

## **Climate Change Strategy and Action Plan**

**2014 - 2017**

Hinckley and Bosworth Borough Council recognises that climate change has implications for the future economic, social and environmental well being of the Borough. It is for this reason that the Hinckley and Bosworth Climate Change Strategy has been developed.

The main objectives of the Climate Change Strategy for Hinckley and Bosworth are to:

1. Raise awareness of the potential impact of climate change across the Borough
2. Reduce greenhouse gas emissions through energy conservation and use of renewable energy and to reduce water usage in the Council's own activities
3. Propose measures to help prevent the causes of climate change by aiming to reduce carbon dioxide (CO<sub>2</sub>) emissions from activities in the Borough using the Council's power and influence with other organisations
4. Encourage everyone in the Borough, individuals, organisations and businesses to take measures to adapt to the predicted effects of climate change
5. Reduce CO<sub>2</sub> emissions as a result of energy efficiency measures implemented to alleviate fuel poverty within the Borough

### **Climate Local replaces the Nottingham Declaration on Climate Change**

The Nottingham Declaration of Climate Change required local authorities to work with the community to tackle climate change at a local level. Hinckley and Bosworth Borough Council signed the Declaration in 2004 and reaffirmed its commitment on 28 November 2006 by signing the Nottingham Declaration 2. This commitment required the authority to prepare a Climate Change Action Plan to cut carbon emissions in line with national targets and also to encourage and help others to do the same.

Climate Local has replaced the Nottingham Declaration on Climate Change but the principles are still the same. By signing Climate Local the Council has declared its ongoing commitment to reducing carbon emissions and responding to changes in the climate within our own operations, services and the local community. By continuing to adapt to the changing climate, there is less risk from flooding and a greater awareness of the impacts of extreme weather conditions. Our natural environment will also be better protected.

### **Climate Change**

Climate is not the same as weather. Climate is the average pattern of weather for a particular country or region over a significant amount of time. Climate change is the long term alteration in weather patterns across the globe, particularly in respect of temperature and storm activity. Climate varies for natural reasons but recent changes in industrial and agricultural activities could validate evidence that it is as a consequence of a "greenhouse effect".

Of the six main greenhouse gases, carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride, carbon dioxide is the most significant. Carbon dioxide is currently responsible for 60% of the "enhanced" greenhouse effect. The concentration of carbon dioxide in the atmosphere has increased by 30% since the Industrial Revolution, particularly in the

northern hemisphere where more fossil fuel including coal, gas and oil, particularly in a transport capacity, is burned. It is predicted that this will reach a level of 60% by 2100 but it could be as early as 2045 if action is not taken quickly.

This strategy sets out a systematic approach to embedding climate change into Hinckley and Bosworth Borough Council's core functional activities. It provides the framework for identifying climate risk, building capacity for adaptive measures and options, and ensuring co-ordinated delivery from all sections of the authority.

Although this strategy will concentrate on the reduction to carbon dioxide emissions in the Borough, it also needs to recognise the risks from climate change and build in resilience to reduce the impact from them.

### **How Climate Change will affect us**

Information is available which demonstrates that the local climate will become more unpredictable in the future with weather patterns that cannot be calculated from past decades. Summers could become hotter and winters less cold but wetter with fewer and heavier rain patterns.

### **The way forward**

The need to reduce our carbon dioxide emissions (carbon footprint) and adapt to climate change is identified in the action sections of the document. Hinckley and Bosworth Borough Council is committed to reduce the emissions resulting from local authority operations.

The Council, in partnership with Leicestershire County Council and other district councils is also committed to planning to adapt to climate change. The aim of this is to embed the management of climate risks and opportunities across all levels of services plans and estates.

In addition the Council will endeavour to reduce emissions by working in partnership with the local community and businesses with the aim of reducing their impact on the climate.

We shall be monitoring fuel poverty by reporting on the percentage of people receiving income-based benefits together with those living in homes with a low and high energy efficiency rating.

The Climate Change Action Plan 2014 -17 allows for flexibility and the ability to respond to future developments from partners' initiatives and government initiatives. There will be annual reviews to further develop the Plan with revisions on a three year rolling basis. Targets are robust and focus on areas where a real difference can be made, for example, carbon dioxide emissions from Council buildings.

