



CAUSES

THE MAIN REASONS FOR THE CLIMATE CRISIS AND A GLIMPSE INTO THE FUTURE

CLIMATE CHANGE

Climate change describes a shift in Earth's weather patterns over a long period of time. These include more frequent and powerful extreme weather events, rising temperatures and changes to rainfall sequences. Our climate is transforming faster now than it has for the last 1,000 years.

WHY IS THE CLIMATE CHANGING?

Most greenhouse gases, such as CO₂ and methane, occur naturally in the atmosphere. They are able to trap heat – without them, Earth would be a chilly -18°C (0.4°F), rather than our average temperature of 15°C (59°F). Unfortunately, many of our activities over the last 100 years have increased the levels of all of these gases. This means that they are trapping more heat than ever before, changing the climate and making the planet a lot hotter.

GLOBAL WARMING

Global warming is the long-term rise in temperatures across the world. The average surface temperature on Earth is now 1.1°C (1.9°F) higher than it was between 1850 and 1900, before large-scale fossil fuel burning began.

THE GREENHOUSE EFFECT

Earth receives energy from the Sun, and the greenhouse gases in our atmosphere naturally stop some of this solar energy from being reflected back into space. The greenhouse gases act a bit like a blanket and as we produce more of them, the blanket gets thicker. This prevents the heat from escaping and increases temperatures on Earth.

CAUSES

Natural causes of global warming do exist – the Sun's strength varies over time and Earth's orbit shifts, which changes the amount of sunlight it receives. However, the main cause is the increase in greenhouse gases being leaked into the atmosphere, mainly through the burning of fossil fuels.

FOSSIL FUELS

Oil, coal and gas are fossil fuels. They were formed over millions of years from decomposing organisms. When we burn fossil fuels to make energy, greenhouse gases are released into the air.

'Carbon dioxide' and 'CO₂' mean the same thing. We will use both terms interchangeably throughout this book.

GREENHOUSE GASES

In 2019, we pumped over 43 billion tonnes (47 billion short tons) of carbon dioxide alone into our atmosphere. The major sources of greenhouse gases are shown below. Are you surprised by any of them? Thinking about your own life, is there something you could change which would help to reduce your own contribution to our rising emissions?



The biggest cause of rising greenhouse gases is our burning of coal, natural gas and oil to produce electricity and heat for buildings.



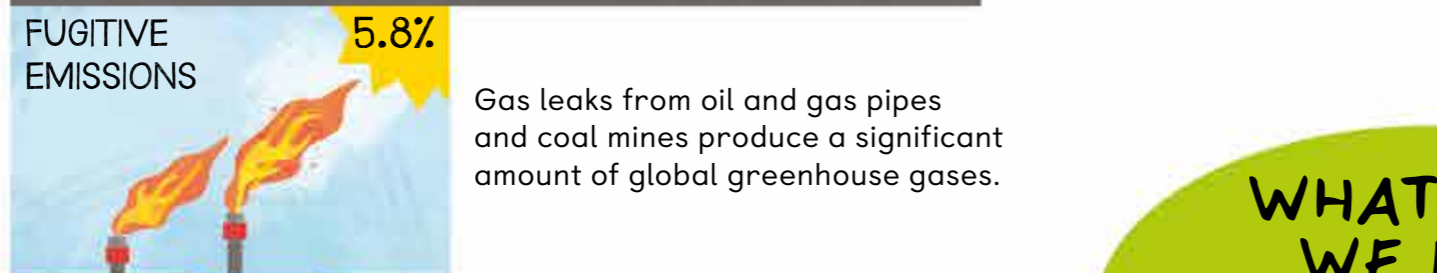
We burn a lot of fossil fuels to make and build things. We also produce plenty of greenhouse gases directly when we make materials such as cement, ammonia and metals.



