Appendix One

Derbyshire
A Climate Change Strategy

The Derbyshire Partnership Forum

Unless we are guided by a conscious vision
of the kind of future we want
We will be guided by an unconscious vision
of the kind of present we already have

The Edge Magazine 1995

Foreword

We are all beginning to understand the far reaching consequences which climate change will have on our lives in the 21st century. From international to local levels the issue is rising up the political agenda. We are increasingly being encouraged and even required, by central Government, by our peers and by concerned communities and individuals, to increase our knowledge of the impacts climate change will have in Derbyshire, the UK and the world as a whole. We need to take action both individually and collectively to reduce our carbon and other greenhouse gas emissions to lessen the future effects of climate change, as well as to adapt the ways we live as individuals and communities and the ways we deliver public services across Derbyshire in a changed climate.

There is no doubt that climate change will be one of the key challenges for us all in the 21st century. It will be a major driver of change within our communities not just in Derbyshire but throughout the world. We recognise that it is happening now, that it will threaten our quality of life, that it is caused by human activity in both the social and economic spheres and that we must all play a part in reducing its effects wherever possible and adapt our way of life and delivery of services accordingly.

All organisations in Derbyshire, whether public, private or voluntary have a responsibility to take action on this crucially important issue. Because climate change will affect us all and because we believe that working in partnership strengthens, not only our resolve, but also our effectiveness in tackling the issue we have decided to produce one climate change strategy for Derbyshire.

This is an umbrella document covering aspects of the services we provide in the county. It is written in a way which will allow us to progress action as a partnership on the one hand but also allow signatories to develop their own action plans, specific to their own organisation's needs and requirements, on the other. These individual action plans will nest within the overall aims of this climate change strategy for Derbyshire and together will form a coherent way forward to tackle climate change within our county.

The development of this climate change strategy is a first, pro-active step in working more effectively together to mitigate the effects of climate change through improving resource and energy efficiencies and managing increasing costs to our services. With both declining fossil fuels and greater insecurity of energy supply we need to adapt and improve the efficiency of delivery of our services to cope with a changing climate and to deliver benefits to the local community of increased awareness of, and improved resilience to, the climate changes which are predicted.

Acknowledgements

We would like to thank everyone who has contributed to the development of this strategy, including Derbyshire Partnership Forum partners; those councils and strategic partnerships who have already developed their climate change strategies, whose documents gave guidance and structure to the Derbyshire Climate Change Strategy, including Birmingham City Council and Birmingham Strategic Partnership, Bristol City Council, Devon, Nottinghamshire and Warwickshire County Councils, High Peak Borough and South Derbyshire District Councils and the Lancashire Climate Change Partnership. We would also like to thank members of those communities in Derbyshire who are engaged in making climate change mitigation and adaptation a reality. Lastly, but not least, we would like to thank all those whose work, on a daily basis, contributes to tackling climate change in small but meaningful ways.

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Executive Summary

'It's time to act'[1]

The seriousness of the climate change issue cannot be overstated. We hear or read news items at least weekly on how a warming world is changing not only the climate, but also ecosystems, the oceans, our food-growing capacity and our ability as humans to cope with these changes. Scientists warn us that we are near to nine major global tipping points[2] which could be triggered by the end of this century and which are likely to occur very quickly rather than happen smoothly and over a long timescale.

Whilst political time horizons are very much shorter than those in which climate changes operate, it is vital that we take action now to avoid the worst consequences of global warming, for ourselves and for future generations. Urgent action is required in virtually all activities and decision-making processes which impact on climate change in order to mitigate the effects we have on the climate in future years. In addition, we need to adapt the delivery of our services and even the way we live, to operate more effectively in a changing climate, as temperatures are expected to increase between 1.1 and 6.4^{o}C this century[3], with attendant weather changes such as the increased intensity of storms, flooding and heatwaves.

Part One of the Derbyshire Climate Change Strategy looks at the background to climate change explaining what it is and showing how average temperatures have changed in England over the centuries since temperatures were first recorded in 1659.

Derbyshire's contribution to climate change can be seen in Figure 1. Carbon emissions in the administrative county are an estimated total of 6,649,000 tonnes[4] and are broken down by sector. This figure translates to 19% of the East Midlands region's emissions and 1.4% of the UK total. Projections of what this might mean for the future UK climate include hotter, drier summers, milder, wetter winters and more intense rainstorms, all of which will be less predictable than the weather of the past. Some weather events, such as intense and prolonged rainstorms could cause serious flooding and extensive damage to life and property.

It is vital then that all organisations – public, private and voluntary sector, communities and individuals take action to mitigate their carbon emissions and make plans to adapt to a changing climate.

Whilst organisations can tackle climate change within their own operations and service delivery, it is recognised that a combined effort through partnership working will bring a

[1] The Stern Review on the economics of climate change, Sir Nicholas Stern, Cambridge University Press, 2006. http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

[2] Lenton, T et al, 2008, Proceedings of the National Academy of Sciences, School of Environmental Sciences, University of East Anglia. http://researchpages.net/ESMG/people/tim-lenton/tipping-points/

[3] http://www.defra.gov.uk/environment/statistics/globatmos/gakf01.htm

[4] This total does not include emissions from industries belonging to the EU Emissions Trading Scheme or those with Climate Change Agreements. Neither does it include emissions from aviation, shipping, diesel railways or traffic on motorways.

better response than acting alone, because such an approach avoids replication and allows best practice, experience and resource sharing.

The Derbyshire Partnership Forum[5] (DPF), consisting of nearly 60 public, private and voluntary sector organisations in the county, is an ideal vehicle for working together on the important and urgent issue of climate change. In response the DPF has produced this strategy which provides the foundation for working towards mitigating the greenhouse gas emissions[6], which are causing climate change, emitted as a result of the delivery of our services and our day to day operations.

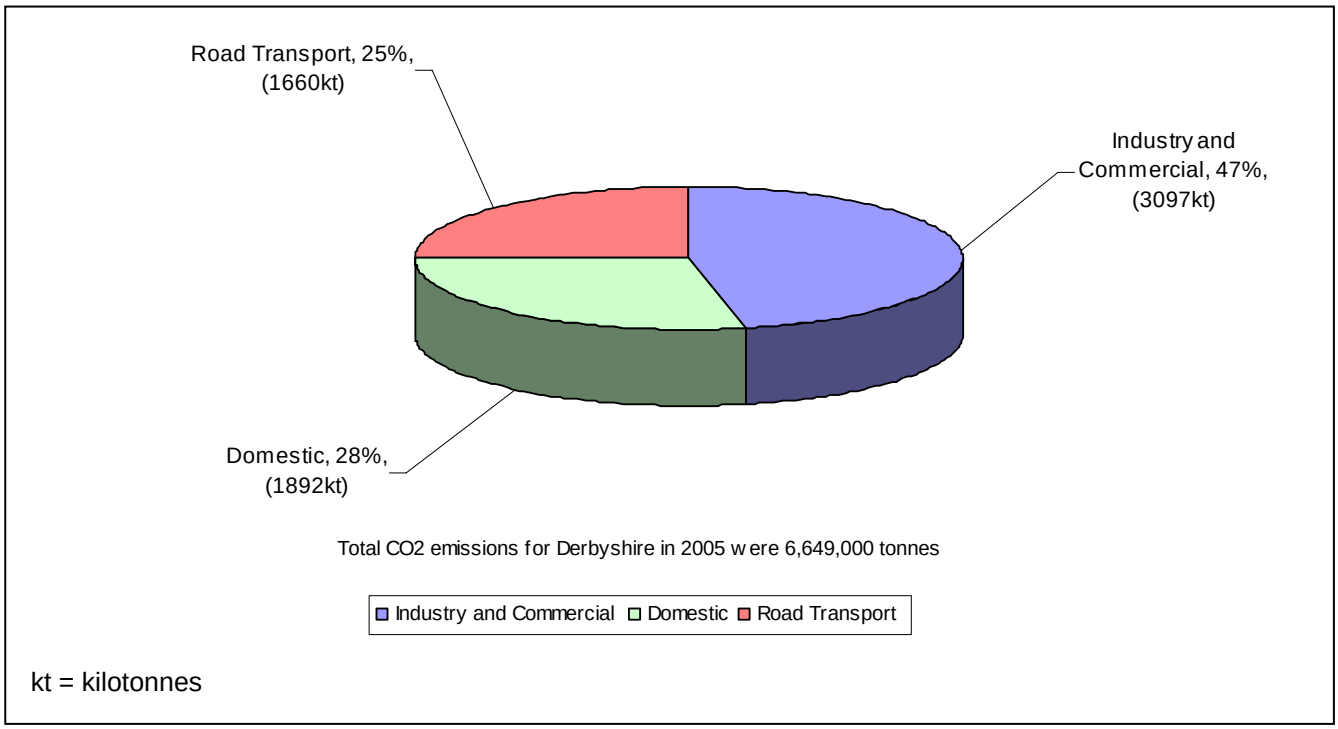

Figure 1: Derbyshire – Carbon Emissions (Estimates) by Sector (2005)

Source: www.defra.gov.uk/environment/statistics/globatmos/galocalghg.htm
See also: Appendix One, for summary figures and www.derbyshire.gov.uk/climatechangestrategy for detailed end user emissions by sector.