### **Foreword by Councillor David Gould, Climate Change Champion**

Climate Change remains the biggest challenge facing humanity, and recent events highlight the impact that changing weather patterns are having on the United Kingdom.

It remains imperative, that within Hinckley & Bosworth Borough Council we take definitive action throughout the organisation to reduce our emissions of gases that contribute to Climate Change. By working together towards a common goal, each department can cut emissions. From our significant investment in new and improved efficient buildings through to careful driving to save fuel, we are working holistically to this end.

Our on-going strategy will provide focus on reducing emissions further, whilst maintaining our current efficient standards, not only saving the Council money, but also making contributions large and small towards reducing our impact on the environment for many generations to come.

## **Glossary and Information**

### **Adaptation**

Greenhouse gases take a long time to disappear once they have been released into the atmosphere. Carbon dioxide may take up to 100 years. In such circumstances some change in climate is inevitable even if we succeed in reducing future emissions. This may lead to wetter, milder winters and drier, hotter summers. We will be at risk from heavy rainfall, heat waves, and gales including very high winds. Preparing for these changing conditions is termed "adaptation".

### **Cancun Agreements**

The Cancun Climate Change Conference held in Mexico during November 2010 produced the basis for the most comprehensive international response to climate change to date agreeing to establish a Green Climate Fund, cooperate in developing and applying technologies to control, reduce or prevent manmade emissions of greenhouse gases which are not controlled by the Montreal Protocol.

### **Carbon dioxide (CO<sub>2</sub>)**

Almost the Earth's entire atmosphere (99%) is made up of nitrogen (78%) and oxygen (about 21%). While both of these gases play important roles in the vast number of processes which support life on Earth, they play almost no part in regulating the climate. This is carried out by some of the trace gases in the remaining 1% of the atmosphere which occur in relatively small amounts: carbon dioxide, methane, nitrous oxide, ozone, water vapour and halocarbons.

Carbon dioxide (CO<sub>2</sub>) is the primary greenhouse gas given off as a result of human activities. It is produced as a result of burning anything containing carbon. While CO<sub>2</sub> emissions come from a variety of natural sources, emissions from human activities, such as driving cars, travelling in aircraft, industrial power plants and heating homes, are responsible for the increase that has occurred in the atmosphere since the industrial revolution.

### **What is a Climate?**

Climate is the combination of all the elements of weather in a particular place. Some places have particular types of weather at specific times of the year. For example, the tropical monsoon climate areas in South East Asia will experience dissimilar wet and dry seasons which are as a result of temperature differences between the land

and sea. The prevailing winds reverse their direction twice a year to produce this effect. In Britain our climate has changeable weather at all times of the year.

### **Climate Change**

Climate change is the long-term alteration in global weather patterns, especially increases in temperature and storm activity, regarded as a potential consequence of the green house effect.

### **Fossil Fuels**

Fossil fuels including coal, gas and oil are so called because they have been formed from the organic remains of prehistoric plants and animals. They provide the main source of electricity production. Sources of world electricity production in 2009 were fossil fuels 67%, renewable energy 16% (mainly hydroelectric, wind, solar and biomass), and nuclear power 13%, and other sources were 3%. The majority of fossil fuel usage for the generation of electricity was coal and gas. Oil was 5.5%, as it is the most expensive common commodity used to produce electrical energy. Ninety-two percent of renewable energy was hydroelectric followed by wind at 6% and geothermal at 1.8%. Solar photovoltaic was 0.06%, and solar thermal was 0.004%.

### **Fuel Poverty**

Until 2012 fuel poverty was defined as a situation where a household spent more than 10% of their total income on fuel use. Following a review by Prof. John Hills, a new more complex definition of fuel poverty is now used. It is now defined as when a household's required fuel costs are above the median level; and if they were to spend what is required, then the household would be left with a residual income below the official poverty line. Additionally, a Fuel Poverty Indicator has been created, which shows how far into fuel poverty households are, not simply if they are in poverty or not. Definitions of "income" and "adequate heating regime" vary between the UK Government and Scottish, Welsh and Northern Ireland governments.

The government recognises that local authorities have key role in improving the energy efficiency of residential accommodation in their areas and to achieve the required reductions in domestic carbon emissions.

