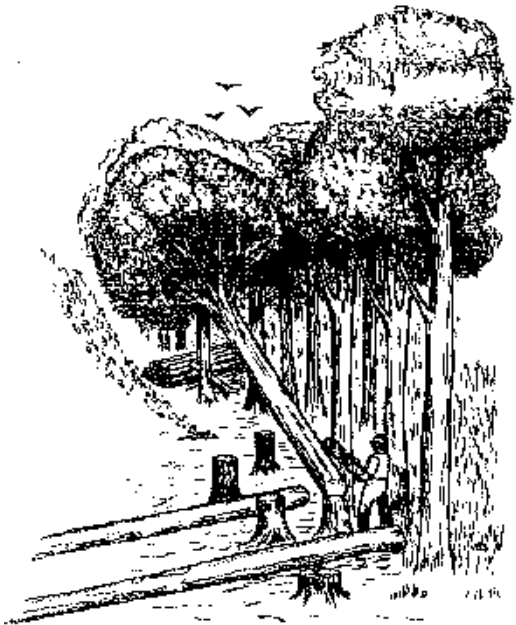


## Global Warming



### Introduction

Global warming is the increase of average world temperatures as a result of what is known as the greenhouse effect. Certain gases in the atmosphere act like glass in a greenhouse, allowing sunlight through to heat the earth's surface but trapping the heat as it radiates back into space. As the greenhouse gases build up in the atmosphere the Earth gets hotter.

### Causes

One of the main greenhouse gases is carbon dioxide (CO<sub>2</sub>). As trees grow they take in CO<sub>2</sub> from the air. When the wood dies the CO<sub>2</sub> is returned to the air. Forest clearance and wood burning (such as happens in tropical rain forests) is increasing the latter half of the process, adding to the CO<sub>2</sub> in the atmosphere. Deforestation is now out of control. For example in 1987 an area of the Amazon rain forest the size of Britain was burned, adding 500 million tonnes of CO<sub>2</sub> to the atmosphere. The loss of the forests also means that there are fewer trees to absorb CO<sub>2</sub>.

The recent fires in Indonesia, with more than a million hectares of forest ablaze, thanks to fires set

deliberately by logging companies, are likely to have an effect on global climate, but the more immediate effect has been the cloud of smog which enveloped much of south-east Asia during September and early October 1997.

However, as large a contribution as deforestation makes, it causes less than half the yearly total of CO<sub>2</sub>, the rest comes from the burning of coal, oil and other fossil fuels. These fossil fuels are burned in cars, power stations and factories of the wealthier nations such as the USA, Western Europe and the USSR.

Televisions, lights and computers use electricity that is created mainly from burning coal. Every time we switch on a light we are adding to the greenhouse effect. Cars are also major sources of CO<sub>2</sub>. The average European is responsible for nearly 2.5 times as much atmospheric carbon as a Latin American. The concentration of CO<sub>2</sub> has increased 25% since the industrial revolution, half of this rise has been in the last 30 years. It is expected to double within decades.

## **Other Greenhouse gases**

CO<sub>2</sub> contributes about 50% to the greenhouse effect. The other greenhouse gases are methane, chlorofluorocarbons (CFCs) and nitrous oxide (N<sub>2</sub>O)

### **Methane**

- is released during coal-mining activities, oil exploration and when vegetation is burnt during land clearance. The main source of methane though is agricultural activity. It is released from wetlands such as rice paddies and from animals, particularly cud-chewing species like cows. The problem with methane is that as the world population increases, agricultural activity must increase and so emissions of methane will also increase. Since the 1960s the amount of methane in the air has increased by 1% per year - twice as fast as the build up of CO<sub>2</sub>.

### **Nitrous oxide**

- comes from both natural and man-made processes. Man influenced sources, which represent about 45% of output to the atmosphere, are mainly: fossil fuel combustion, as in power stations; use of nitrogenous fertilisers; burning rain forests and human and animal waste. N<sub>2</sub>O contributes about 6% to the greenhouse effect at the moment.

### **CFCs**

- found in fridges, air conditioners, aerosols etc. are extremely effective greenhouse gases. Although there are lower concentrations of CFCs in the atmosphere than CO<sub>2</sub> they trap more heat. A CFC molecule is 10,000 times more effective in trapping heat than a CO<sub>2</sub> molecule, methane is about 30 times more effective.

Methane molecules survive for 10 years in the atmosphere and CFCs for 110 years. It is this that causes people to want to ban them completely.

