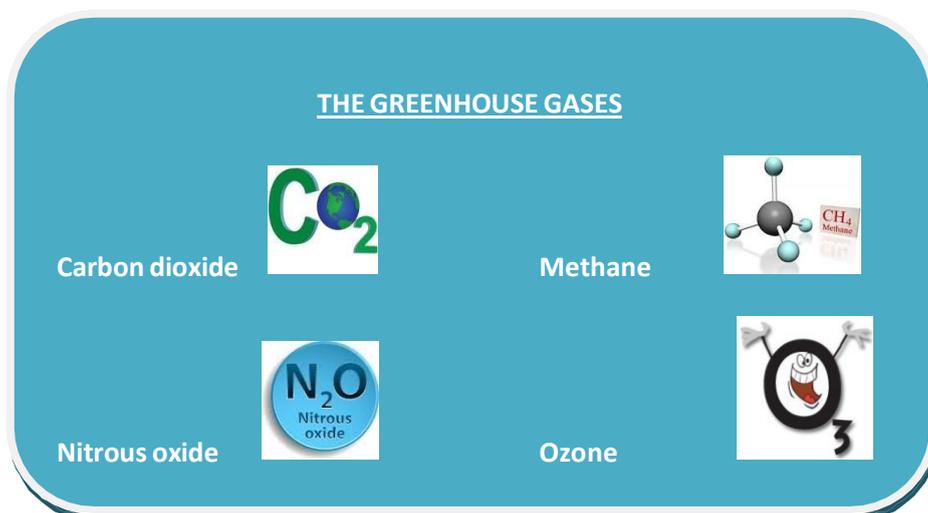


## What is Climate Change?



### A little bit of Chemistry!

The Earth's atmosphere is an envelope of gases surrounding the Earth (like a blanket around our globe). The atmosphere consists of about 78% nitrogen, 21% oxygen, with the remaining 1% composed of trace gases such as argon (0.93%) and the greenhouse gases.

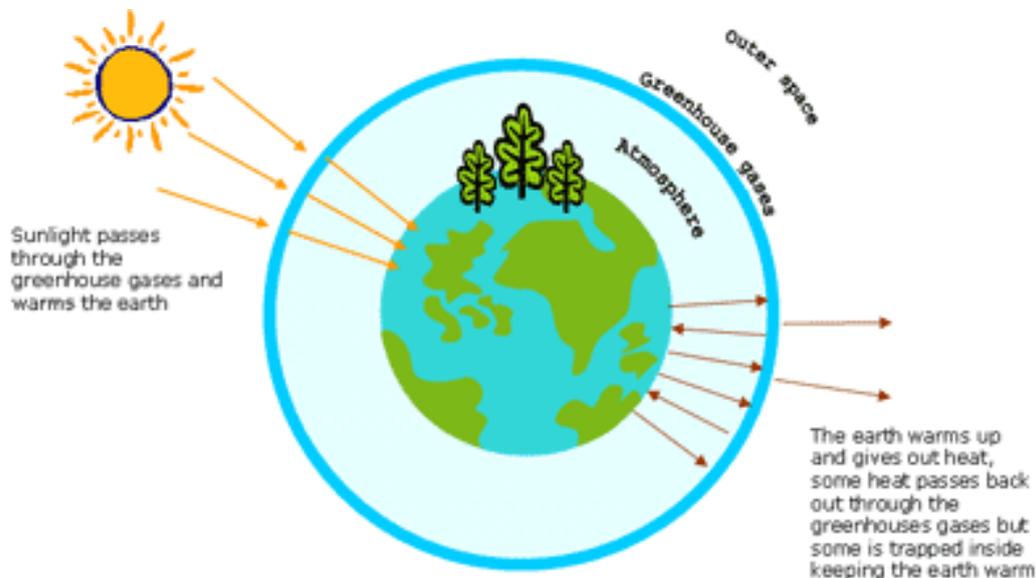


The atmosphere also contains water vapour, clouds and aerosols. The composition of the atmosphere plays an important role in determining the global climate.

*The climate of an area is the average of, and variations in weather over long periods of time. Regional climate is dependent on factors such as latitude, altitude, proportion of land to water, proximity to mountains and ocean circulation. Climates are categorised according to temperature, as well as rainfall and wind patterns.*

The Earth's surface temperature is determined by a continuous supply of energy from the sun, the amount of energy emitted from the Earth's surface and the action of greenhouse gases in the Earth's atmosphere.

**The greenhouse effect** is the term used to describe the warming of the Earth. The diagram shows this. If there were no greenhouse gases the Earth would be a frozen ball in space without the possibility of supporting life, so we should be happy we have some of these greenhouse gases in our atmosphere! However, too many greenhouse gases and our planet warms up too much causing climate change.



<http://www.stalbans.gov.uk/environmentandwaste/greenerliving/climate-change/>

Climate change has been happening for thousands and thousands of years due to natural causes like volcanism and solar and orbital variations. In the past century however, the temperature of the earth has increased by 0.8% and scientists believe that the temperatures will be rising by a further 3 - 6% over the next one hundred years. The rate of this change is such that many of the world's ecosystems will be unable to adapt, indeed many species particularly in tropical and Polar Regions are already undergoing rapid decline.

It is now widely believe that this rapid increase in global temperatures and changing climate is due to **human activity**. But what is it that we are doing that is so bad?

Reducing Greenhouse gas emissions is the key to solving global climate change. The main cause of human induced climate change is the release of these greenhouse gases into the atmosphere through the burning of **fossil fuels** like **coal, oil and natural gas**. Fossil fuels are the primary source of energy used for transport, heating and electricity generation. When we burn fossil fuels we release carbon dioxide drawn from the atmosphere, by plants and animals, millions of years ago.

Activities such as deforestation, cement manufacture and changes in land use also play a major role in the increase of greenhouse gases.

**Changes in land use** are the second largest source of greenhouse gas emissions. For thousands of years we have been cutting down trees both to use the wood for fuel and construction, and to develop land for agriculture. Irelands first Neolithic farmers used to clear areas of trees to create grazing pasture for their animals; once the land was depleted they would move to the next area and repeat this process. During these times the world



population would have been small enough to enable the land to recover; nowadays there are many more people on earth so the land does not get as much time to recover.

Forests are home to about two thirds of all plant and animal species found on land and play a vital role in regulating our climate. Trees and Plants take in Carbon Dioxide as they grow, thus reducing the amount of CO<sub>2</sub> in the atmosphere. Forests store carbon in trees, vegetation and soil in the form of decaying plant matter.

**Deforestation** through logging and burning results in the release of this stored carbon in the form of CO<sub>2</sub>, the loss of forest cover also reduces the planet's ability to absorb CO<sub>2</sub> contributing to increased concentration of the gas in our atmosphere.

**Cement Manufacture** produces enormous quantities of CO<sub>2</sub>. For every ton of cement an equivalent quantity of CO<sub>2</sub> is produced, when quarrying and transportation are taken into account. This is because making the chemical process involved in the production of Portland cement involves turning limestone (calcium carbonate) into calcium oxide involves turning limestone (calcium carbonate) into calcium oxide and carbon dioxide. Cement manufacture alone is responsible for 5% of global emissions of CO<sub>2</sub>