The national policy context for taking action is becoming more focused on specific targets for carbon emission reductions; the Climate Change Act[7], when it reaches assent, will have legally binding targets for a number of sectors across the UK. The National Performance Framework for local authorities and their public sector partners defines a new indicator set which includes three specific climate change indicators, listed below and a fourth NI 187 on tackling fuel poverty.

NI185 – CO_2 reduction from local authority operations
NI186 – Per capita reduction in CO_2 emissions in the local authority area
NI188 – Planning to adapt to climate change

[5] http://www.derbyshire.gov.uk/council/partnerships/derbyshire_partnership_forum/

[6] NB The terms 'carbon dioxide emissions', 'carbon emissions' and 'greenhouse gas emissions' will be used synonymously throughout this document. A full explanation of the terms can be found in the Glossary.

[7] The Bill is expecting enactment in 2008. See Appendix Three for further details.

The latter two have been adopted by the DPF to form part of its Local Area Agreement (LAA) 35 headline indicator set. Targets relating to NI 186 require a CO_2 emission and overall reduction of 3.02% per year for the next 3 years. A proportion of 0.5% of this target is the responsibility of local authorities and their partners to meet.

Approaches to dealing with climate change include taking action to mitigate greenhouse gas emissions, adapting service provision and strengthening the community leadership role of local authorities and their partners to raise awareness of the issue and encourage others to take action on mitigation and adaptation. The Derbyshire Partnership Forum, the county-wide Local Strategic Partnership for Derbyshire, already has a head start having worked together on issues of mutual interest since 2000. Its structure has enabled it to incorporate many subject-specific officer groups already existing within the county.

The DPF has set down a series of strategic objectives detailed below for which an action plan will be developed in due course. The objectives relate to action which can be taken in partnership and which encourage action at an organisational level to reduce carbon emissions across the whole county.

Key strategic climate change objectives for Derbyshire

1. Work together on climate change matters for mutual benefit and support and add value to existing activity where organisations are acting alone.

2. Commit to take action on climate change by signing the Nottingham Declaration, including developing a climate change action plan for mitigation and adaptation of greenhouse gas emissions, as soon as possible. (All Derbyshire local authorities are signatories already).

3. Undertake a climate impact assessment for Derbyshire in the short and medium terms.

4. Define a baseline carbon footprint for Derbyshire, and recommend emission reduction targets and measures to reduce both organisational and community emissions of greenhouse gases.

5. Undertake an investigation of the potential sites for standalone renewable energy generation installations in Derbyshire and take steps to realise this potential where appropriate.

6. Consider climate change mitigation and adaptation actions in the future review of the Local Area Agreement, appraise all ensuing plans and programmes for impact on and impact of climate change, as these are updated.

7. Identify where adoption of climate change objectives could help deliver existing Community Strategy/Local Area Agreement targets and any supporting plan and programme targets.

8. Reduce greenhouse gas emissions from services delivered jointly by DPF organisations through the Local Area Agreement.

9. Raise awareness and understanding of climate change throughout the wider Derbyshire community and amongst all staff of organisations within the DPF, creating the capacity to take action to mitigate and adapt to climate change.

10. Encourage and influence other Derbyshire organisations, beyond the DPF, to reduce emissions of greenhouse gases and prepare to adapt to a changed climate.

11. Take account of regional and national strategies and objectives and in turn influence them to ensure that energy use/carbon emissions are minimised through proposed national and regional programmes and plans.

12. Collaborate on action plan development to determine priorities to take forward the objectives in this strategy and to monitor their implementation.

It is recognised that to tackle climate change across all sectors in Derbyshire we will need to concentrate on issues such as mitigating carbon emissions from an organisation's operations, including buildings; through purchasing; waste management and travel arrangements and through the use of regulatory controls such as the planning process, including using the Supplement on Climate Change to Planning Policy Statement 1, to reduce or eliminate potential future emissions. We must also recognise that there are huge environmental carbon stores, particularly in the peat landscapes of the Peak District Moors which need protection from further erosion and consequent carbon release. In addition, organisations such as Primary Care Trusts (PCTs) may have to deal with some of the health consequences of climate change and may need to prepare to adapt their services accordingly.

Part Two of the strategy deals specifically with issues and controls in a series of themes listed according to whether they have a role to play primarily in mitigation, adaptation or both. More detailed accounts are given which draw attention to what action can be taken and where the DPF or individual organisations should focus attention to achieve the biggest gains for the climate change agenda. This will be further developed in guidance to support action plan development where the DPF or individual partners can focus attention to achieve the biggest gains for the climate change agenda. The key themes are grouped as follows:

Services which have the greatest impact on climate change and can offer immediate benefit to the mitigation agenda are detailed in section 6.0. Mitigating action is vital to reduce future climate change risk. These include:

- Corporate property, facilities and energy management
- Travel and local transport
- Waste management and resources
- Procurement.

The group below can have both an impact on climate change and needs preparation to adapt to a changed climate. These themes are grouped in Section 7.0 and include:

- Planning, land-use and regulation
- Housing and fuel poverty
- Water resources
- Economic development and business activity
- Derbyshire communities

- Agriculture and Farming.

Services and themes where the responsibility is predominantly one of identifying the impacts which climate change will have and which will require consideration of adaptation strategies to reduce potential future risk can be found in Section 8.0 and include:

- Health, welfare and occupational exposure
- Management of landscape and natural habitats
- Education and communication
- Crime.

Because climate change and its specific terms are a relatively new area of study, a detailed **Glossary** is included, as are detailed **references** both throughout the text and in a separate section at the end of the document.

Finally, this **executive summary** is intended as an aide memoir to the main sections of the strategy, which can be used as a separate summary document to the substantive strategy.

Vision Statement

We resolve to work together to put into place at both the corporate and community levels, measures leading to the reduction of greenhouse gas emissions by at least 60% of 1990 levels by 2050; measures to absorb and store carbon dioxide where possible and measures to ascertain the impacts of climate change and adapt the delivery of our services accordingly.

Part One

1. Introduction

1.1 Why does Derbyshire need a climate change strategy?

Over the last two decades, and informed by scientific investigation, there has been increasing concern from international to local levels, about the continued warming of the earth's atmosphere. It is now thought that the severe east African droughts of the 1980s in Ethiopia were early evidence of continental scale weather patterns changing as a result of global warming.

The pace of scientific evidence on climate change has gathered momentum in recent years along with international debate on what action to take. Increasingly the findings and predicted changes have been aired on prime time television. In 2005 the Al Gore film, An Inconvenient Truth, made its debut and quickly became the 'must-see' film for sceptics and 'climate change converts' alike.

There is now consensus amongst the scientific community that climate change is brought about by human economic and social activity which uses fossil fuels, such as coal, oil and gas, to generate electricity, heat our homes, run our vehicles, power industry and commerce and deliver public sector services. The use of these fuels releases millions of tonnes of waste gases, including carbon dioxide (CO_2), methane and nitrous oxides into the atmosphere every year and is driving climate change. The Stern Review refers to climate change as the greatest and widest ranging market failure ever seen and climate change is now recognised as the major global challenge of the 21st century.

1.2 Peak oil and security of energy supply

The climate change agenda is further complicated, but arguably assisted, by the concept of peak oil and gas. It is well known that global oil and gas supplies will shortly reach peak production. In addition, as further demands are made on global reserves from emerging economies, such as in China and India, remaining supplies will increase in price as demand begins to outstrip supply.