All English local authorities are now required by the Department of Energy and Climate Change to prepare a Home Energy Conservation Act (HECA) detailing outcomes against targets at two-yearly intervals.

### **Greenhouse Effect**

The term "Greenhouse Effect" is commonly used to describe the increase in the earth's average temperature that has been recorded over the past 100 years. The earth receives its life sustaining warmth from the sun. On its way to the earth's surface most of the heat energy passes through the earth's atmosphere, while a smaller proportion is reflected back into space. The energy warms the earth's surface and, as the temperature increases, the earth radiates heat energy (infrared energy) back into the atmosphere. As this energy has a different wavelength to that coming from the sun, some is absorbed by gases in the atmosphere. An increase in greenhouse gases in the atmosphere enhances the atmosphere's ability to trap heat, which leads to an increase in the average surface temperature of the earth. As greater amounts of the main greenhouses gases are released into the atmosphere

due to human activities, more heat is trapped and the planet's becomes warmer. Every time a machine is used, or a car or aeroplane journey is undertaken, more carbon dioxide is produced as the result of the fossil fuel consumed.

### **Intergovernmental Panel on Climate Change (IPCC)**

The IPCC is a scientific body supported by the United Nations (UN) comprising thousands of scientists from all over the world who contribute on a voluntary basis. It is the leading international body for the assessment of climate change, reviewing the most recent scientific, technical and socio-economic information produced worldwide.

### **Kyoto Protocol**

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty that sets binding obligations on industrialised countries to reduce emissions of greenhouse gases. The UNFCCC is an environmental treaty with the goal of preventing hazardous anthropogenic (i.e., human-induced) interference of the climate system. The Protocol was ratified by 192 nations and "recognises that developed countries are principally responsible for the current high levels of greenhouse gas emissions in the atmosphere as a result of more than 150 years of industrial activity. Many developed countries, including the UK through the European Union, have agreed to legally binding limitations/reductions in their emissions of greenhouse gases.

### **Methane**

Methane (CH<sub>4</sub>) is a greenhouse gas released by the decomposition of organic materials in the absence of air. It is mainly associated with the digestive process of livestock, rice production and fossil fuel extraction and is 21 times more damaging than carbon dioxide.

### **Mitigation**

This refers to the action that is taken to reduce greenhouse gas emissions and tackle climate change, thereby limiting the most severe impacts.

### **Montreal Protocol**

An international treaty ratified in 1989 by 196 nations plus the European Union, designed to protect the ozone layer by phasing out the production of substances responsible for ozone depletion. This treaty was acclaimed as an example of exceptional international cooperation.

### **Ozone Layer**

The ozone layer is a thin layer of ozone gas (O<sub>3</sub>) in the stratosphere that absorbs damaging ultraviolet (UVB) radiation from the sun. Some of the chlorofluorocarbons (CFCs) used in industry and domestic appliances (especially refrigerators) are capable of destroying ozone if they are released into the atmosphere. Thinning of the ozone layer has no direct impact on the greenhouse effect, but it may increase the effects of harmful radiation on plants that absorb carbon dioxide. It will also increase the incidence of skin cancers. The ozone-destroying CFCs also act as greenhouse gases.

## **Resilience**

Resilience is the ability of the environment and other systems to recover from certain levels of environmental impact e.g. floods, heatwaves. Risk assessments provide data to assist in building resilience into service action plans.

## **Sustainability/Sustainable Development**

Sustainability began with the 1987 publication of the World Commission on Environment and Development Report "Our Common Future", also known as the Brundtland Report, (named after Gro Harland Brundtland, the Norwegian politician who chaired the committee). This document defined sustainable development as "development that meets the need of the present without compromising the ability of future generations to meet their own needs".

This means effective protection of the environment, prudent use of natural resources and recognising the needs of everyone. Living sustainably will mitigate climate change and contribute to the adaptation to change likely to occur.

## **Weather**

The weather is the state of the atmosphere at any given time i.e. sunny, raining, foggy or snowing.

## **INTRODUCTION**

Climate Change is probably the most serious environmental challenge facing the planet. Valid scientific evidence is accumulating that indicates it is the activities of humans, accelerating the release of gases into the atmosphere, which is contributing to this situation.

