

From Grandparents against Climate Change

2. This is where our understanding began 1800-1900.

Even before our parents were born, scientists understood the Greenhouse Effect and the impact that increasing levels of carbon dioxide (CO₂) could have on the planet's climate.

Now that we are able to look back at [historic](#) levels of atmospheric CO₂ we see that over the past 800,000 years it fluctuated through the ice ages from about 180-280 parts per million (ppm). As the Industrial Revolution started in 1750 it stood at 280 ppm.

At this time we could have expected to be approaching the end of the current, warm [interglacial](#) period before the onset of the next glaciation within the ongoing [Quaternary](#) 2.6 million year Ice-age sequence. Instead of a slow, gradual cooling of the planet, our activities are now taking us rapidly in the opposite direction.

The Industrial Revolution started in the UK slowly spreading to Europe and the USA and by 1850 CO₂ levels had reached 285 ppm and by 1900 [296 ppm](#).

During this period a number of nineteenth century [scientists](#) independently contributed to the development of our understanding of the Greenhouse Effect. They determined that increasing levels of CO₂ could impact on the Earth's climate.

1800 William Herschel discovered infrared radiation in the electromagnetic spectrum. In a simple experiment he placed thermometers in the visible spectrum emanating from a glass prism and found an invisible but warmer band below the red visible light band which became named infrared.

1824 Joseph Fourier realised that the Earth's atmosphere retained heat radiation from the sun keeping the planet warmer than would be the case in a vacuum. He also realized that the heated surface emitted invisible infrared radiation, which carries the heat energy away into space. He also suspected that human activities could influence climate.

1856 Eunice Foote studied the warming effect of sunlight on different gases and considered that changing the proportion of CO₂ in the atmosphere would change the Earth's temperature.

1859 John Tyndall independently investigated the absorption of infrared radiation in different gases. He found that water vapour, hydrocarbons like methane (CH₄), and CO₂ strongly block infrared radiation. He understood that such gases high in the air help keep our planet warm by interfering with escaping radiation.

1896 Svante August Arrhenius used basic principles of physical chemistry to estimate the extent to which increases in atmospheric CO₂ would increase the Earth's surface temperature through the Greenhouse Effect. These [calculations](#) led him to conclude that CO₂ emissions, from fossil-fuel burning and other combustion processes are large enough to cause global warming.

1899 Thomas Chrowder Chamberlin developed at length the idea that changes in climate could result from changes in the concentration of atmospheric CO₂.

By 1900, Scientists had already developed an understanding of how CO₂ emissions could affect the Earth's climate. In 1938, [Guy Stewart Callendar](#), a British engineer, presented evidence collected from weather stations across the world to demonstrate that both temperature and CO₂ levels in the atmosphere had been rising over the past half-century. By the '50s scientists began warning of the potential dangers and predicting where increasing emissions would lead.