



Examples of sources of greenhouse gases from left to right: farming, fossil fuels, car exhausts

What are greenhouse gases?

Greenhouse gases (GHGs) absorb heat energy and trap it, stopping it from escaping into space! This causes the Earth to get hotter than it would be without the gases. There are many GHGs, however, the most important ones are:

- water vapour, H_2O
- carbon dioxide, CO_2
- methane, CH_4
- nitrous oxide, N_2O
- CFCs (chlorofluorocarbons)

Funnily enough, GHGs aren't always bad! GHGs do form naturally throughout space and have always been present. A natural source of greenhouse gases that has been around long before us are volcanoes! Without GHGs Earth would be too cold to live on!

Throughout geological time, the amount of GHGs in the atmosphere has varied and this has caused the Earth to be very hot at times and also very cold! The super cold times are known as ice ages and the drastic changes between climate extremes take thousands to millions of years

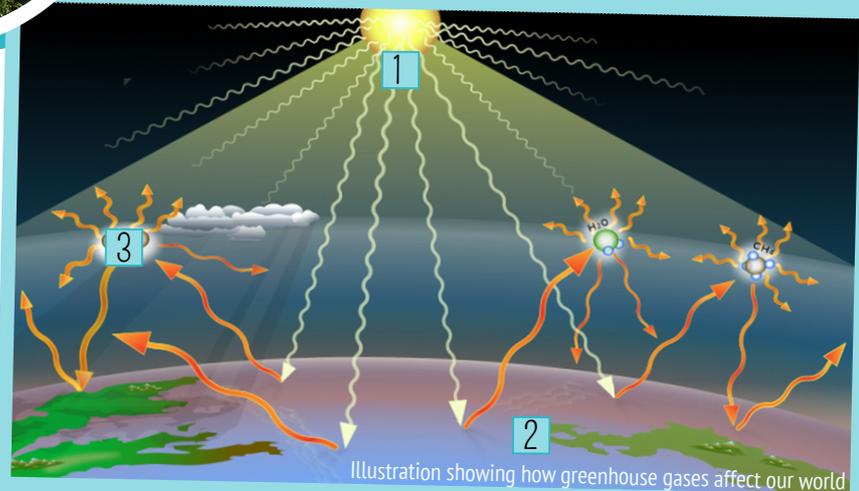


Illustration showing how greenhouse gases affect our world

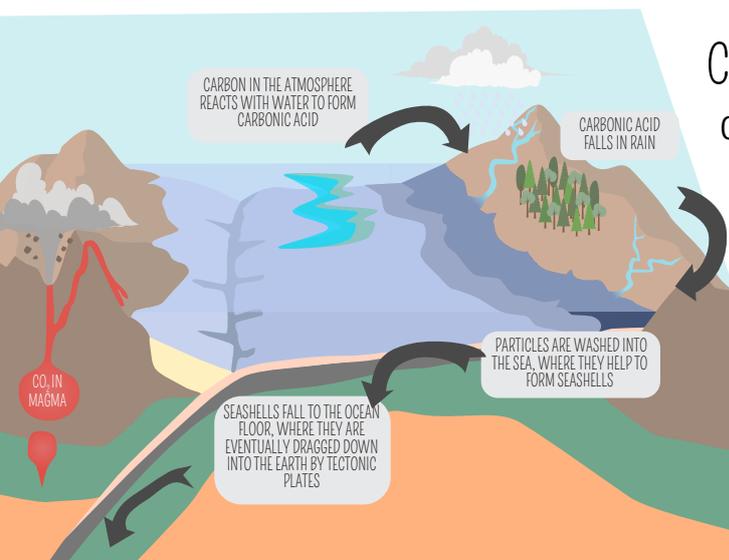
The Process

1. Radiation from the sun, shown by the wiggly yellow arrows, passes through the atmosphere and beams down onto the Earth's surface.
2. The Earth absorbs some of the radiation (those with short wavelengths) and the rest bounces back off the earth's surface, which is shown by the wiggly red arrows bouncing off the earth.
3. Some of the radiation is absorbed by the GHGs in our atmosphere, causing the surface of the earth to warm. This is shown by the shorter wiggly red arrows in the atmosphere!
Radiation with longer wavelengths is able to escape.

Carbon in the rock cycle

Over millions of years, carbon can be drawn out of the atmosphere by rocks. Carbon dioxide reacts with water in the atmosphere to make a very weak acid called carbonic acid. This falls onto the ground when it rains, but is so mild that we don't feel it at all. However, over a long time it can weather certain types of rocks, helping to break them up.

Particles from the weathered rocks are washed into rivers and oceans, where animals in the sea combine them with carbon to make their shells! This locks up some of the carbon on the sea floor. Finally, after the animals die and the shells fall to the ocean floor, they are eventually dragged down into the Earth's mantle, where tectonic plates slide under one another. Eventually, this carbon is released from volcanoes.