By publishing this Strategy and Action Plan, Hinckley & Bosworth Borough Council fully acknowledges its responsibility in contributing towards the greenhouse gas emissions considered responsible. We publicly declare the commitment to achieve a significant reduction in greenhouse gas emissions from our own authority's operations particularly energy sourcing and use, travel and transport, waste production and disposal and the purchasing of goods and services.

This strategy aims to raise awareness of the issues surrounding climate change and how it will affect the Borough in years to come if we do not tackle the causes. The accompanying action plan is the second update of our 3-year plans to help move us towards the long term goals. The present document is therefore intended to set out these goals and also to plan actions for the borough through to 2017.

The Climate Change Act became law on the 26th November 2008. The Act puts in place a framework to achieve a mandatory 80% cut in the UK's carbon emissions by 2050 (compared to 1990 levels), with an intermediate target of between 34% by 2020.

Hinckley & Bosworth's target is to achieve a 20% reduction in carbon dioxide emissions from corporate buildings by 2016 and 80% by 2050 in line with the UK government target. To assess progress against targets, the government introduced National Indicators including NI 185 which required local authorities to report the percentage reduction in carbon emissions arising from their own activities based on 1990 data. These indicators have been replaced by the requirement to submit data

on a suite of greenhouse gases. Records of emissions held by HBBC back as far as 1990 was incomplete and therefore the authority took 2005 as a baseline.

In 2011, the Department of Energy & Climate Change (DECC) requested views from local authorities on a way forward on sharing information on their emissions from a local authority's own estate and operations. This resulted in a requirement to publish a greenhouse gas report on an annual basis. It differs from previous reports as it is greenhouse gases and not just carbon emissions that are considered. However, due to biennial Home Energy Conservation Act reports, figures are available between 1985 and 2008 and show an overall improvement in home energy efficiency of 21.6%.

The main objectives of this strategy are to:

1. Raise awareness of the potential impact of climate change across the Borough
2. Reduce greenhouse gas emissions through energy conservation and use of renewable energy and to reduce water usage in the council's own activities
3. Propose measures to help prevent the causes of climate change by aiming to reduce carbon dioxide (CO<sub>2</sub>) emissions from activities in the borough using the council's power and influence with other organisations
4. Encourage everyone in the borough, individuals, organisations and businesses to take measures to adapt to the predicted effects of climate change
5. Reduce CO<sub>2</sub> emissions as a result of energy efficiency measures implemented to alleviate fuel poverty within the borough

The council has already declared its commitment to tackling climate change by:

- signing the Nottingham Declaration on Climate Change and its successor Climate Local. Climate Local is a framework that reflects local priorities and opportunities for action. It supports the council's efforts both to reduce carbon emissions and to improve our resilience to the anticipated changes in the climate. The initiative was launched by the Local Government Association (LGA) and aims to work with local authorities to develop local actions to reduce carbon emissions and improve their ability to protect residents and council services from the anticipated changes in the weather.
- introducing a Carbon Management Plan to examine the potential for the deployment of renewable energy and low carbon technologies within the borough. It focuses on renewable electricity and heat technologies including both commercial scale renewables and micro generation including on-site and building-integrated renewables and district heating
- undertaking a Renewable Energy Capacity Study which examines the potential for the deployment of renewable energy and low carbon technologies within the borough focusing on renewable electricity and heat technologies including both commercial scale renewables and micro generation (including on-site and building-integrated renewables) and district heating
- adopting the Leicestershire Municipal Waste Management Strategy Update 2011 committing HBBC to a target of recycling or composting 58% of local authority collected waste by 2020
- implementing the Hinckley and Bosworth Green Travel Plan reducing emissions by encouraging the staff of all Hinckley Hub partners to adopt more sustainable ways of traveling to and from work
- developing a Sustainable Purchasing Policy
- being one of the founder members of the Climate Mitigation and Adaptation group (CLIMA)

## **Climate Change context: “Climate change is an avoidable catastrophe”**

Climate change is already here and is most noticeable in the extremes of weather experienced not only in the UK but across the globe. Our planet is warming. In 2001 climate change experts concluded that global temperatures have increased more than 0.80C since 1900. Here in the UK, 4 out of the 5 hottest years in the 330-year Central England temperature record occurred in the last 10 years. The polar ice caps are melting and now scientists are predicting that ice melt from small glaciers and the “calving” of icebergs into the ocean will account for 60% of all sea-level rise due to this reason. This calculation does not include the expansion of warming ocean water, which could double the estimate.

