

# Climate Change and Global Warming

## What is it, why is it happening and what are the potential impacts?

### Introduction

The weather patterns on our planet are changing. People all over the world have noticed changes in temperatures, shifts in seasons and more extreme rain, drought and winds. Scientists have now confirmed what many ordinary people have noticed; that our climate is changing. They have warned us that this change could threaten human, animal and plant life. More alarmingly, scientists have confirmed that we humans are causing these changes. In our quest for industry and the comfort of Western lifestyles, we have extracted too much from the earth and produced too much pollution. The earth has reached its limits and if we continue on our current path, it will no longer be able to sustain us.

A great task for humankind right now is to learn how to stop contributing to climate change by changing our lifestyles. We also need to understand the potential impacts of climate change so that we can prepare for these. For example, we need to be sure that we will have access to food and clean water in the face of droughts, floods and unpredictable weather.

This introductory pamphlet will try to answer the questions: - What is global warming? What is climate change? What is causing them? How will they impact on our lives?

### Greenhouse gases are causing our planet to overheat

Climate change is caused by the fact that the surface of the earth is getting hotter, and this is creating new weather patterns all over the world. One of the reasons for the surface of the earth getting hotter is an increase in “**greenhouse gases**” in the atmosphere.

The earth is wrapped in a layer of gases called the atmosphere. We are most familiar with oxygen which is one of these gases – we need to breathe *oxygen* to keep us alive! However, there are many other gases in the atmosphere. The interesting ones, when it comes to climate change, are called greenhouse gases because they have the same effect as the glass roof and walls of a greenhouse. In other words, they let the sunshine in, which warms the land and sea, but they stop a lot of that warmth from leaving.

Thanks to greenhouse gases the earth is just the right temperature for us. Without greenhouse gases, the earth’s warmth would disappear into space, leaving our planet too cold to support life –



Greenhouse gases trap the heat of the sun and warm the earth

Source: global warming for dummies



like a greenhouse without a roof. Greenhouse gases are essential for life, but too much of a good thing can be a problem.

The most significant greenhouse gas is carbon dioxide (CO<sub>2</sub>). When we (and all other animals) breathe, we take in oxygen and **give off** carbon dioxide. But luckily, growing plants **take in** carbon dioxide and this helps keep things in balance. Unfortunately hu-

mans are upsetting this delicate balance by digging up large quantities of oil, gas and coal and burning it for energy. When we burn **fossil fuels** (coal, gas and oil), we release carbon dioxide into the atmosphere. This increases the amount of greenhouse gas in the atmosphere, causing too much heat to be trapped – the greenhouse roof is too thick!

### How are fossil fuels related to climate change?

Fossil fuels (coal, oil and natural gas) are amazing sources of energy. These fuels have taken millions of years to form. They are the remains of plants that lived 300 million years ago — and died forming thick layers of “compost”. Slowly over time, these dead plants were covered over by layers and layers of earth and rock. The pressure of those layers and the heat of the earth slowly fossilised them, and transformed them into coal, gas and oil. By burning them we can generate heat to make electricity and to power our cars.

We have come to rely heavily on fossil fuels to run the modern industrialised world and there is no other source of energy quite as powerful or efficient (For example a 5 litre bucket of petrol can move 1 ton of car for about 100 kilometres!) However, there are two major problems with the use of fossil fuels to meet our global energy demands:

1. They add carbon dioxide to the atmosphere which is a major cause of global warming and global warming causes changes to the climate.
2. The supply of fossil fuels is limited. At some point in the future we will run out of oil, coal and gas.

**Global warming** is when the temperature of the earth's surface rises because there is too much greenhouse gas in the atmosphere.

**Climate change** is one of the effects of global warming. Rainfall, winds and other weather patterns change permanently.

**Greenhouse gases** help keep the earth from freezing over. Without them, the earth's average temperature would be about -18°C, which is too cold for life to exist. The major greenhouse gases are carbon dioxide (CO<sub>2</sub>), water vapour (H<sub>2</sub>O), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), chloroflourocarbons (CFCs).

### A further problem....

When plants “breathe” they absorb carbon dioxide from the atmosphere. They use carbon dioxide to grow their leaves, roots and branches. This helps to *reduce* the level of carbon dioxide in the atmosphere. But sadly humans are rapidly destroying forests and grasslands to make way for new developments or for agriculture. We are disrupting the earth's natural mechanisms for keeping carbon dioxide levels under control.

