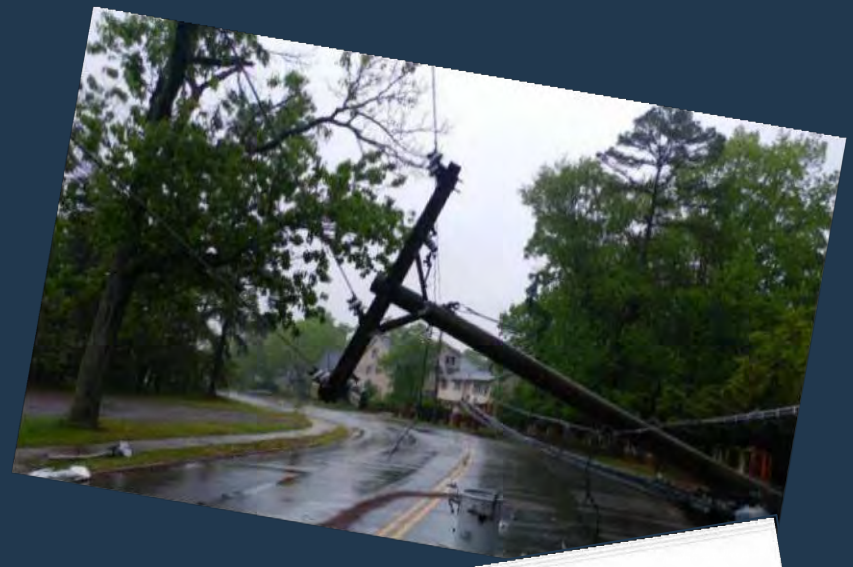
UK & Ireland Context

- There is increasing evidence to suggest that hurricanes may track further north, with the potential to cause increased damage in the UK and Ireland.
- More frequent extreme weather leading to increased pressure on infrastructure



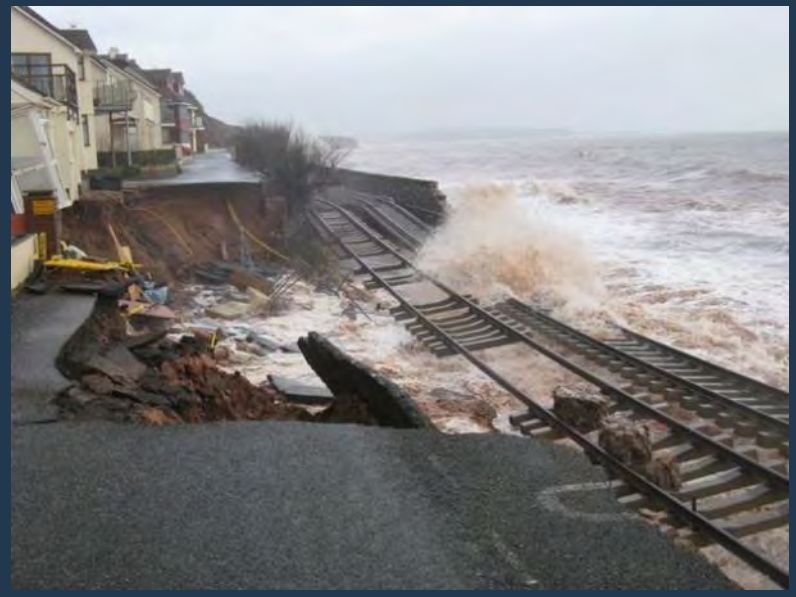
Why is extreme weather an issue for SSEN?

- Extreme weather can "knock" power stations out.
  - Fuel supply problems – pipelines etc..
  - Employee safety & movement
  - Impact of flooding
- Direct impact on renewables such as wind turbines. High winds may be beneficial (to a point!).
- High winds can be a particular issue for infrastructure such as powerlines



Storms – how can we adapt?

- Design assets to be more resilient to wind/precipitation extremes.
- Retrofit for the "new normal"
- Site new assets away from vulnerable areas
- Potential opportunity – increased global windspeeds may present better opportunities for renewable energy
- Changing approach to work with nature

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Science & Environment

Renewable energy: Rise in global wind speed to boost green power

By Matt McGrath
Environment correspondent

18 November 2019

Climate change

GETTY IMAGES

Rising winds are boosting energy production from turbines

A new study suggests that global wind speeds have increased substantially since 2010 after decades of decline.