Some researches believe that global production, particularly of oil will reach a peak in 5 – 10 years time. Recent research from the Energy Watch Group in Germany[8], which uses data on the history of discoveries rather than reserve data, shows that peak oil was reached in 2006 and production is projected to decline by several percent per year. By 2020 and even more by 2030 global oil supply will be dramatically lower. Increasingly, this situation will create a supply gap which cannot be closed by growing contributions from other fossil, nuclear or alternative energy sources within these time frames.

Fossil fuels, and particularly oil, form the basis of the world's economies. Declining oil production will lead to a marked structural change in the world's economic system, influencing all aspects of our daily lives. In the next few years we will begin to see marked increases in the costs, not only of fuels directly, but of all commodities which use such fuels or use electricity generated by these fuels, in their manufacture.

[8] 'Crude Oil – The Supply Outlook', Report to the Energy Watch Group, EWG-Series No 3/2007, October 2007. http://www.energywatchgroup.org/fileadmin/global/pdf/EWG_Oilreport_10-2007.pdf

Fossil fuels are a finite resource. As reserves of oil and gas in the UK are reduced, the UK will become a net importer of energy. The UK Government Energy White Paper[9] estimated that the UK became a net importer of gas in 2006 and that three quarters of the UK's primary energy needs will be imported by 2020 in a global market of decreasing supplies. Relying on the political stability of other countries and on the long distance transport of energy supplies may have serious consequences for the security of UK energy supplies[10].

Climate change will also force us to change energy consumption patterns by significantly reducing the burning of fossil fuels. The co-incidence of the climate change and peak oil agendas must provide a greater impetus to build resilience to these developing scenarios through the implementation of this strategy to minimise the effects of these phenomena on the delivery of services. An "invest to save" approach to energy efficiency can be seen as an initial measure for mitigating carbon emissions, and for insuring against increasing global fuel prices. The development of renewable generating capacity will further insulate against the changes that peak oil and potential insecurity of energy supplies will bring, but a major review of plans and programmes within the DPF and partners organisations may well be necessary to cope with these projected changes.

2. The Background to Climate Change

2.1 What is climate change?

It is not the intention of this strategy to include a detailed account of the science behind the current perceptions of climate change; such information is available elsewhere and attention is drawn to the reference section towards the end of the document. This short synopsis of the current situation is included to aid understanding, firstly of the need for this strategy, and secondly, the task facing organisations, and the general public alike.

There is now an overwhelming body of scientific evidence highlighting the serious and urgent nature of climate change. The fourth report from the Intergovernmental Panel on Climate Change[11] (IPCC) published in November 2007 shows conclusively that the debate over climate science has moved from whether or not it is happening to what action we now need to take.

2.2 So, what's the problem?

The Earth is surrounded by a blanket of gases, the atmosphere, which keeps the planet at a temperature able to sustain life. This is known as the 'greenhouse effect' and keeps surface temperatures approximately 33^{o}C higher than would be the case if they were not present. These gases – carbon dioxide (CO_2), nitrous oxide (N_2O), ozone (O_3) methane (CH_4), water vapour (H_2O) and other trace gases – allow the entry into the atmosphere of the sun's rays but prevent some of this 'heat' escaping back into space.

[9] Meeting the Energy Challenge – A White Paper, HMSO, May 2007
http://www.berr.gov.uk/files/file39387.pdf

[10] Gas supplies to the UK – a review of the future. Dr. Peter Hodgson, Institute of Physics. 2004.
http://www.iop.org/activity/policy/Publications/file_4153.pdf

[11] Working Group II, Fourth Assessment Report, Climate Change Impacts, Adaptation and Vulnerability, Intergovernmental Panel on Climate Change, United Nations Environment Programme and World Meteorological Organisation, February 2007 http://www.ipcc-wg2.org/

Over the last 150 years the atmospheric blanket has become thicker from the rise in concentrations of the major greenhouse gases particularly carbon dioxide, nitrous oxide and methane. These have all increased significantly in line with the rising use of fossil fuels: coal, oil and gas to power the world's social and economic systems.

Carbon dioxide is the most important of the greenhouse gases providing around 60% of the global warming potential. This gas is normally absorbed and released by plants, soils, oceans and the atmosphere as part of the carbon cycle. But recently, this natural cycle has been influenced by the amount of carbon dioxide being released by human activity, so the gas is building up in the atmosphere, and along with other greenhouse gases, is disrupting the normal thermal balance of the atmosphere trapping in heat, intensifying the greenhouse effect and raising average atmospheric temperatures. Concentrations of atmospheric carbon dioxide[12] have increased from pre-industrial concentrations of 280 parts per million (ppm)[13] to 387 ppm[14] in 2008 which is far higher than the natural range of 180-300ppm of CO_2 over at least the last 650,000 years, as determined from ice cores.

Global temperatures have risen by 0.74^{o}C over the past century and 0.4^{o}C of this warming has occurred since the 1970s, although this warming is unevenly distributed across the world being more pronounced at the polar and high altitude regions and less so in the inter-tropical areas of the earth. Average UK central England temperatures are now higher than at any time since records began in 1659. Eleven of the last 12 years have been amongst the 12 warmest since global records began in 1850.

Figure 2 shows by how much, average annual temperatures have deviated from the mean over the centuries. The amount of warming in the late 20th century can be clearly seen.

[12] The term carbon is sometimes used, but 12 tonnes of carbon are equivalent to approximately 44 tonnes of CO_2

[13] Ocean Acidification due to increasing atmospheric carbon dioxide, p 13, Policy Document 12/05, The Royal Society, June 2005. http://royalsociety.org/displaypagedoc.asp?id=13314

[14] Carbon Dioxide levels in the atmosphere are around 387 ppm. Including other greenhouse gases gives a carbon dioxide equivalent total of around 430ppm.
http://www.esrl.noaa.gov/gmd/ccgg/trends/index.html#global