## **Feedback Process**

### **CO2**

- about half the CO<sub>2</sub> released by burning fossil fuels is absorbed by the oceans. It is taken up by minute sea creatures or dragged to the ocean depths by the circulation of water. Recent research suggests that as the earth heats up, the oceans will be less efficient in absorbing CO<sub>2</sub>, leaving more in the atmosphere and so adding further to global warming.

### **Methane**

- as global temperatures become greater, so large quantities of methane stored in the frozen tundra of the north may be released. Also methane trapped in the sea bed may be freed by temperature rises.

As the world warms it causes feedback processes. Increases in temperature cause the liberation of CO<sub>2</sub> and methane which then cause further warming. Another feedback mechanism arises through higher air temperatures evaporating more water and so providing more cloud which both traps heat from below and reflects back sunlight from above. As the world warms, the effect of clouds could become more and more significant.

## **EFFECTS**

If no action is taken the greenhouse effect could lead to a rise in average global temperatures of between 1.5-4.5 degrees Celcius as early as the year 2030. These rises will be greater towards the poles and less at the tropics. There will also be more warming in winter than summer. Such increases will make the world hotter than it has been for more than 100,000 years. The rise will also be faster than ever before; a rise of 3 degrees Celcius after the last ice age took thousands of years. By the end of next century temperatures could have reached those of the time of the dinosaurs and it is doubtful if humans could survive. The effects are already showing - the ten hottest years since the 1860's have been in the last 15 years.

### **Storms**

- storms and hurricanes will become more frequent and stronger as oceans heat up causing more water to evaporate. Evidence is building up at an alarming rate. In September 1991 Japan was hit by Typhoon Mireille, its worst for 30 years. Then in September 1993 it was hit by Typhoon Yancy - the 13th that year, and the worst for 50 years. In January 1993 barometric pressure around Shetland dropped to its lowest recorded

level, 915 millibars. The oil tanker Braer broke up in the resulting storm. In March 1993 the 'Storm of the Century' hit America, causing \$1.6 billion in damage from Canada to Cuba. In December 1993 hurricane-force storms caused Britain its worst flooding for 40 years.

### **Droughts**

- continental heartlands will dry out more in summer. In 1988 the US suffered its worst heat wave and drought for 50 years. It cannot be proved that this was due to the greenhouse effect but it does give us some idea of what to expect in the future.

### **Floods**

- sea levels are already rising at a rate of 1 to 2mm each year due to expansion of the top layer of the oceans as they warm and the melting of the polar ice caps. The predicted rise by 2050 is between 20 and 50cm. This will cause increased flooding in coastal areas and river estuaries such as Bangladesh and the Nile Delta. London and many other British coastal cities will be threatened also. It is now a priority to strengthen Britain's sea defences.

### **What can be done?**

It is important to slow the warming as much as possible. This means using less fossil fuel, eliminating CFCs altogether, and slowing down deforestation.

This can be achieved best through

#### **energy conservation**

, including better use of public transport and cleaner, more efficient cars; and

#### **energy efficiency**

by greater use of gas which produces less CO<sub>2</sub> than coal and oil, and through renewable energy such as solar power. We need to stop destroying rain forests (

#### **deforestation**

) and start replanting trees (

#### **afforestation**

) to soak up carbon dioxide.

A United Nations panel has estimated that we need to reduce global fuel use by 60% immediately in order to stabilise the climate. Current commitments by those governments participating in CO<sub>2</sub> reduction will only lower global CO<sub>2</sub> by 4 - 6%. Although the developed industrialised nations still produce most CO<sub>2</sub>, the rapidly developing nations of South America and Asia are increasing their CO<sub>2</sub> production at a much higher rate, and by 2010 they will overtake the West as the main producers of CO<sub>2</sub>.

The developing countries are reluctant to participate in any CO2 emission reduction plans, arguing that they did not create global warming and that it is the responsibility of developed countries to cut their own emissions or to support developing countries with financial aid. Oil producing countries - including a significant lobby in the US - are also reluctant to have their sales reduced and have protested against action on climate change.

### **Nuclear Power**

- does not produce CO2 so could replace other forms of energy. It is necessary though, to find an effective means of safely disposing of the radioactive waste that can remain dangerous for hundreds to thousands of years.

### **Alternative Energy**

- more funding is required for research and development of alternative pollution-free energy sources such as solar, wave and wind energy.

Visit the Wood Land Trust's

[Carbon Balanced](#)

website for other ways that you could help halt climate change.

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