Scientists say they believe that changes in the patterns of ocean and atmospheric circulation are behind the rise.

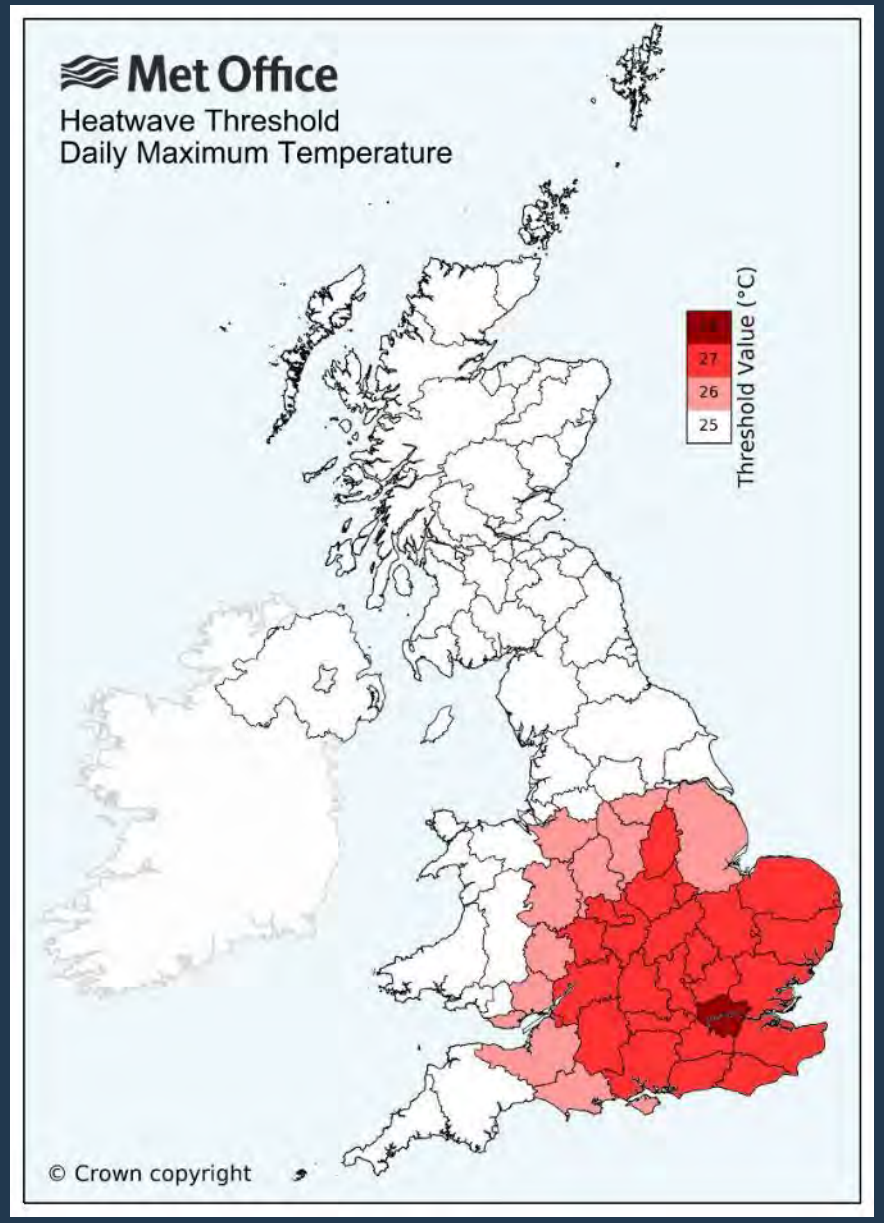
Heatwaves

Impact of Climate Change

- Defined differently depending on where you are
- Potentially one of the most deadly impacts of climate change

UK & Ireland Context

- In the UK we define a heatwave as 3 consecutive days experiencing weather over the heatwave threshold.
- In Ireland a heatwave is 5 days above 25 degrees Celsius.
- In 2020 there were over 2,500 excess deaths due to excessive heat.
- Higher temps double the likelihood of a service failure on critical infrastructure – e.g. rail
- In 2003 2,193 excess deaths in 10 days, Met office predicts that such events could occur every other year by the 2040s

