Introduction

The globe is warming and it is this warming that changes the climate. The globe has warmed by approximately 0.7°C since 1860 when temperature records began. This may not sound much but the last time the average temperature of the globe rose by 5°C, 95% of life on earth was made extinct. The EU and the British government have set a target of 2°C above pre-industrial temperature this century to limit the dangerous effects of climate change.

It is often said that the climate has always changed. Previous climate change has been brought about because of the devastating natural occurrences like meteor strikes (which is one theory for the demise of the dinosaurs) or massive volcanic events. There is also a natural cycle of climate change that occurs because of the relationship of the Earth's orbit to the sun, sometimes known as the Milankovitch cycle or wobble. This leads to our ice ages and inter-glacial periods. From available paleoclimate data it can be seen that there have been six or seven major ice ages in the last million years.

Solar changes may have been the major cause of global warming in the first half of the twentieth century, but there is no natural effect that explains the 0.5°C global warming (which constitutes nearly all the measured warming and has occurred in a very short period of time) in the past thirty years. In fact the solar cycle should have caused a marginal global cooling. This global warming is anthropogenic (man-made) as is the accompanying climate change.

A potted History of Global Warming

- In 1827 Jean Baptise Fourier recognised the warming effect of the greenhouse gases in our atmosphere and compared the atmosphere to the glass of a greenhouse which gave rise to the name greenhouse effect.
- In 1860 John Tyndall measured the absorption of infrared radiation by carbon dioxide.
- In 1896 a Swedish chemist, Svente Arrhenius, calculated the effect of increasing greenhouse gases. He estimated that doubling the concentration of CO2 would increase global average temperature by 5 to 6°C. The latest report from the Intergovernmental Panel on Climate Change (IPCC) puts a top figure of warming this century of 5.8°C for a doubling of CO2 concentrations.
- It was not until 1940 that calculations were carried out on the warming of our atmosphere due to burning fossil fuels.
- And it was not until 1957 that a paper published in America said: "with a build-up of carbon dioxide in the atmosphere humans are carrying out a large-scale geophysical experiment".
- In 1992 the world's governments met at the Rio Earth Summit and agreed to "precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures." And agreed to: "stabilize greenhouse gas concentrations in the atmosphere at a level that does not cause dangerous interference with the climate system".
- In 1997 the Kyoto Protocol was negotiated and committed signatories to "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." It came into force in 2005.
- Nineteen of the twenty warmest years on record have occurred since 1980. The five warmest years have all been since 1998, which was the warmest year on record. NASA have said that 2005 is now the warmest year on record and unlike 1998 this was not an El Nino year which naturally makes the globe warmer.

Information Sheet - Climate Change & Global Warming

The Greenhouse Effect

The Earth can sustain life because of the natural greenhouse effect. Without it the Earth would be a lifeless -18ºC instead of the average 15ºC which allows the cycle of life on Earth. Short-wave solar radiation reaching the Earth from the sun passes unimpeded through the atmosphere, which includes the greenhouse gases. The sun's rays are absorbed by the Earth, warming the globe. In a greenhouse, thermal radiation that is emitted by the plants and soil is absorbed by the glass that re-emits some of it back into the greenhouse. The glass acts as a 'radiation blanket' helping to keep the greenhouse warm. Greenhouse gases act in the same way as the glass, trapping heat in the lower atmosphere. As the concentrations of the greenhouses gases increase, more heat is trapped and the globe's temperature increases. In effect the greenhouse gases are like a duvet. The higher the greenhouse gas concentration the higher the tog of the duvet.

Greenhouse Gases

The greenhouse gases are: water vapour, carbon dioxide, methane, nitrous oxide, ozone and CFCs, HFCFCs and HFCs. All of these are natural greenhouse gases with the exception of CFCs, HFCFCs and HFCs which are man-made. Water vapour is an important greenhouse gas but its concentrations are not being altered by human activities.

The man-made increase in CO2 has contrbuted about 70% of the enhanced greenhouse effect to date. Methane (CH4) about 24% and nitrous oxide (N2O) about 6%.

Carbon dioxide is released from burning fossil fuels, deforestation and tilling the soil. All electricty and heat used for process and utilities in business produced by fossil fuels will produce global warming, as will any activity that leads to deforestation and land use change. Concentrations have increased from 280 to 380 ppm since the Industrial Revolution. This is unpresedented. Ice cores show that CO2 levels have not been higher for 800,000 years and climatologists suggest that they may not have been higher for twenty million years.

Methane is released from coal mining, the natural gas and petroleum industries, rice paddies, livestock, waste treatment, landfills and biomass burning. CH4 is 20 times more powerful a greenhouse gas than CO2. Since 1800 CH4 concentrations have doubled.

Nitrous oxide (also known as laughing gas) is emitted in the largest quantities from industrial farming methods that use artificial nitrate fertilizers and pesticides. N2O is also emitted from burning biomass, the chemical industry and aviation. It is a greenhouse gas 296 times more powerful than CO2 and has risen by 16% since pre-industrial times.

CFCs which were used as a refigerant and in aerosols have been phased out following the Montreal Protocol which was set up in 1987. Unfortunately in some cases they are being replaced by HFCFCs & HFCs which is another greenhouse gas, albeit a much less powerful one.

Ozone is formed by our industrial processes and aviation. The ozone layer is part of the greenhouse effect and also prevents harmful solar ultraviolet radiation reaching the Earth's surface. It is worth mentioning that the hole in the ozone layer over Antarctica (and a lesser one over the Arctic) does not cause global warming. In fact the reduced atmospheric ozone actually reduces the greenhouse effect. Unfortunately, the CFCs that caused the hole in the ozone layer, more than compensate for this. A CFC molecule has a greenhouse effect five to ten thousand times greater than a CO2 molecule.