As a global issue it can only be tackled by international action. Avoiding the worst impacts of climate change relies almost entirely on whether the countries with the greatest emissions take action. The UK is in this group contributing 1.7% of all emissions - 11 tonnes of CO<sub>2</sub> equivalent for every person in the country. Global emissions are currently estimated to be about 47 billion tonnes and increasing. Emitters need to reduce carbon emissions to a level capable of keeping temperature rise to less than 2°C above pre-industrial levels. To achieve this, global emissions must peak before the end of this decade if global warming is to be decreased and the most significant climate impacts avoided.

In July 2005, Sir Nicholas Stern was appointed by the UK government to conduct reviews on the economics of climate change. The Stern Review on the Economics of Climate Change is the 700-page report released on the on 30 October 2006 and discusses the effects of climate change on the world economy. It was not the first economic report on global warming but its significance is as the largest and most widely known and discussed report of its kind.

The report suggests that climate change threatens the basic elements of life for people around the world – access to water, food production, health, and use of land and the environment – and these impacts are not evenly distributed. The poorest countries and people will suffer earliest and most. If and when the damages appear it will be too late to reverse the process. We should therefore plan a long way ahead. It also recommends regulation, carbon taxes and carbon trading to reduce greenhouse gas emissions.

The Stern Review is relevant in terms of the human influence on global climate as increasing amount of greenhouse gases are emitted. About 6.5 billion tonnes of CO<sub>2</sub> is emitted globally each year, mostly through burning coal, oil and gas for energy.

In a further report published in 2010, Sir Nicholas Stern and Christopher Taylor proposed that the economic slowdown has made emissions targets less difficult to attain but, as world economies strengthen, emissions are likely to rise more rapidly.

## **Government Action**

In October 2008 the government created a new department devoted to actions on Climate Change – the Department of Energy and Climate Change – comprising the Climate Change Group previously in the Department for Environment, Food and Rural Affairs (DEFRA) and the Energy Group previously in the Department for Business, Enterprise and Regulatory Reform.



The Climate Change Programme, published in 2008, committed the UK government to reducing all six Kyoto greenhouse gases by 80% measured against the 1990 baseline, enabling the UK to become a low carbon economy.

Several government initiatives have been introduced including the Carbon Reduction Commitment. This is a mandatory cap and trade scheme that applies to large non-energy organisations in the public and private sectors, including local authorities, that have mandatory half-hourly metered electricity consumption greater than 6000 MWh per year. This applies to emissions from direct energy use as well as purchased electricity. As HBBC falls outside this remit, it is not required to register at present.

The Department of the Environment, Food and Rural Affairs (DEFRA) has published the first UK Climate Change Risk Assessment giving detailed analysis of 100 potential impacts of climate change. It will be updated every 5 years. The National Adaptation Programme published on 24 February 2014 includes measures to raise awareness to adapt, increase resilience, predict for the long term and address major evidence gaps.

### **Local Action**

HBBC is a member of CLIMA, the Countywide Climate Change group. Membership is limited to representatives from local authorities and associated partners involved in monitoring or delivery of climate change issues within Leicester, Leicestershire and Rutland. Other individuals and organisations are invited to attend meetings for specific agenda items, to co-ordinate action, share intelligence and monitor progress on climate change issues

### **What are the implications?**

Weather patterns across the globe are becoming increasingly unpredictable and violent and the species interactions that hold our planet's life-supporting ecosystems together are becoming progressively more disconnected.

At present global warming can be linked to human activities in burning fossil fuels and releasing carbon dioxide into the atmosphere. It is possible that this will lead to climatic feedbacks or the resulting effects of global warming will either promote or inhibit further effects. As the earth's surface warms and the arctic permafrost melts, billions of tonnes of carbon dioxide and methane currently trapped in frozen peat bogs will be released. These will contribute to the levels of carbon dioxide and methane already in the atmosphere.

Further warming may occur due to the earth having less snow and ice cover to reflect back the Sun's rays which instead will be absorbed by the surface. Warming will therefore take place at higher altitudes. Glaciers all over the world have been melting for at least the last 50 years and the rate of melting is speeding up.