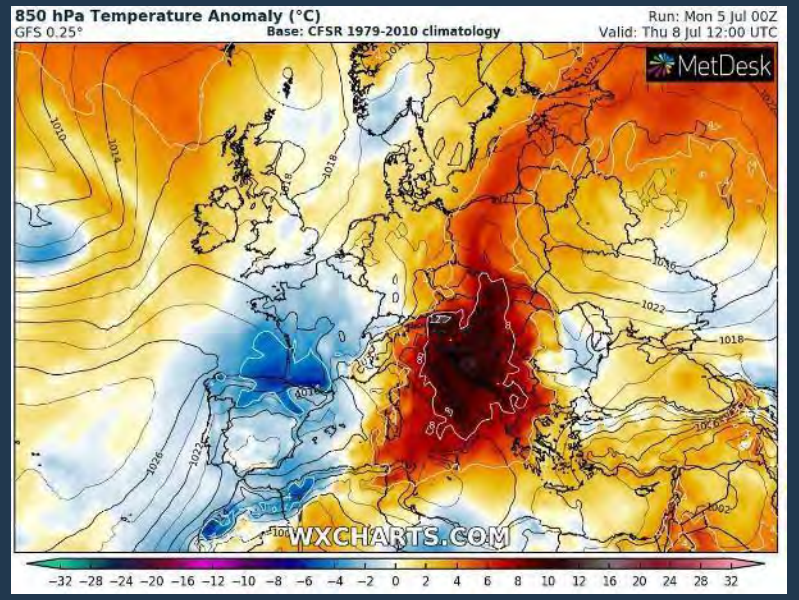


Why are heatwaves an issue for SSEN?

- Design limits of substations and cable operating temperatures reached/exceeded,
- Environmental limits breached limiting thermal station operation
- Potential increase in electricity demand for cooling
- Heat waves often associated with low wind speed and changes in energy demand.
- Potential impacts to employee health and wellbeing

Heatwaves – how can we adapt?

- Design/retrofit to ensure resilience to greater temperature extremes
- Better awareness – heatwaves can kill!
- Look at ways to reduce the pressure on health and emergency services



Adaptation Vs Mitigation

Mitigation

- Sustainable transportation
- Energy conservation
- Thermal mass / sinks for temperature regulation
- Insulation and heat recovery systems
- Renewable energy
- Energy & carbon efficient materials and products
- Improve vehicle fuel efficiency
- Capture and use landfill & digester gas

Both

- Geothermal
- Green roofs
- Solar thermal
- District heating
- Building design for natural light & ventilation
- Tree planting & care
- Local food production
- Water harvesting & conservation

Adaptation

- Infrastructure upgrades: SUDS, sewers & culverts
- Residential programs: sewer backflow & downspout disconnection
- Health programs and help for vulnerable people
- Emergency & business continuity planning
- Coastal and river bank protection and flood plain maintenance

Mitigation: the globally responsible thing to do

Actions that reduce the emissions that contribute to climate change.

Adaptation: the locally responsible thing to do

Actions that minimize or prevent the negative impacts of climate change.

The end of the training… for now…

…but the next step in your journey. Next time: climate change and nature

POLL QUESTIONS

Thank you

Any questions?

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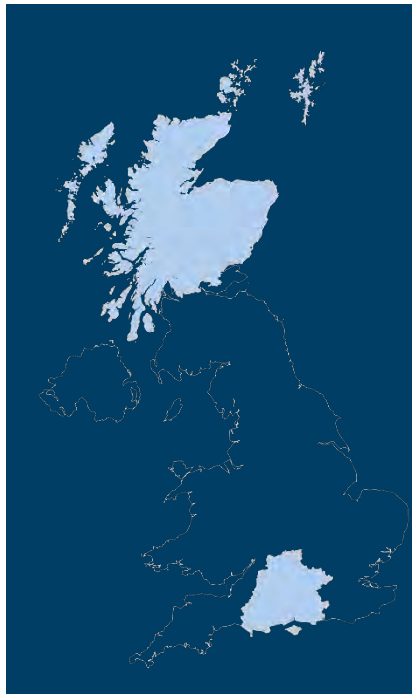

We own and maintain the electricity networks across northern Scotland and central southern England.