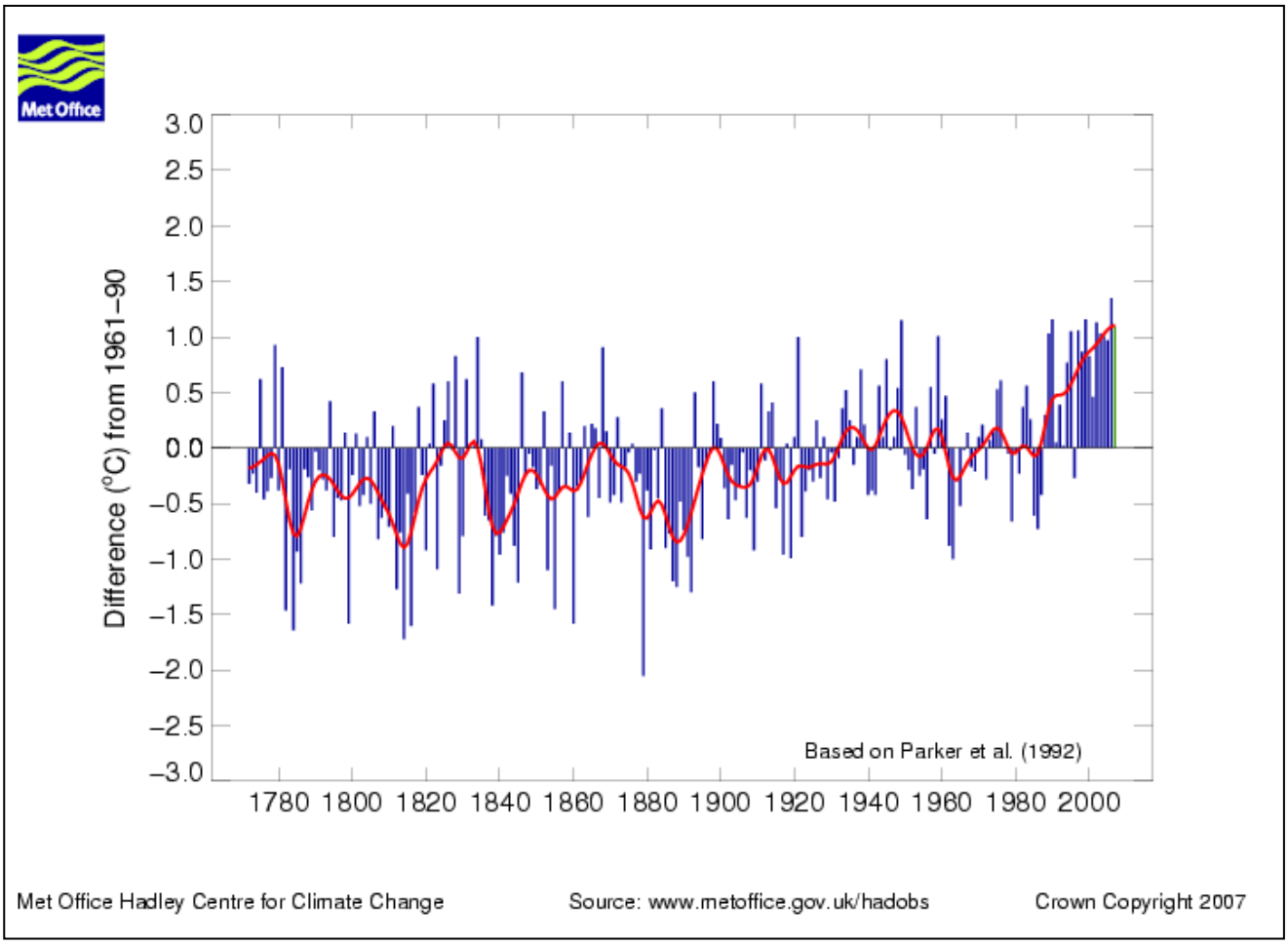

Figure 2: Mean Central England Temperature – annual anomalies, 1772 to November 2007

Source: Parker, D.E., T.P. Legg, and C.K. Folland. 1992. A new daily Central England Temperature Series, 1772-1991. Int. J. Clim., Vol 12, p317-342". http://www.metoffice.gov.uk/hadobs/

The Stern Review has stated that without intervention, greenhouse gas levels will reach a level of at least 550ppm CO_2e by 2050 committing the world to at least a 2°C rise in temperature. Recent studies from the University of East Anglia[15] have found that the Southern Ocean carbon sink is no longer absorbing CO_2, adding to the atmospheric burden which could cause temperatures to rise more rapidly than predicted. The IPCC report estimates that without intervention greenhouse gas levels will rise to between 600 – 1500ppm by 2100 with associated levels of warming of between 1.7 and 7.0°C above pre-industrial levels by the end of the century. Figure 3 shows past and predicted global levels of CO_2 emissions.

Such temperatures would bring about severe global consequences for sensitive ecosystems, melting ice-caps, rising sea levels, rainfall intensities and frequencies, intensities of storms and flooding and frequency of heatwaves. These changes in the natural environment are likely to be irreversible and could bring about significant changes to human societies.

[15] Le Quéré, C., et al, 'Saturation of the Southern Ocean CO_2 sink due to recent climate change', University of East Anglia and the British Antarctic Survey, 2007.

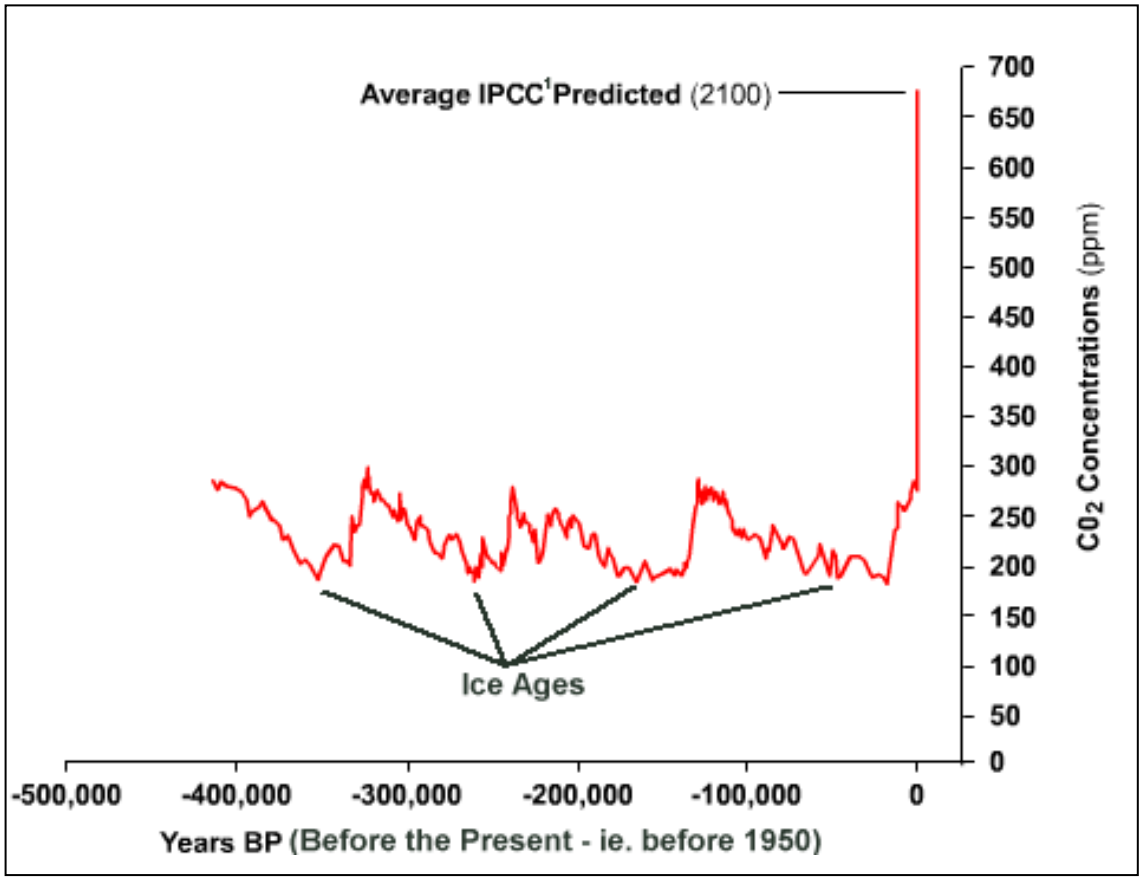

Figure 3: Past and projected atmospheric carbon dioxide concentrations (2001).
Source: http://www.townplan.org/images/Co2Ice.png. Data for this graph comes from the Carbon Dioxide Information Analysis Centre: cdiac.esd.ornl.gov. The Centre does not distribute model or statistical projections.

The current evidence now available makes clear that some level of climate change is unavoidable, but averting the worst consequences needs immediate, decisive and collective action. The longer we delay action, the more dramatic and costly the changes we will have to make.

The Government's Climate Change Bill[16], due for enactment in the 2007/8 Parliamentary session, as the first piece of legislation of its kind in the world, should commit the UK to legally binding carbon reduction targets of 60% by 2050, with an acceptance that this target is likely need an upward revision to 80% in the near future.

2.3 What is Derbyshire's contribution to climate change?

In 2005, the latest year for which detailed figures are available, carbon dioxide emissions in Derbyshire[17] were an estimated 6.6 million tonnes. These emissions are broken down into the three sectors producing the vast majority of carbon emissions and shown,

[16] The Climate Change Bill and Partial Regulatory Impact Assessment, HMSO, March 2007 http://www.defra.gov.uk/corporate/consult/climatechange-bill/consultation.pdf

[17] References to Derbyshire refer to the administrative county, excluding Derby City, unless otherwise stated.

including percentages, in Figure 4.