### **Why are greenhouse gases important?**

Carbon dioxide, water vapour and methane form a natural blanket of air around the Earth. The burning of fossil fuels (oil, gas and coal) and also the acceleration in deforestation has led to a massive increase in the amount of carbon dioxide released into the atmosphere. Larger quantities of other greenhouse gases, such as methane and nitrous oxide, are also being released.

Greenhouse gases occur naturally in the atmosphere but some, for example fluorocarbons or chlorofluorocarbons, are industrially manufactured. These chemicals have been used in refrigeration, air conditioning, and as solvents. The production of these gases is being eliminated under existing international agreements because they deplete the stratospheric ozone layer. Other fluorocarbons that are also greenhouse gases are being used as substitutes for CFCs in some applications, for example in refrigeration and air conditioning. Although currently very small, their contributions to climate change are expected to rise.

The earth's surface is heated by the sun. As the surface warms up, it reflects heat back into the atmosphere. About 70% of the sun's energy is radiated back into space but greenhouse gases, which warm the atmosphere and reflect heat back down to earth, trap some of the infrared radiation.

As a result of the greenhouse effect, the earth is kept warm enough to make life possible. Increased emissions of greenhouse gases are disturbing the balance of this complex system causing global warming.

### **Carbon Dioxide**

Carbon dioxide is currently responsible for 60% of the "enhanced" greenhouse effect. The earth's 4.6 billion year geological history shows that it has probably been in the atmosphere in greater proportions (8%) than today. Most carbon dioxide was removed as organisms evolved photosynthesis, securing it as carbonate minerals, oil shale and coal in the Earth's crust when the organisms died.

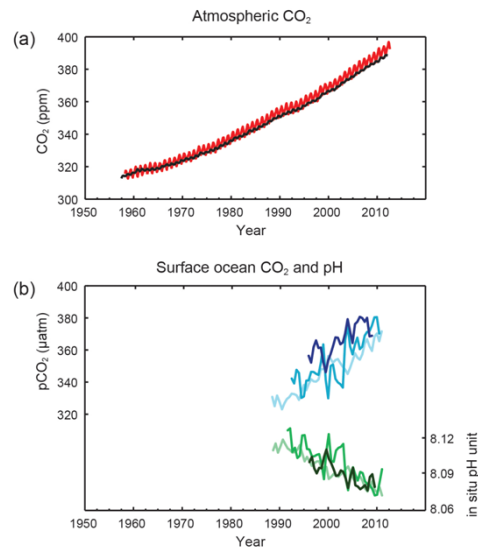
Natural sources, mainly the decay of plants, volcanic eruptions and waste products from animal respiration are responsible for carbon dioxide in the atmosphere. It is removed by photosynthesis and becoming dissolved in water, particularly on the surface of oceans. A balance is maintained between photosynthesis and respiration and decay. It is this balance which is being overridden by the excess of carbon dioxide entering the atmosphere from human use of fossil fuels which happens when we run vehicles using petrol and diesel, heat homes, businesses and power factories. Deforestation releases the carbon stored in trees and also results in less carbon dioxide being removed from the atmosphere.

The concentration of carbon dioxide in the atmosphere has increased by 30% since the Industrial Revolution particularly in the northern hemisphere where more fossil fuel is burned. It is predicted that this will reach a level of 60% by 2100 but it could be as early as 2045 if action is not taken to reduce the use of fossil fuels.

**Figure SPM.4**

Multiple observed indicators of a changing global carbon cycle

All Figures © IPCC 2013



IPCC AR5 Working Group I  
Climate Change 2013: The Physical Science Basis

ipcc  
INTERGOVERNMENTAL PANEL ON climate change  
WHO UNEP

## Methane

Even though it occurs in lower concentrations than carbon dioxide, methane produces 21 times as much warming as carbon dioxide and accounts for 20% of the greenhouse effect. Present concentrations of methane are nearly three times higher than several hundred years ago. Today, more than 60% of the atmospheric methane comes from human activities including growing cattle and rice agriculture, coal mining, natural gas usage, and biomass burning. It is also generated when disposing of waste into landfill by bacteria that break down the organic material.

