3.0 Section B: Dealing with the Challenge of Climate Change

3.1 Section introduction

Global warming is a consequence of the sun's heat is being trapped in the lower atmosphere. This is due to the accumulation of certain so-called 'greenhouse' gases which prevent the radiation of heat away from the earth in a similar way to glass in a greenhouse. The trapped heat causes the temperature of the earth's surface to increase over time, and this is one of the main causes of climate change.

The principal greenhouse gas is carbon dioxide (CO_2). This accounts for approximately 55% of the total greenhouse gases found in the atmosphere. The main sources are from burning fossil fuels in energy generation, and emissions released from car exhausts. Greenhouse gases also come from a variety of other sources such as methane from the decomposition of organic material and from agriculture.

The UK Climate Impact Programme (UKCIP) has modelled a number of scenarios based on different emission projections. The likely consequences are not fully understood but overall, weather events are likely to become more extreme and unpredictable. For West Sussex this probably means that average temperatures will increase and summers will become hotter and drier, creating greater pressure on water resources. Winters are likely to become milder and wetter which, when combined with rising sea levels means there will be an increase in flood risk and coastal erosion.

The community of West Sussex has developed in a relatively predictable and stable climate. Major changes to this climate will impact on the way people live, their health, the economy, the infrastructure, and the countryside including farmed landscapes and wildlife.

Likely changes include;

- changes to the growing season, temperature and water availability, which will all have a bearing on the types of crops farmers can grow in the future,
- pressures on the ageing sewerage system, particularly during periods of peak flow,
- increases in flooding, storm damage and coastal erosion,
- impacts on infrastructure, buildings and people from extreme sustained heat waves,
- fragmentation and loss of species and habitats, and resultant changes to landscapes,
- water shortages in summer and low river flows, impacting on people and wildlife,
- different patterns of weather related deaths, with more people dying in the summer from heat related conditions, but less in the winter from cold related,
- more outbreaks of food poisoning, and outbreaks of different human and animal diseases, and
- marketing and diversification opportunities, such as bio fuels and energy crops.

Action is being taken at international level to reduce the extent and effects of climate change. In Kyoto 1997, developed countries signed up to the Kyoto Protocol on Climate Change, with the European Union (EU) proposing a 5.2% cut in carbon dioxide emissions by 2008-12 (from 1990 levels). The UK pledged to reduce emissions by 12.5%, and the current government has pledged to reduce emissions by 20% before 2010 and, as debated in the 2007 UK Climate Change Bill, to increase this to a 30% reduction by 2020 (subject to further agreement beyond 2012).

In managing climate change, it is important to both reduce greenhouse gas emissions and ensure effective adaption strategies are in place in order for society to respond to those impacts that cannot be reversed.

This section (Section B) of the Environment Strategy considers how emissions causing climate change can be reduced, how the county can adapt to the inevitable impacts of climate change, and how these messages can be communicated. Reference should also be made to other sections of this Strategy, and in particular those that deal with energy (Section C) and water management (Section E) in more detail.

This section of the Environment Strategy deals with the following sub-topics;

- Cutting greenhouse gas emissions: climate change mitigation, and
- Adapting to the impacts of climate change.

3.2 Cutting greenhouse gas emissions: climate change mitigation

3.2.1 Introduction

The Intergovernmental Panel on Climate Change (IPCC 2007) report suggests that an 80% reduction in CO_2 emissions by 2050 will be necessary to prevent the dangerous climate change which may result if the average global temperature increases by more than 2^{o}C. Globally, the 29 billion tonnes of CO_2 emitted into the atmosphere each year could result in 200 million people being forced from their native lands by rising sea levels, drought and floods.

Reducing carbon emissions to reduce future impact is known as climate change mitigation. Some examples include;

- improving energy efficiency to reduce CO_2 emissions (also see Section C),
- investing in innovation and new low carbon technologies,
- encouraging behaviour change, for example by levying green taxes on energy, and
- regulating products that waste energy.