## The South African economy and fossil fuels

South Africa is one of the biggest culprits in causing global warming because we rely heavily on burning coal to produce energy, and burning coal releases lots of carbon dioxide into the atmosphere. South Africa has massive coal reserves and it can be mined quite cheaply. For this reason we have a very *energy intensive* economy — meaning that the kind of business and industry that has developed is the kind that works best with cheap coal or electricity.

South Africa is the fifth largest producer of coal in the world and coal supplies over 70% of our energy needs. Unfortunately, we are also one of the “dirtiest” countries. China, USA and the European Union are the top three producers of carbon dioxide. South Africa comes in at number 12 in the world.... So we urgently need to find other ways of producing energy.

In addition to coal, we depend on petrol and diesel for transporting people and goods. Have you ever imagined how much petrol or diesel it takes to transport your food? Not only food, think of anything you have purchased and imagine the energy it has taken to transport it to your home.

A lot of research is being carried out into the development of “renewable energy” such as energy from the sun (solar), energy from plants (biomass) and energy created by water (hydro). These forms of energy can be tapped and recreated without fear of their running out.

We have become so reliant on these fuels that we hardly think about the role they play in so many aspects of our lives and well-being. Many of us realised for the first time how dependent we are on electricity when we had rolling blackouts in 2007. How will we continue our high energy life styles into the future if we can no longer depend on fossil fuels?

## What are the effects of global warming?

We have established that the build up of greenhouse gases in the atmosphere is causing a rise in the planet’s temperature. This heat is causing massive changes in global weather patterns and conditions. It is not simply a rise in temperature that we can expect in the future, but also more extreme weather conditions – places that are currently arid may face greater droughts. Where it rains a lot there could be flooding and violent storms. There could be changes in wind patterns and ocean currents. The weather is becoming much more unpredictable and violent natural disasters are on the rise.

Global warming threatens to create more deserts and longer periods of drought. Water scarcity, food scarcity and changing ecosystems are predicted. Those areas that are currently humid could also face difficulty in that they could become more wet, with greater storms and flooding.

As the temperature of the earth rises, sea temperatures also rise and more water vapour is released into the air. When winds or hurricanes pick up this vapour more intense storms

Fossil fuels are also called **non-renewable energy** sources. Fossil fuels will eventually run out and we have no way to replace them, they are “non-renewable”. When they come to an end we need to be sure that we have other resources and systems in place to ensure our energy needs are met.

**Renewable energy** sources are things like sunlight, wind power, wave power, wood, etc. They do not run out... or in the case of wood, can be replaced by growing more trees.

## How much Carbon dioxide?

South Africa as a country uses millions of litres of petrol and diesel, and millions of tones of coal per year.

In 2007 we were responsible for releasing into the atmosphere, approximately 436 million tons of carbon dioxide. This is about the same as 73 million adult male elephants!... each year!

are created. In other places the ocean is becoming colder for now - the northern polar caps are melting and creating colder ocean temperatures in that region. The melting of the polar caps is also causing sea levels to rise, causing floods and heavier rainfall. The rising of sea levels could have devastating effects on coastal dwellers who could suffer from floods and devastation of their sources of livelihoods.



## **The impact of climate change on South Africa**

Climate change could have great impacts on South Africa's environment, society and economy. South Africa's rainfall is already erratic and we battle with desertification even now. It is predicted that the average temperature could rise by 3°C over the next 100 years. Rainfall could be reduced by up to 10% in the winter rainfall regions and increase marginally in the summer rainfall areas. We can probably expect more droughts and floods with prolonged dry spells followed by intense storms. The South African government will need to be ready to deal with these changes and ensure that infrastructure such as dams and water supply channels are in place to supply water to particularly vulnerable areas. Food security is another key concern that we need to be prepared for as it is predicted that farmers will battle with the new weather conditions.

Sea levels could rise by 0.9m by 2100. Those who battle with annual floods, particularly in informal settlements will really bear the brunt of the effects of rising sea levels. In addition to the devastation of homes due to flooding, there could also be an increase in the incidence of water-borne diseases such as cholera or the incidence of malaria.

## **Conclusion**

Our planet is in trouble due to the industrialisation of our global economy. The greatest polluters by far are the most developed countries. However, it is the poorest people who will probably bear the brunt of our changing climate. It is the poorest who will suffer most as food prices rise and water resources become scarce and as marginal living spaces such as informal settlements battle floods and related diseases.

South Africa finds itself between the devil and the deep blue sea – how do we provide the services that people need in a way that does not continue to cause global warming? How do we raise the standard of living for all who are living now while ensuring that future generations have what they need to survive?

Many people are working on solutions to these problems, such as designing more environmentally friendly technologies and supporting environmentally sound ways of producing food. The solutions are out there, but it will take the right political will to implement them.