Methane remains in the atmosphere for up to 12 years, which is less than most other greenhouse gases, and is removed through a natural process to form water. Normally this would be a balanced equation. There is now two and a half times more methane in the atmosphere than prior to the Industrial Revolution, when the rise became more prominent. Without further technical knowledge, the balance of the equation will be disturbed and further rises will probably occur.

## Nitrous oxide

Although there is less than one-thousandth the amount of nitrous oxide in the atmosphere than carbon dioxide, it is 200 to 300 times more efficient at trapping heat and can remain for up to 150 years. The nitrous oxide produced today could still be trapping heat in 2150. Levels have increased by 16% in the last 300 years.

Plants trap nitrogen from the air. Soil micro-organisms remove this nitrogen from the soil and it is released back to the atmosphere. This process produces nitrous oxide. The oceans, and burning fossil fuels and wood, release other nitrous oxide but the main contributor is thought to be the human use of nitrogen fertilisers.

## Halocarbons

Chlorofluorocarbons (CFC) are man-made compounds containing chlorine, fluorine and carbon not found in nature. The production of CFCs began in the 1930s for the purpose of propellants and refrigerants. These are industrially produced and hardly ever occur naturally. Chlorofluorocarbons (CFCs) are well known through their use as propellants in spray cans and as refrigerants during the 1970s but tended to be substituted for others Hydrochlorofluorocarbons (HCFCs) and hydrofluorocarbons (HFCs) after many countries signed the Montreal Protocol in 1987 limiting their use.

### **How will we be affected by continued Climate Change?**

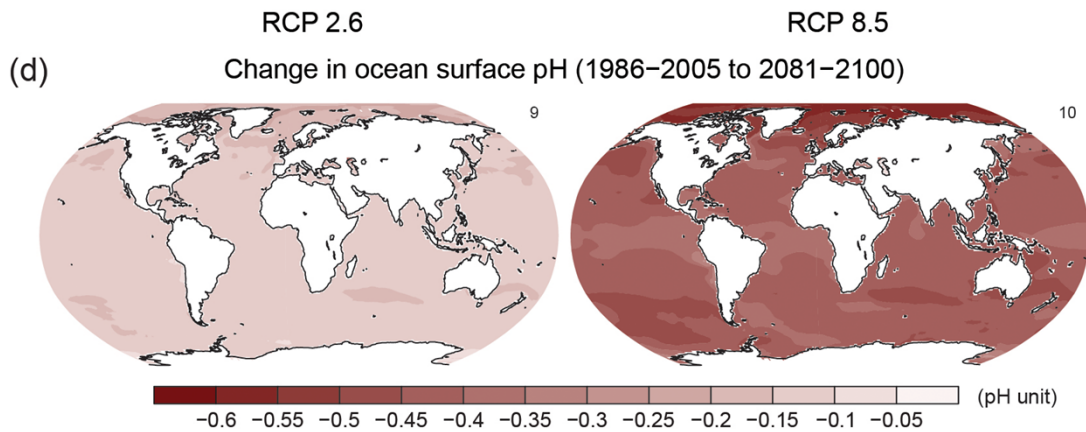
On 31 March 2014, the Intergovernmental Panel on Climate Change (IPCC) published a press report stating that the “effects of climate change are already occurring on all continents and across all oceans. The world, in many cases, is ill-prepared for risks from a changing climate”. It concludes that, although the risks are already difficult to manage as high levels of global warming has already taken place, there are still opportunities to respond to the risks. People, industries, structures and ecosystems are exposed to risks from increased dangers due to environmental events brought on by progressive climate change. Targeting and making investments in reducing and adaptive measures will increase present and future resilience.

Climate change is being recognised as a global crisis and 115 governments have accepted the findings of the IPCC report entitled “Climate Change 2014: Impacts, Adaptation and Vulnerability”.

The report acknowledges other factors are influencing the outcomes i.e. variations of the solar cycles, volcanic eruptions. It notes that the United Nations Framework on Climate Change (UNFCCC), the international environment treaty negotiated at the UN Conference on Environment and Development (Earth Summit) held in Rio de Janeiro in 1992, produced the objective to “stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous manmade interference with the climate system”. This organisation also established legally binding obligations for developed nations to reduce their greenhouse gases through the Kyoto Protocol.