Time scales are a key issue in mitigating climate change impacts. De-carbonisation of the county's economy will be a long term process that will require careful planning and investment to ensure the appropriate technologies and infrastructure are in place. Alongside this, a wholesale shift in attitudes and behaviour across society will be necessary.

3.2.2 Baseline

- Every household in the UK generates around 6 tonnes of CO_2 every year – enough to fill 6 hot air balloons 10 metres in diameter. Homes, and individual travel, account for 40% of all UK CO_2 emissions[6]. By taking energy efficiency measures, the average household could reduce this by one third,and save £200 per year.[7]
- In the UK, the transport sector, excluding international aviation, is currently responsible for about a quarter of the total UK CO_2 emissions – 80% of this is due to road users.
- In West Sussex in 2003 - 4, 205,448 tonnes of CO_2 was released into the atmosphere from energy use alone[8].

3.2.3 Current action to mitigate climate change in West Sussex

WSCC takes its responsibility as community leader on this issue very seriously.

- WSCC has signed two major declarations - the Nottingham Declaration on Climate Change, and the Assembly of European Regions, 'Declaration on Energy Efficiency and Renewable Energy Sources'. These assert the County Council's commitment to significantly reduce greenhouse gas emissions, and to help local residents and businesses improve the local environment, reduce energy costs, reduce congestion and deal with fuel poverty.
- WSCC is working towards reducing its carbon emissions through a number of initiatives within the County Council Sustainability Action Plan, and it is planned that this work will be further developed. Current initiatives include the use of a Work Place Tool and promoting "Travel Wise"
- Between 2004 and 2007, WSCC was involved with a Europe-wide partnership project: European Spatial Planning Adapting to Climate Events (ESPACE). As mentioned in Section A: Changing Behaviours, the project was primarily about adapting to climate change, but the West Sussex work investigated ways that awareness of climate change could be increased and turned into action. County-wide surveys were undertaken in 2004 and 2006 to understand gaps in the understanding of climate change, and what methods were most effective for raising awareness and stimulating behaviour change. An ESPACE Climate Change Communications Strategy was produced that will be used to deliver effective messages intended to result in the residents of West Sussex taking steps to reduce their 'carbon footprint'.

3.2.4 Outcomes and suggested West Sussex indicators

Outcomes	Suggested Indicators	Reporting Responsibility

[6] DTI (2007) Meeting the Energy Challenge- White Paper.
[7] Energy Saving Trust: http://www.energysavingtrust.org.uk/
[8] 2003 Regional and Local Energy Consumption, DTI

Outcomes	Suggested Indicators	Reporting Responsibility
B1 West Sussex meets UK targets for reducing greenhouse gas emissions.	CO_2 emissions from the County Council's activities	WSCC
	Annual emissions of greenhouse gases by sector.	DTI
	Overall carbon footprint of West Sussex	WSCC
	Transport Plan policies that affect vehicle use.	WSCC
	Strong policies contained within Local Development Frameworks (LDFs) to promote; Sustainable construction techniques and developments containing micro-renewable energy provision, and Sustainable transport policies (those which are supportive of good access- particularly rural and urban linkages by foot, bicycle and public transport).	Local Authorities LDFs
	Number of ISO 14001 / EMAS registrations	UKAS ISO 14001 accreditations database.
B2 Individuals, organisations and communities understand the clear message that climate change is happening and has long-term impacts, but that some of the causes can be mitigated.	Measurable changes in behaviour and understanding of issues	Not measured yet

3.3 Adapting to the impacts of climate change

3.3.1 Introduction

Even if all carbon emissions into the atmosphere were stopped tomorrow, the planet would continue to warm for at least another 30 years due to the time the oceans and atmosphere take to react to historical emissions.

This lag between emitting CO_2 and experiencing the resulting rise in temperatures means action needs to be taken now as future damage is irreversible. The impact on the environment of West Sussex of the changing climate has been touched upon in the introduction of this section of the Strategy.