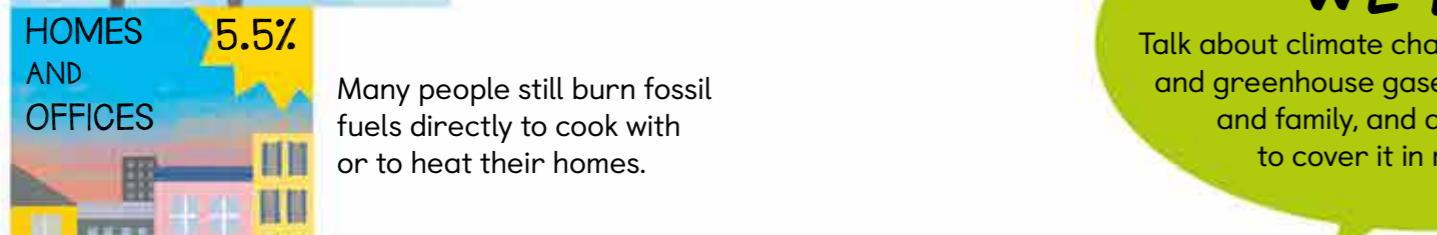
When trees are cut down and burnt to make way for agriculture, they release the CO₂ that they have absorbed during their lifetime. Livestock farming produces a lot of methane when animals burp and fart!



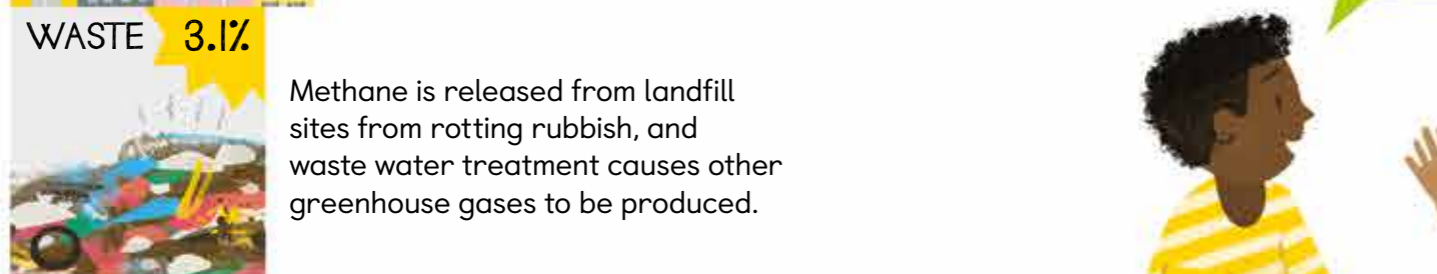
Vehicles are responsible for a lot of fossil fuel burning. There are now more than one billion combustion engine cars on the roads.



Gas leaks from oil and gas pipes and coal mines produce a significant amount of global greenhouse gases.



Many people still burn fossil fuels directly to cook with or to heat their homes.



Methane is released from landfill sites from rotting rubbish, and waste water treatment causes other greenhouse gases to be produced.

WHAT CAN WE DO?

Talk about climate change, global warming and greenhouse gases with your friends and family, and ask your school to cover it in more detail.



THE GREENHOUSE GASES IN OUR ATMOSPHERE



Carbon dioxide is the least potent of the greenhouse gases, but we have produced far too much of it from burning fossil fuels, and it remains in the atmosphere for thousands of years.



Methane can hold much more of the Sun's energy than CO₂, making it more able to warm our planet. Luckily, it only sticks around for about ten years, but there are large stores of it in the ice and in the seabed, which could heat things up really quickly if released. Two thirds of methane comes from decaying waste in landfill, burping and farting livestock, and leaks from fossil fuel mining.



Fluorinated gases (F-gases) are the most potent greenhouse gases. They can stay in the atmosphere for up to a thousand years. They are found in fridges, air conditioning units and aerosols.



Nitrous oxide is a powerful greenhouse gas because it stays in the atmosphere for about 100 years and damages the ozone layer. About 40% of nitrous oxide in the atmosphere is the result of human activity, mainly agriculture.

HISTORY REPEATS ITSELF

The amount of carbon dioxide in the atmosphere is measured in parts per million (ppm). In 2019, concentrations of CO₂ were around 415ppm and are predicted to rise to 427ppm by 2025. The last time Earth experienced a similar level of CO₂ was 15 million years ago; humans didn't exist, temperatures were 2-3°C (3.6-5.4°F) hotter and the sea level was up to 20 metres (65ft) higher than it is now.

WARMING STRIPES

The warming stripes, devised by British climate scientist Ed Hawkins, show annual temperatures from 1850 to 2019, with darker reds representing the warmest years. They make it clear that it has got a lot warmer over the last 15 years!

1850

2019

DID YOU KNOW?

One third of all methane is naturally produced by peatland, wetlands and farting termites! Termites produce tiny amounts of methane but it adds up to some 20 million tonnes (22 million short tons) each year because there are so many of them!