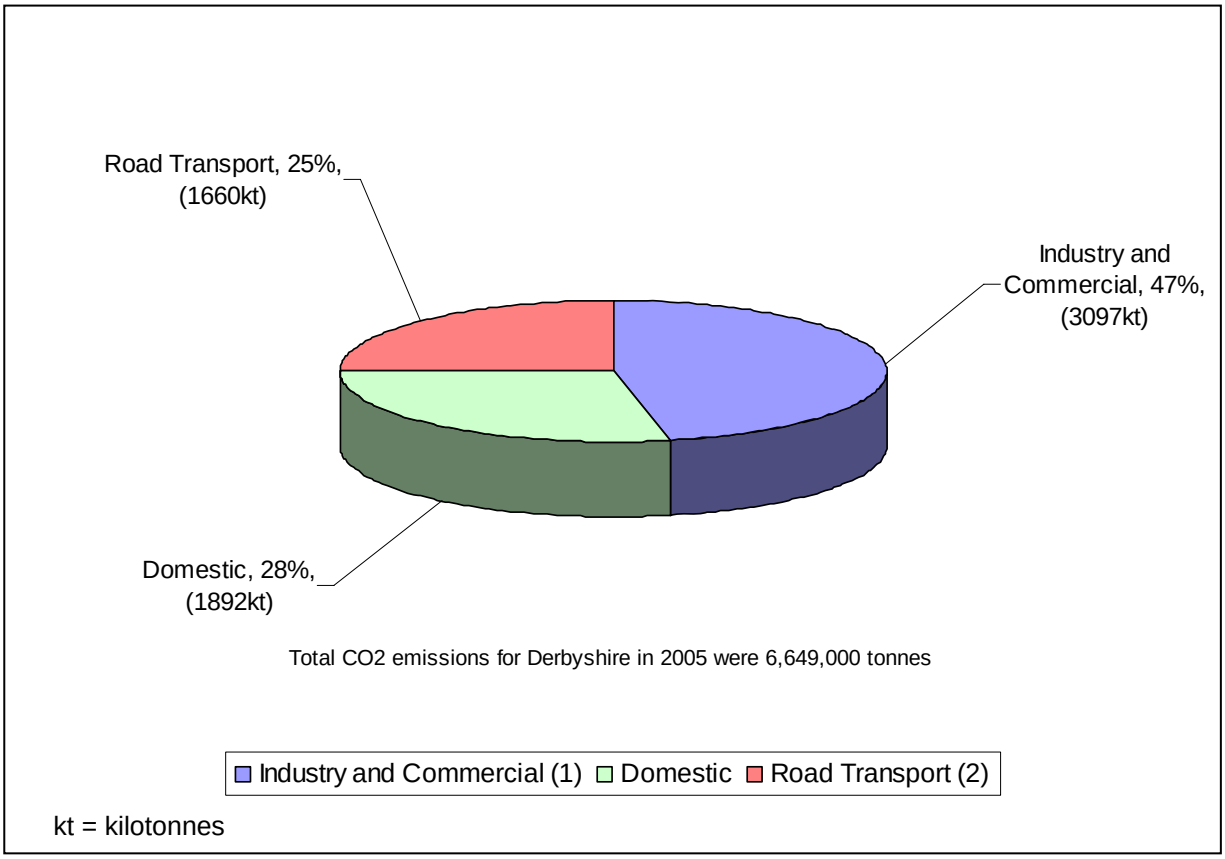

Figure 4. Derbyshire – Carbon Emissions (Estimates) by Sector (2005).

(1) In addition to the total CO_2 emissions for Derbyshire of 6, 649,000 tonnes, emissions of 2,138,000 tonnes from the industrial sector (a further 32% of Derbyshire's total) are offset under the European Union Emissions Trading Scheme (EU ETS) (See the Glossary for further information).

(2) Figures supporting this and the diagrams below are derived from DBERR electricity and gas consumption data, for both the housing and the business sectors. Other fuel statistics reported by larger organisations are from detailed specific transport census data (annual average daily flows) published by the Department for Transport. Totals do not include emissions figures from motorway traffic, diesel railways, industries belonging to the EU ETS, aviation and shipping or land use changes. Emissions from local authorities and their public sector partners and emissions from agriculture are included in the Industrial and Commercial sector. See also Appendix One for summary figures and www.derbyshire.gov.uk/climatechangestrategy/ for a detailed breakdown of sector totals.

Source: www.defra.gov.uk/environment/statistics/globatmos/ galocalghg.htm

In Derbyshire CO_2 emissions per capita, averaged across all sectors, is 8.9 tonnes which is higher than the East Midlands average of 8.3 tonnes per capita and well above the average for the UK at 7.9 tonnes[18]. Total emissions in Derbyshire of 6.6 million tonnes provide around 19% of the East Midlands total and around 1.4% of the UK total of 466

[18] http://www.defra.gov.uk/environment/statistics/globatmos/download/regionalrpt/local-regionalco2emissions2005.xls

million tonnes [19]. A sector breakdown of the 2005 figures by end user and by district can be found in Appendix One[20].

Specific conditions existing in Derbyshire, such as a larger percentage of industry, solid-walled housing, major roads, the rural/urban mix and higher altitudes within the county are probably responsible for the differences between the UK average and Derbyshire per capita figures and between each of the districts in Derbyshire.

Reductions in CO_2 emissions are most likely to be achieved by addressing the largest contributing sectors of business and commerce (including the public sector), housing and road transport which together form almost all of Derbyshire's total[21]. To reduce its carbon emissions and to meet the requirements of NI 186, organisations in Derbyshire must concentrate on those sectors where they can have the greatest influence, particularly on their own corporate emissions, on road transport through the influence of the Local Transport Plan and on domestic sector emissions through Home Energy Conservation Act (HECA) and Carbon Emissions Reduction Target (CERT) responsibilities (See Appendix Two for a fuller explanation). In addition, the community leadership role of the public sector and of local authorities in particular, will be vital in persuading all communities in the county to increase carbon mitigation activity.

[19] Local and Regional Estimates of Carbon Emissions by End User, Summary, 2005. This work was made possible by the publication of new local gas, electricity and road transport fuel consumption estimates by the DTI (2004 and 2005). http://www.defra.gov.uk/environment/statistics/globatmos/galocalghg.htm

[20] 2005 is the latest year for which figures are available

[21] See the footnotes to Appendix One for an explanation of what is included and excluded from this total

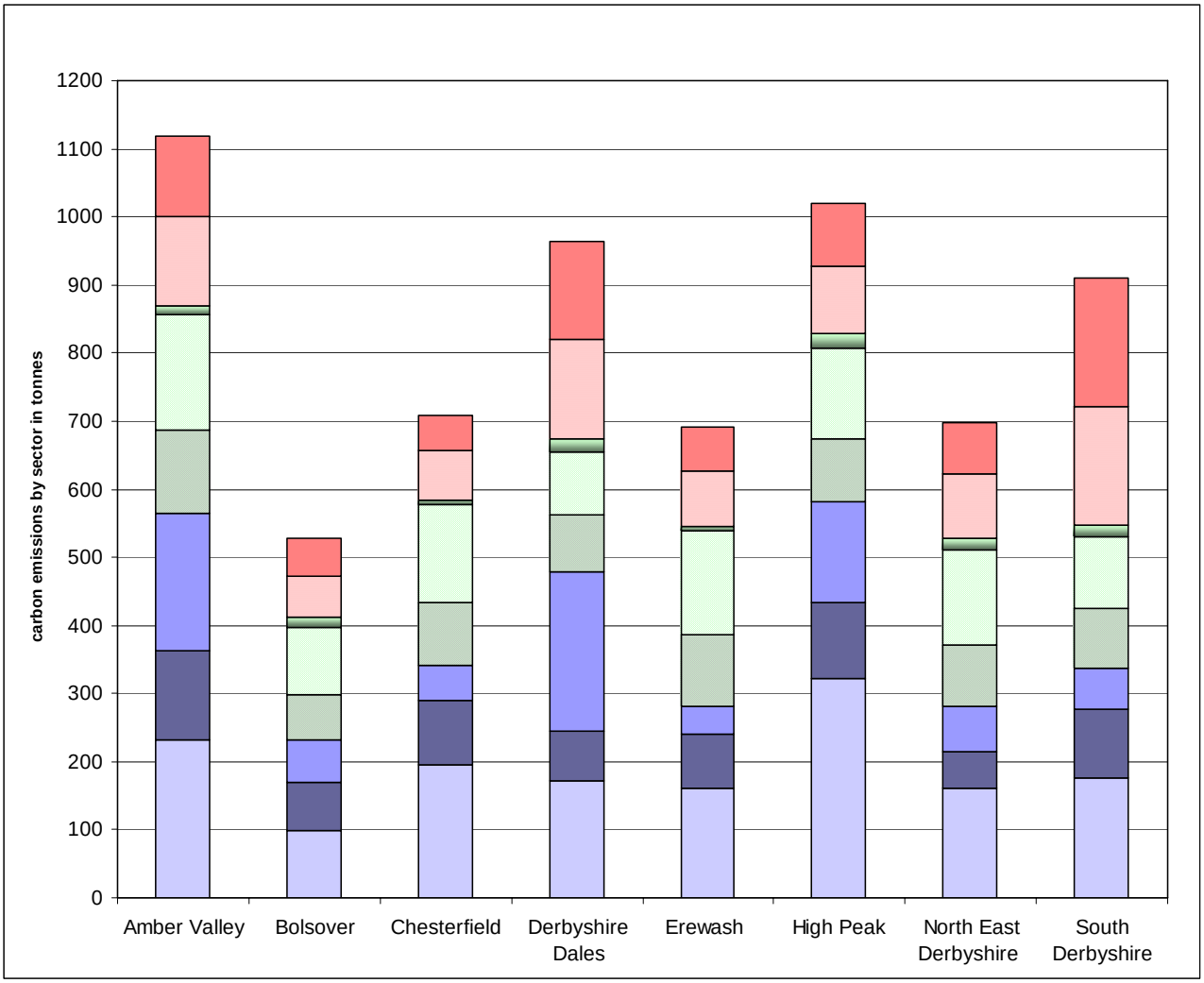

Figure 5 Derbyshire Districts: carbon emissions in tonnes with sector breakdown
Source: www.defra.gov.uk/environment/statistics/globatmos/ galocalghg.htm

It should be noted here that differences between districts shown in Figures 5, 6 and 7 are the probably the result of a number of factors including predominant domestic fuel type, proportion of solid-walled housing, existence of major roads, mix and type of industry and the average altitude of the land within each district amongst other factors.