Examples of measures of adapting to some of these impacts include;

- managing the countryside to take account of the 'climate space' for native wildlife species changing in response to climate change, and allowing for migration across the landscape. If habitats are too isolated and fragmented, this migration may not be possible for many species, and they will be squeezed into extinction. Measures to address fragmentation will include the provision of corridors of habitats to enable species and habitats to migrate (also covered in Section F),
- increasing flood risks in the winter and drought risks in the summer means that adaptation measures required must revolve around managing water at a catchment scale. Reducing run off during the winter, storing more water on the land, and treating it as a valuable resource rather than a problem, means that as well as reducing flood risk in the winter, rivers and streams continue to flow for longer during the dry summer months. (also covered in Section E),
- the agricultural sector in West Sussex will see some of the greatest and most immediate changes to their industry and will need to adapt accordingly. The length of the growing season has already increased in recent years and already on some south facing slopes of the West Sussex downland, some forward-thinking farmers have started planting vineyards. The distribution of pest species and diseases has also changed (also covered in Section G), and
- the West Sussex visitor economy may be able to capitalise on warmer summers.

3.3.2 Baseline

- The South East of England is predicted to suffer real water shortages during prolonged periods of drought. Paradoxically, rising sea levels and increased winter rainfall levels are likely to cause more flooding in river floodplains, low lying coastal areas and reclaimed estuaries.
- In addressing climate change there is a need for a very strong emphasis on adaptation because of the impacts that changes to the climate are going to have on the community of West Sussex. The county is particularly vulnerable in a number of areas, but the management of water (in its many guises) will be particularly problematic.

- In 2007, fluvial flooding across central England was estimated to have cost UK businesses and house owners £3billion. Significant communities in West Sussex (including Arundel and Upper Beeding) are situated in reclaimed estuaries and fluvial floodplains. Adaptation strategies include managing rivers and floodplains so that there is adequate space for floodwater without impacting on property and infrastructure, and working with local communities to understand localised flood risks and what they can do to reduce the impact to their properties and risks to their lives during major storms. Some existing infrastructure and rights of way are currently situated in unsustainable locations and may need to be relocated to make more space for rivers and floodplains to function.
- Estimates from the NHS indicate that whilst the numbers of cold related deaths will be reduced significantly as a result of warmer winters, there will be a smaller increase in heat related deaths during heat waves. Similar numbers of people do not die in tropical or arctic nations because they are more adapted to the predictable conditions.

3.3.3 Current action helping the West Sussex community adapt to climate change

- Of particular note is the work that is taking place on the Manhood Peninsula where rising sea levels and failing sea defences are bringing home the realities of climate change to the people who live there. Here WSCC has been very involved with the Manhood Peninsula Partnership in helping to produce and implement an Adaptation Action Plan.
- The drought of 2005/6 raised awareness of scarce water resources. Much of West Sussex is served by water from the chalk aquifers, which act to buffer some coastal areas against short dry periods. However, in more long term droughts where there are consecutive dry winters, these resources are under real strain.
- WSCC continues to chair the Sussex Water Partnership, which was instrumental in getting the water saving message across during the drought of 2005/6, and which resulted in a significant reduction in demand in comparison with previous years. This partnership, which includes the Environment Agency, the water companies and a wide range of other organisations, held Water Festivals in Arundel, and a range of other water related events across the county during the summers of 2006 and 2007.

3.3.4 Outcomes and suggested West Sussex indicators

Outcomes	Suggested Indicators	Reporting Responsibility
B3 A clear set of actions is in place for West Sussex to adapt flexibly to the challenge of climate change.	Deaths caused by extreme weather events (as a proxy of adaptation- the smaller the figure, the better adapted we are).	Not yet measured
	Number of properties flooded that resulted in residents having to move out afterwards.	Not yet measured
	Water consumption figures (per capita)	Not yet measured
	Numbers of species declining due to impacts of climate change	Sussex Biodiversity Partnership
	Proportion of people living in floodplains who are registered to receive flood warnings.	Environment Agency
B4 Individuals, organisations and communities understand the clear message that climate change is happening and has long-term impacts, but that it is possible to adapt to the impacts.	Measurable changes in behaviour as a result of communication events.	Not yet measured
	Local Planning Authorities in West Sussex not granting planning permission for new developments in flood risk areas	Not yet measured