GREENHOUSE GASES

www.geolsoc.org.uk/factsheets

HUMAN SOURCES OF GHG EMISSIONS:

Although GHGs occur naturally. Human activities are releasing so many greenhouse gases that the make-up of the atmosphere is changing! These gases add to the continued warming of our world, leading to melting ice caps and hotter average temperatures. The pie chart below shows the global sources of GHG:

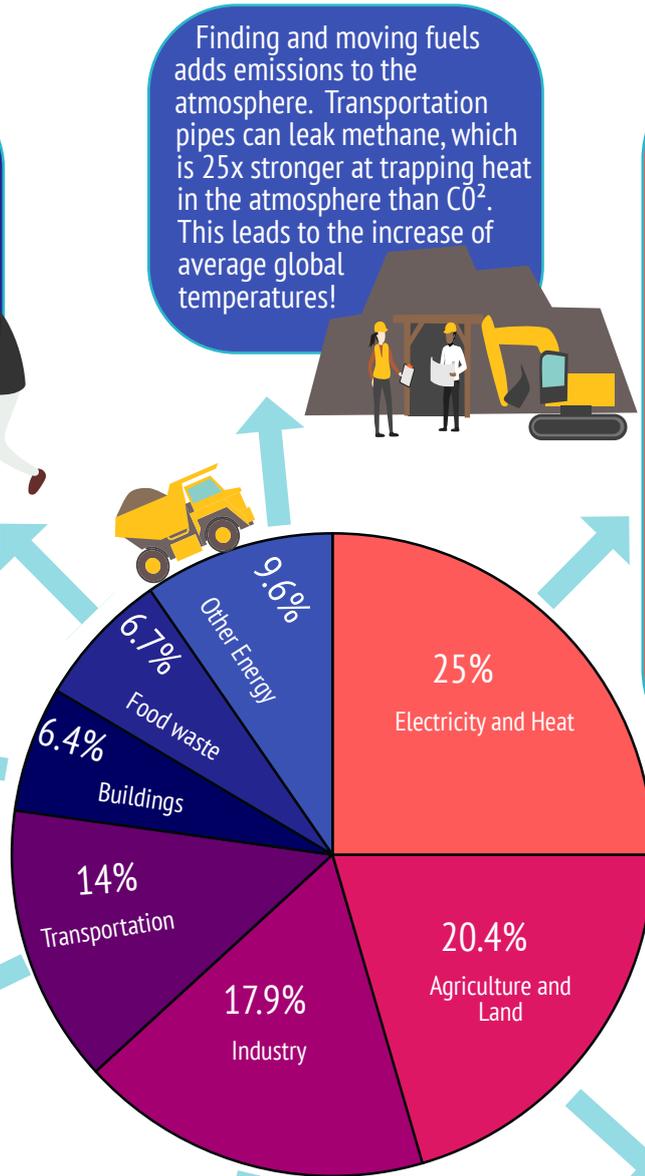


Burning of fossil fuels such as coal and natural gas is the largest producer of GHGs. These fuels are made from plants and animals that have been buried underground for millions of years. We burn fossil fuels to generate energy, power transport and businesses. Natural gases are used for every day activities such as cooking and lighting our buildings.

Countries are now looking into energy sources that do not use fossil fuels so we can lessen the amount of GHGs being released into the atmosphere - for example wind power!



Deforestation is when an area of land is cleared of all its forests. This is done to make way for livestock (animals) and farming. This is a problem as trees are great at absorbing CO₂ from the atmosphere! and when they are cut down the CO₂ is released! That's not the only issue, the livestock themselves also produce GHGs. Did you know cow farts are known to produce methane?!



9.5 million tones of food is wasted by homes and businesses each year! When food waste is put in landfills, as time passes, it breaks down. Tiny microbes decompose the food and the chemical and biological reactions of this cause methane to be released into the atmosphere.



Finding and moving fuels adds emissions to the atmosphere. Transportation pipes can leak methane, which is 25x stronger at trapping heat in the atmosphere than CO₂. This leads to the increase of average global temperatures!



Energy used in businesses and residential buildings, including refrigeration and air conditioning, and even fire extinguishers contributes to GHGs



Transportation such as traffic jams and planes are a visible source of GHG emissions. Some forms of transportation are more environmentally friendly than others. For example, taking public transport like trains is better for the environment than taking a car as they carry way more people and reduce the amount of emissions being produced. A full train is on average fifteen times more fuel efficient than a car.



Making all the things we need globally produces a huge amount of GHGs. We use cement, whose key ingredient is concrete, in loads of everyday things, from buildings to playgrounds but creating cement produces 8% of the globe's CO₂ emissions. It doesn't stop there! The waste created when we produce items also adds to the problem.