The object of NI 186 is not to compare one district's emissions with another but to reduce per capita emissions of CO_2 across the major sectors within each district.

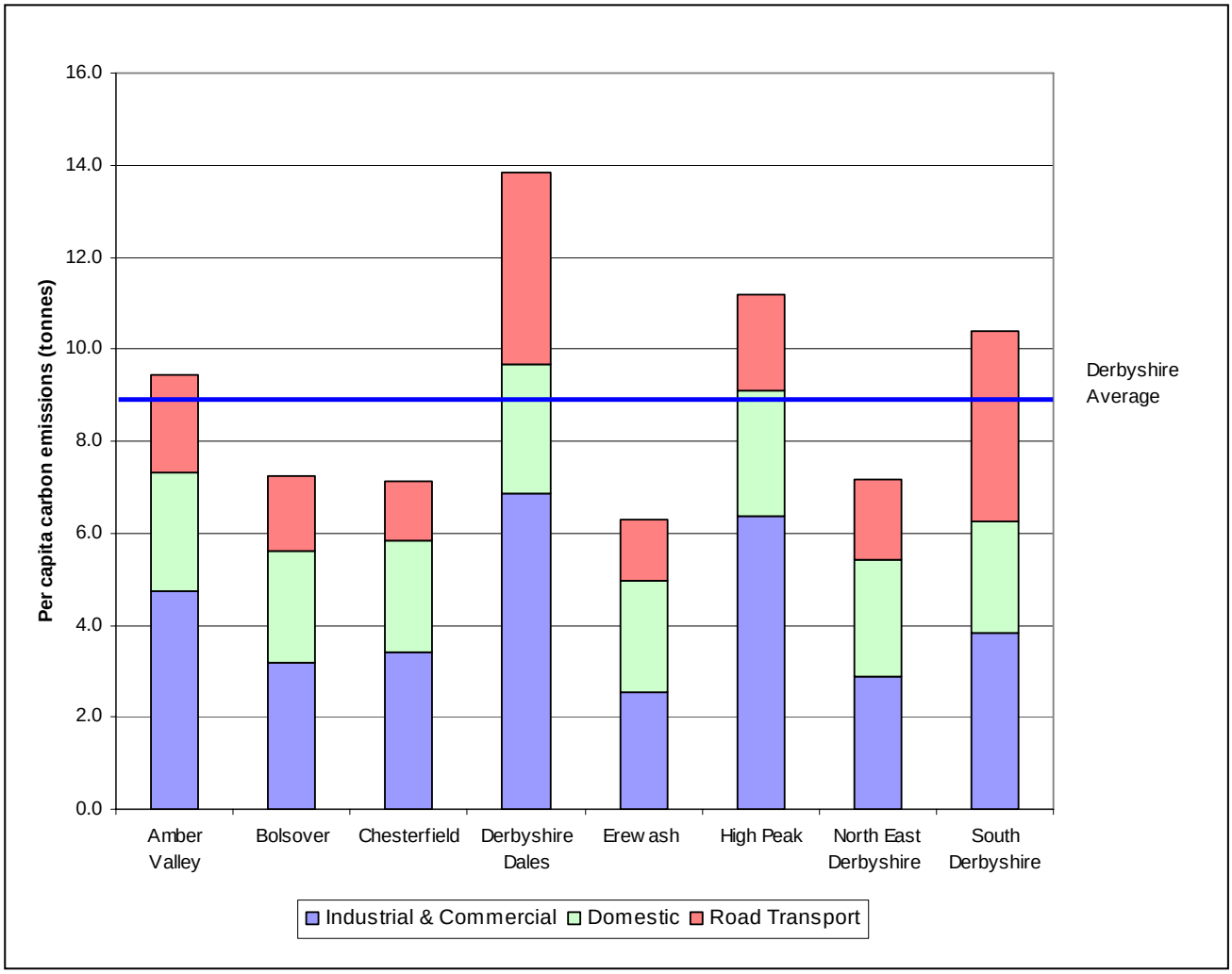

Figure 6: Derbyshire District per capita emissions by sector
Source: www.defra.gov.uk/environment/statistics/globatmos/ galocalghg.htm. See also Appendix One.

The district with the highest per capita emissions for all sectors, at 13.8 tonnes of carbon (tC), is Derbyshire Dales. Closer inspection of this area reveals high per capita CO_2 emissions of 6.8 tC for the industrial sector and above average per capita emissions of 4.2tC for the road transport sector. The A6 main road carrying additional visitors who travel by car to the southern sections of the Peak District National Park may explain this in part. In addition, surrounding quarries generating traffic and a strategic freight route may add to the total. Interestingly, although domestic per capita emissions for this district are higher than the county average at 2.8 this figure is not unduly high and may be explained by a higher proportion of older solid-walled properties.

High Peak shows a similar trend. However, per capita CO_2 emissions for all sectors here are at least 2 tonnes lower at 11.2 tC than the figure for Derbyshire Dales. Again, a high per capita figure of 6.4 for CO_2 emissions from the industrial sector is evident. The actual emissions at 581,000 tC for the industrial sector are the highest for any Derbyshire district. However, road transport emissions are amongst the lowest at 192,000 tonnes translating to a per capita figure for this sector of 2.1. Again, a slightly higher domestic per capita figure of 2.76 tonnes may be explained by a higher proportion of older solid-walled properties.

The highest road total of carbon emissions of 364,000 tonnes occurs in South Derbyshire where the existence of both the A38 and A50 major roads may contribute to this figure.

The road transport total contributes significantly to South Derbyshire's position as the district with the fourth highest per capita emissions for all sectors at 10.4.

The continuation of the A38 major road through Amber Valley will also contribute to this district's higher than average carbon emissions for the road transport sector. Coupled with the highest industrial and domestic sector emissions in the county this results in the highest actual carbon emissions of any district at well over 1 million tonnes. However, the highest population figures of any Derbyshire district at 118,600 also serve to reduce per capita emissions to 9.4, just above the Derbyshire average of 8.9.

The district areas of Bolsover and North East Derbyshire and the borough areas of Chesterfield and Erewash show below Derbyshire average per capita emissions of carbon with Bolsover showing the lowest actual emissions of 529,000 tC within all sectors, although the lowest per capita emissions belong to Erewash borough at 6.3tC. It may be useful to observe any effect of the new M1 motorway junction, 29A, within Bolsover district and whether this generates more traffic within the district in the coming years. Any figures attributable to this new development are available from the end of 2010.

Emissions from the public sector, including local authorities and their partners are included in the business sector totals. It is known that many public sector organisations, particularly local authorities are taking measures to mitigate carbon emissions from their building stock and operational activities. Emissions will be measured as part of NI 185: CO_2 reduction from local authority operations and will feed into the reductions required by NI 186: Per capita reduction in CO_2 in the LA area.