A Short Review of Business and Climate Change

Global Climate Coalition (1997-2002) - was made up of American fossil fuel suppliers, motor manufacturers and other industry representatives, including Ford, Shell and BP. The latter was one of the first to leave, citing: "the time to consider the policy dimensions of climate change is not when the link between greenhouse gases and climate change is conclusively proven, but when the possibility cannot be discounted and is taken seriously by the society of which we are part. We in BP have reached that point."

The Corporate Leaders Group (May 2005) – thirteen business leaders (including BAA, BP, HSBC and John Lewis) argued that there is a need for urgent action to avoid the worst impacts of climate change. They offered to work with government to reduce greenhouse gas emissions. In effect they asked for legislation so that they could justify changes to stakeholders, which would be possible given an even playing field. "The global market for environmental goods and services is worth about $500 billion and it's growing every year. If we can get the right policy framework in the UK whereby we encourage companies to come up with the solutions and technologies of the future that will help not just the UK, but the rest of the world reduce its emissions. Clearly there's a commercial advantage there." - Michael Roberts, Confederation of British Industry.

Carbon Disclosure Project (September 2005) - acting on behalf of institutional investors with combined assets of more than £11 trillion they launched a report that surveyed the heads of the world's 500 largest companies. Of the 354 firms that responded 90% said climate change posed commercial risks or opportunities and 63% said they were taking steps to cut emissions.

CarbonNeutral Company (September 2005) - study revealed that three-quarters of FTSE500 directors would only seriously look at reducing carbon emissions if taxes or regulation forced them to. Given this admission, it is interesting that 90% of company heads considered strong green credentials would be an aid to their business. 60% of those interviewed said their firms had no targets for cutting emissions and most companies interviewed said they did not expect their firms to reduce emissions. The survey showed that businesses viewed staff benefits such as car allowances and bonus schemes as a higher priority than managing their environmental impact. Again it is interesting that the survey also found that 75% of directors felt that instigating a carbon reduction plan would not damage profitability. Of the findings, the chief executive of the CarbonNeutral Company said: "Our survey's findings suggest that while businesses are not doing enough to address climate change, there is a growing recognition that tackling carbon emissions has positive benefits to firms' bottom line and the economy."

Allianz Group (June 2006) – Europe's second-largest insurer called on the G8 to come up with a clearer policy on climate change so business can adapt to the global threat. This was backed up by comments earlier in the year from Swiss Re who highlighted Exxon Mobil, which accounts for about 1% of global carbon emissions and lobbies against action to mitigate global warming. Swiss Re indicated that it may be forced to approach Exxon and say: "Since you don't think that climate change is a problem and you're betting your stakeholders' assets on that, we're sure you won't mind if we exclude climate-related lawsuits from your D&O insurance."

The Aldersgate Group (June 2006) – business leaders (from amongst others Tesco, Shell and B&Q) urged Tony Blair to impose tougher limits on greenhouse emissions from UK industry and told the government that government action on reducing CO2 emissions

was needed to drive the development of clean technologies. In an open letter the executives said: "The scientific evidence is showing that human-induced climate change may be happening even faster than expected. It is clear to us that the need for ambitious and long-term action is becoming ever more urgent." They added: it could "provide significant economic opportunities for British business". Neil Carson, chief executive of Johnson Matthey, said: "Strong policies to tackle climate change could give UK businesses an advantage in the new global markets for low-carbon technology."

Stern Review

This government report set out the economic case in favour of combating climate change and was written by Nicolas Stern, the former chief economist of the World Bank. The 700 page report found: if no action is taken to reduce emissions, there is more than a 75% chance of global temperatures rising between 2-3°C over the next 50 years. This is over the level set by the EU for dangerous climate change. There is a 50% chance that average global temperatures could rise by 5°C. Extreme weather could reduce global gross domestic product (GDP) by up to 1%. A 2-3°C rise in temperatures could reduce global economic output by 3%. In the worst-case scenario global consumption per head would fall 20%. Nicolas Stern said: "Investment now will pay us back many times in the future, not just environmentally but economically as well." And "For every £1 invested now we can save £5, or possibly more, by acting now".

The Climate Change Levy (CCL)

This is a tax on energy used by industry, commerce and the public sector and is intended to provide an incentive to increase energy efficiency and thus reduce carbon emissions. Ironically it was introduced on April 1st 2001 and was forecast to reduce emissions by 2.5 million tonnes of carbon by 2010. Crucially electricity generated from renewables and approved cogeneration schemes is not taxed, which is reason enough to switch to a truly 'green' electricity tariff. Please see Vision 21 business information sheet: *Energy Supplies*. Vision 21 has also made easy to switch by simply clicking a mouse - http://www.vision21.org.uk/index.asp?page=goodenergy and http://www.vision21.org.uk/index.asp?page=ecotricity

Climate Change Agreements allow energy intensive business users to receive an 80% discount from the Climate Change Levy providing they meet energy efficiency or carbon savings targets. For more information from DEFRA please see:
http://www.defra.gov.uk/environment/climatechange/uk/business/ccl/index.htm

Business as Usual

This is a term that has many connotations. It has particular resonance when applied to climate change: the Intergovernmental Panel on Climate Change (IPCC) periodically publishes authoritative reports on climate change and predicts possible temperature rises for this coming century based on varying levels of emissions. It plots these scenarios on a graph. One of them is referred to as 'business as usual'. This steep curve upwards would raise the globe's temperature by over 5°C, which last happened about 250 million years ago and led to the largest mass extinction in the planet's long history. We are currently exceeding the graph for 'business as usual' ...