

What is climate change?

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

How are humans changing the climate?

Before the Industrial Revolution, the average temperature across the world was stable at around 14°C (average Earth surface temperature). The Industrial Revolution began in the mid-1800s when humans began to burn fossil fuels such as coal, oil, and gas for fuel.

Burning fossil fuels produces energy, but also releases greenhouse gases such as carbon dioxide, methane, and nitrous monoxide into the air. Over time, large quantities of these gases have built up in the atmosphere. For example, the level of carbon dioxide in the atmosphere rose by 40% during the 20th and 21st century.

Once in the atmosphere, greenhouse gases such as carbon dioxide form a 'blanket' around the planet. This blanket traps the heat from the sun and causes the earth to heat up.

This effect was noticed as far back as the 1980s. In 1988, the International Panel on Climate Change (IPCC) was set up to provide governments with information to tackle climate change.

Evidence has shown that the high levels of greenhouse gases in the atmosphere are the leading cause of increasing global temperatures.

Scientists have been able to rule out natural events as causes of climate change, such as volcanic activity, changes in solar activity, or natural sources of CO₂. These may, however, have a small effect, on top of human contributions.

How fast is the temperature rising?

Since the Industrial Revolution, the average temperature of the planet has risen by around 1°C. It is also important to remember that the world is not

warming evenly, so the temperature increase is higher than 1°C in some countries.

What is the greenhouse effect?

When greenhouse gases such as carbon dioxide build in the atmosphere, they act like a blanket around the earth. When sunlight (ultraviolet radiation) hits this blanket, it passes straight through and continues until it reaches the surface of the planet.

The earth then absorbs this sunlight and emits a different type of light, infrared radiation, back out to space. As it leaves the atmosphere, the infrared radiation also hits the greenhouse gas blanket. Most of it goes straight through, but some of it is absorbed and goes back down to earth. This traps the infrared radiation and causes the surface to heat – a process we call the 'greenhouse effect'.

It is crucial to understand that the greenhouse effect is critical to life on earth. Without a blanket of greenhouse gases trapping in heat, the temperature would be bitterly cold, and humans would be unable to survive. However, by adding extra greenhouse gases into the atmosphere, humans have created an enhanced greenhouse effect.

The greenhouse gas blanket is now thicker and is absorbing more infrared radiation than before. In other words, the greenhouse effect is stronger and, instead of keeping the earth at a stable temperature, it is causing the planet to heat up.

What are the sources of greenhouse gases?

Burning fossil fuels for electricity and heat production.

Gas emissions from Agriculture, Forestry, and Other Land Use.

Feeding our livestock and ourselves, people have chopped down large areas of the forest and used the land to grow crops. Forests are very good at removing carbon dioxide from the atmosphere, and so cutting down trees allows carbon dioxide to build up in the atmosphere even more.

Land can also be used to rear livestock, such as cattle for meat and milk. These animals produce additional gases, like methane. They also eat crops that might otherwise have been eaten by humans, meaning that even more land is required.

As well as fossil fuels, deforestation and land use, aeroplanes and the production of cement also contribute to emissions of carbon dioxide.

How much warming could we see?

Greenhouse gases can live in our atmosphere for tens or hundreds of years. The gases that are already in our atmosphere are effectively locked in and will contribute to increasing temperatures.

Even if we stop all emissions today, we cannot avoid some level of warming. The amount of warming we will see, beyond what we have already caused, depends on the changes we make.

In 2015, almost every country in the world signed a document promising to cut down on greenhouse gas emissions.

Why does an increase in global average temperature actually matter?

Raising the surface temperature of the whole planet: air, land and oceans, means a vast amount of additional energy in the system. It is hugely destabilising. It is also unevenly distributed, with land mass areas heating up more.

- **Rising ocean levels** – Rising temperatures are causing glaciers and ice sheets to melt, adding more water to the oceans and causing the ocean level to rise. Oceans absorb 90% of the extra heat from global warming: warmer water expands, and so our oceans are taking up more space. .
- **Ocean acidification** – (reduction in the pH of the **ocean**) Ocean acidification occurs when the ocean absorbs carbon dioxide and becomes more acidic. It is often called the 'evil twin' of climate change.
- **Extreme weather events** – Climate change is causing many extreme weather events to become more intense and frequent, such as heat-waves, droughts, and floods.

Climate change also affects people and ecosystems. For example:

- **Flooding of coastal regions** – Coastal cities are at risk from flooding as sea levels continue to rise.

- **Food insecurity** – High temperatures, extreme weather events, flooding, and droughts can damage farmland. This makes it difficult for farmers to grow crops and means that their yield of crops each year is uncertain.
- **Conflict and climate migrants** – Climate change is a stress multiplier – it can take existing problems, such as lack of food or shelter, and make them worse. This can cause people to fight over resources (food, water, and shelter), or to migrate.
- **Damage to marine ecosystems** – Rising ocean temperatures, ocean acidification, and ocean anoxia (lack of oxygen) are damaging to marine life such as fish and coral reefs.

How can Governments do to stop climate change? They can't but they can stop it getting worse!

Replace fossil fuels with cleaner renewable energy like wind and solar power.
Invest in low carbon transport solutions.

Stop destroying forest for intensive agriculture such as cattle farming and palm oil plantations.

Plant trees

Create Ocean Sanctuaries so sea life can flourish without the threat of industrial fishing help to restore the oceans natural balance.

There are dozens of ways that both HTC and us as individuals can help tackle climate change which I will cover later.