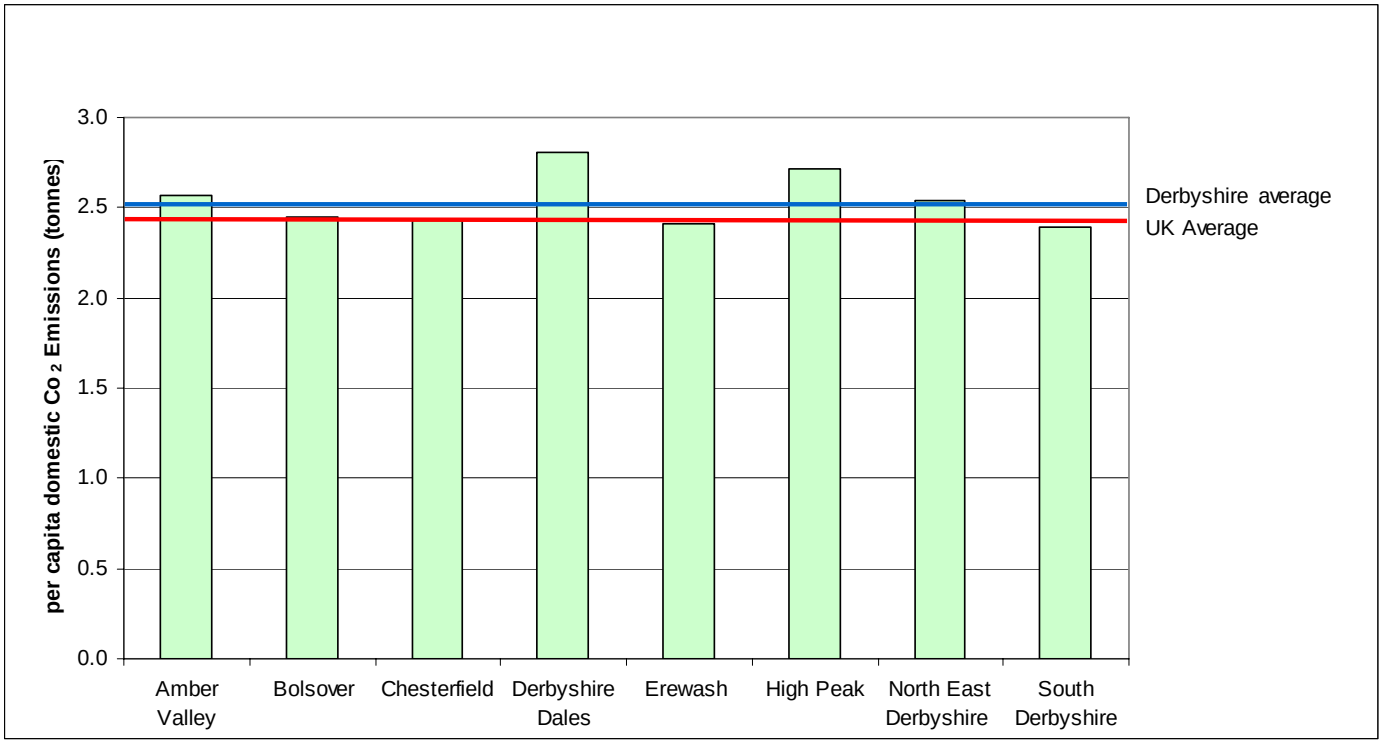

Figure 7: Per Capita Domestic CO_2 Emissions 2005 in Derbyshire Districts
Source: www.defra.gov.uk/environment/statistics/globatmos/ galocalghg.htm

Figure 7 shows the domestic proportion of Derbyshire's per capita emissions based on districts. Derbyshire's average domestic per capita CO_2 emissions are 2.5 tonnes, the same as the East Midlands and the UK averages. This figure has been included because it

is widely thought that the influence of the public sector on CO_2 mitigation could be greater in the domestic sector than in the road transport or business sector.

A more detailed analysis of the housing stock and type of tenure, particularly by district and borough councils, may provide a firmer basis to focus resources to reduce domestic and other sector carbon emissions. The 'Housing Intelligence for the East Midlands' website can provide further information for taking this aspect forward[22].

The recently published 2006 DEFRA headline results for greenhouse gas emissions show CO_2 emissions from home heating fell sharply for the second year running by 3% in 2004/05 and by 4% in 2005/06. The mild winter weather, sharp rises in gas prices and the gradual spread of improved household insulation appear to be behind these changes.

Overall, total greenhouse gas emissions in 2006 were 0.5% lower than the previous year but actual CO_2 emissions specifically were down by a negligible 0.1%. Emissions from transport and the energy-generating sector both rose by 1.3%. The latter may reflect rising electricity use by power-hungry household devices.[23]

The context for this section of the strategy is to provide baseline information which will contribute to a more detailed analysis required by each local authority to further understand the sources of carbon emissions with its boundary. In turn this will help to target resources effectively to reduce carbon emissions in line with the target for NI 186. This is a 0.5% reduction in carbon emissions per year (from national measures with local authority influence and local measures) within an overall reduction of 3.02% per year (2.52% from national measures alone).

2.4 What impacts will a changing climate have in Derbyshire?

Climate is defined as weather averaged over a 30 year period. In the UK, where we have very variable weather, we are a nation of weather-watchers and are generally more concerned about what is happening at a specific time and place rather than over a longer time span. UK climate predictions are for warmer drier summers with potential for severe droughts and warmer, wetter autumn and winter periods with increased rainfall in more intense storms[24].The natural variability of the UK's weather means that cool, wet summers, such as that of 2007 and cold, dry winters can still occur. However, more unpredictable and extreme weather is also likely such as the river flooding which affected parts of Derbyshire after many days of continuous rain during the summer of 2007.

In Part Two of the strategy more detailed consideration of the effect of climate change is given to a number of themes, such as health, habitat change, the economic systems and changing demands on water resources, for example.

National Indicator 188 – Planning to Adapt to Climate Change is now one of the 35 headline indicators of the Local Area Agreement and will guide the work of partners on this issue during the next 3 years.

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[22] http://www.hi4em.org.uk/

[23] http://www.defra.gov.uk/news/2008/080131a.htm reported in the ENDS Report, February 2008: http://www.endsreport.com/index.cfm?action=report.article&articleID=18616

[24] Scenarios Gateway, UK Climate Impacts Programme, 2002 , http://www.ukcip.org.uk/scenarios/ukcip02/ukcip02_head_message.asp

2.5 How is the weather already changing?

The UK Climate Impacts Programme (UKCIP) has produced a set of maps showing potential variations in temperature and rainfall given a variety of emissions scenarios.

Whilst no specific weather maps showing changes in climate exist at the moment, the UK Climate Impacts Programme (UKCIP) has produced a set of maps showing potential variations in temperature and rainfall given a variety of emissions scenarios across the UK[25]. These are further broken down by region.

Figures 8a - c show predicted changes in average temperatures and average summer and winter precipitation for the East Midlands region for a two greenhouse gas emission scenarios for specific decades.