Data published in the report confirm that, over the last two decades, the Greenland and Antarctic ice sheets have been losing mass, glaciers have continued to shrink almost worldwide, and Arctic sea ice and Northern Hemisphere spring snow cover have continued to decrease in extent contributing to rising sea levels and oceanic temperatures. Over the period 1901 to 2010, the global mean sea level rose by 0.19 metres.

The atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years. Carbon dioxide concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions. The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification



The UK Climate Impacts Programme Report has stated that the Central England Temperature (CET) has risen 1°C since 1980 with 2006 being the warmest on record (The Climate of the United Kingdom and Recent Trends 2007). This is a more rapid rise than that of the global average land-surface temperature over the same period.

The CET is the longest continuous temperature record in existence. Records began in 1659. During the eighteenth and nineteenth centuries, a cool period was recorded. This correlated with more snowy winters and cooler summers and the temperatures fluctuated widely but with little trend. From 1910 to 1950 temperatures increased slightly but a sharp rising trend began in about 1975. The years of the last decade have shown temperatures have been higher in all seasons than those previously seen.

Since 1960, data collection has been adjusted to allow for any effects of warming due to the expansion of local built-up areas.

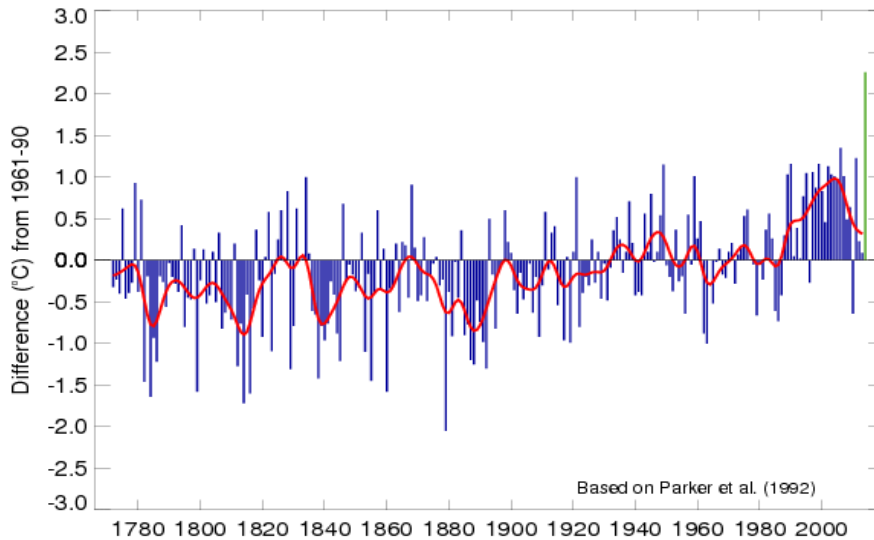
Particular anomalies have been observed in the years 2006 and 2007 during which a number of records have been broken:

- July 2006 was the warmest month since observations began with a mean temperature of 19.7°C
- September 2006 was the warmest September since observations began
- Autumn 2006 was the warmest Autumn since observations began
- April 2007 was the warmest April since observations began
- The 12-month period ending in April 2007 was the warmest such period on record

Further records were broken in the Spring 2011 which was unusual for the warmth during April and also for the lack of rainfall during March and April, particularly over England and Wales. It was the warmest Spring across the UK in the last 100 years, warmer than Spring 2007 and the second driest Spring across England and Wales, marginally drier than 1990. April was an exceptionally warm, dry and sunny month - the warmest and third sunniest April on record for the UK.



### Mean Central England Temperature Annual anomalies, 1772 to 7<sup>th</sup> Apr 2014



The monthly mean surface air temperatures for the first three months of 2014 all show a variance from what would be expected: January 5.7 °C (1.9), February 6.2°C (2.4) and March 7.6°C (2.0).

Human influence on the climate system is clear. This is evident from the increasing greenhouse gas concentrations in the atmosphere, the fast rise in temperature of the North Atlantic Ocean, positive radiative forcing, observed warming, and understanding of the climate system. Radiative forcing is the relative effectiveness of greenhouse gases to restrict long-wave radiation from escaping back into space. It is though that these data cannot be attributed to natural climate factors, which would have in fact led to a cooling in recent decades but is constant with the increase in greenhouse gases.