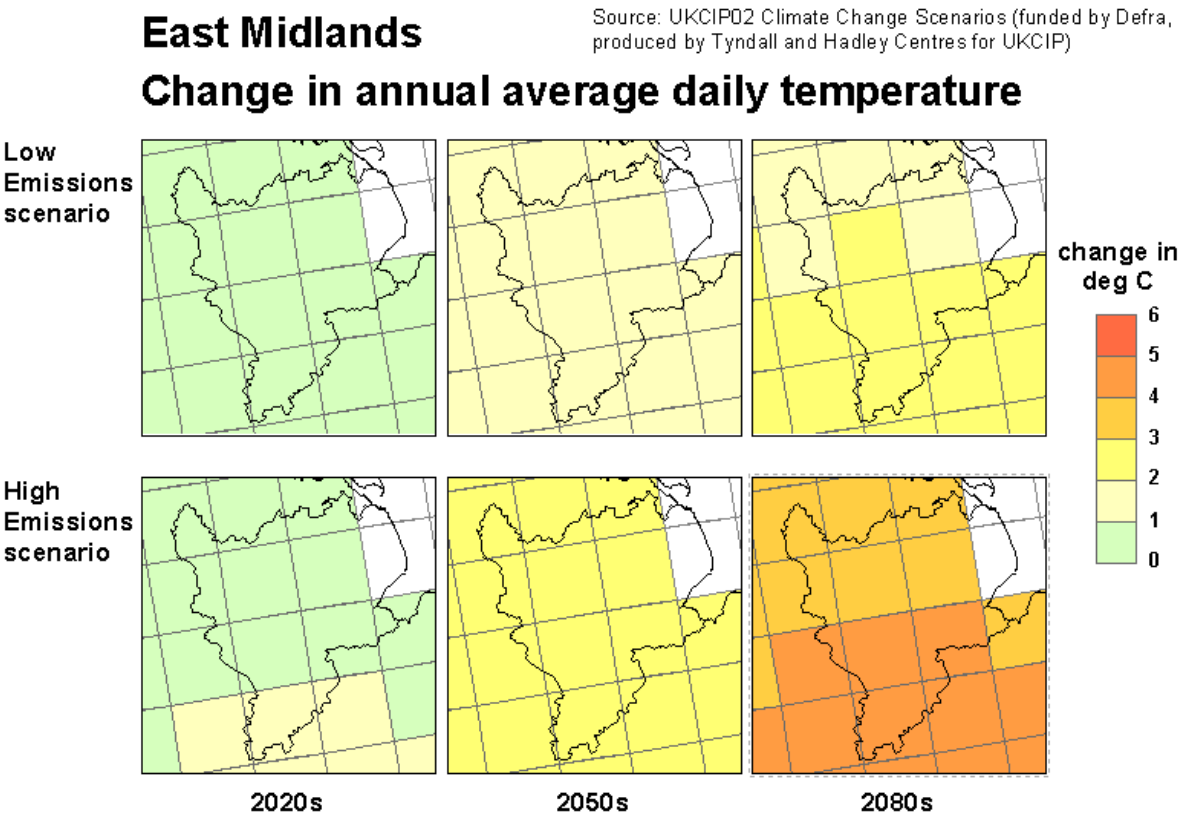


Figure 8a: East Midlands: Change in annual average daily temperature for two greenhouse gas emission scenarios, low and high, for the 2020s, 2050s and 2080s

[25] More accurate and revised predictions for the East Midlands will be available from November 2008.

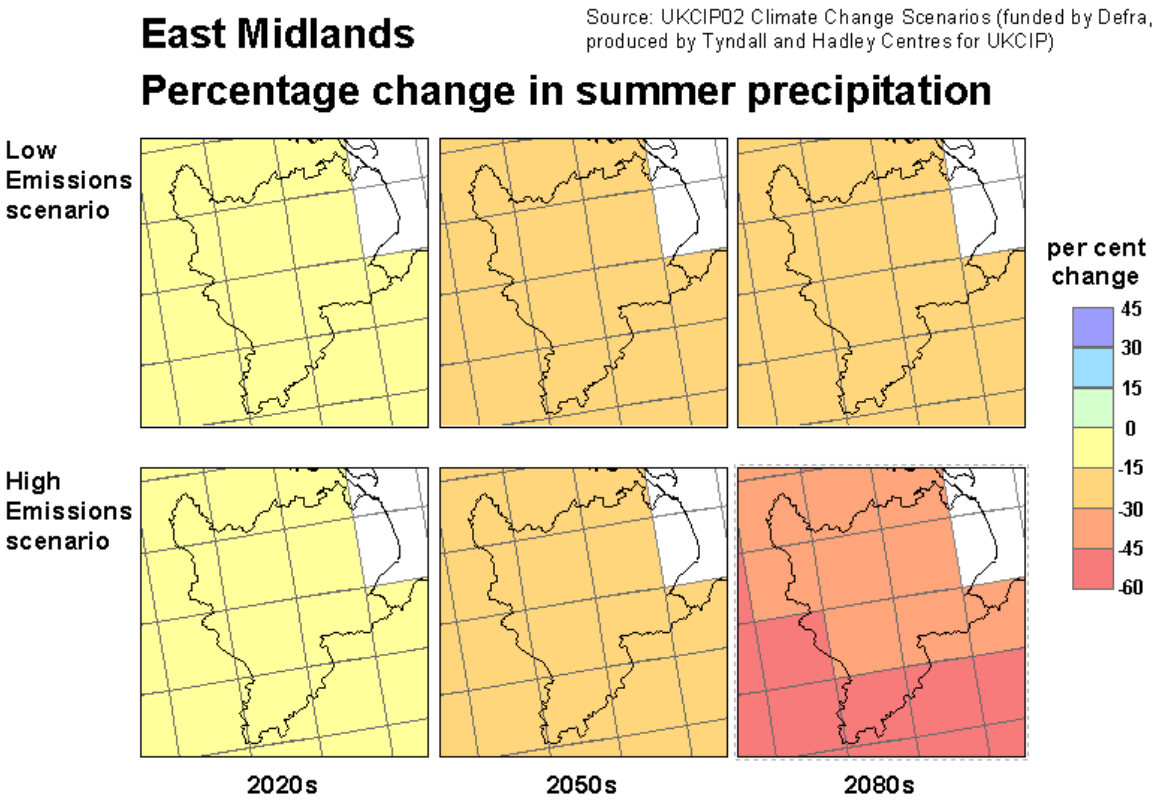


Figure 8b: East Midlands: Percentage change in summer precipitation for two greenhouse gas emissions scenarios for the 2020s, 2050s and 2080s.

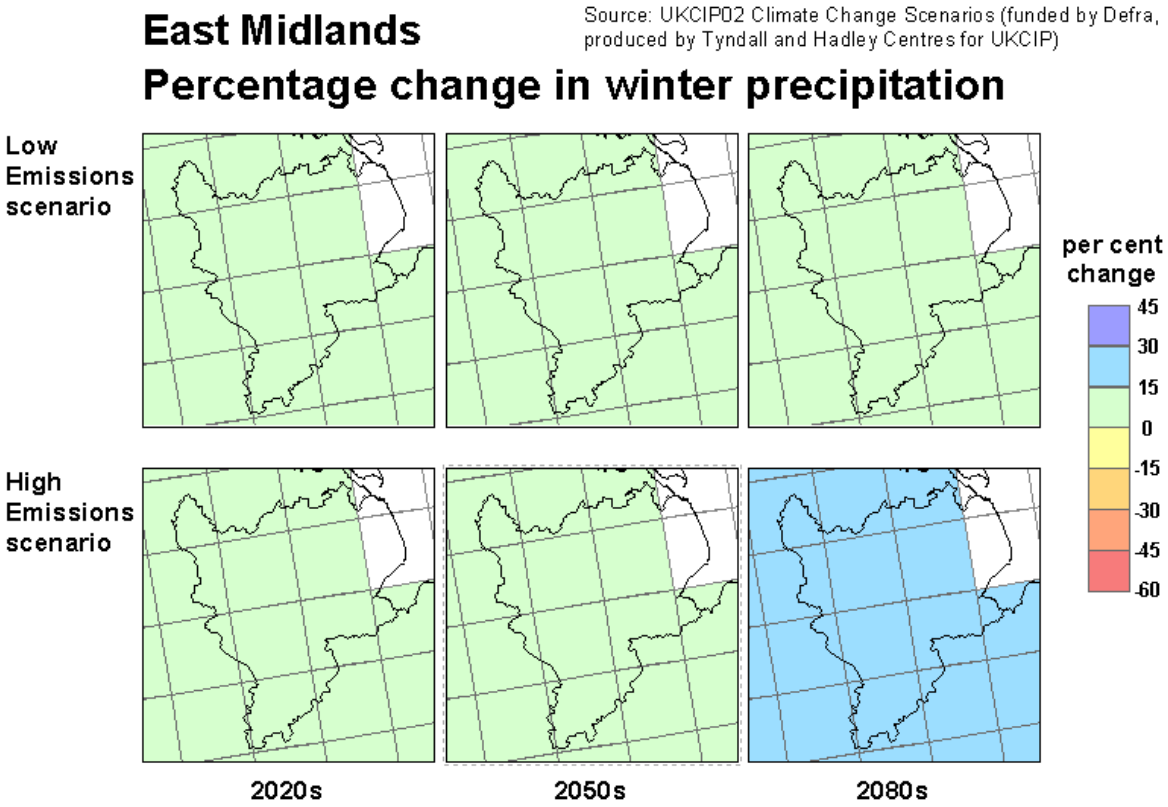


Figure 8c: East Midlands: Percentage change in winter precipitation for two greenhouse gas emissions scenarios for the 2020s, 2050s and 2080s.

Source of figures 8a – 8c: UKCIP02 Climate Change Scenarios (funded by DEFRA, produced by Tyndall and Hadley Centres for UKCIP).
http://www.ukcip.org.uk/index.php?option=com_content&task=view&id=171&Itemid=9

3 The Policy Context for taking action on climate change

3.1 The National Framework

Apart from international frameworks to tackle climate change, such as the Kyoto Protocol[26], the UK Government has produced a range of policy initiatives to drive action on this and related issues. Partly determined by EU Directives these policy drivers have become more urgent in recent years. A list of legislative initiatives which have driven work on climate change in recent years can be found in Appendix Two.

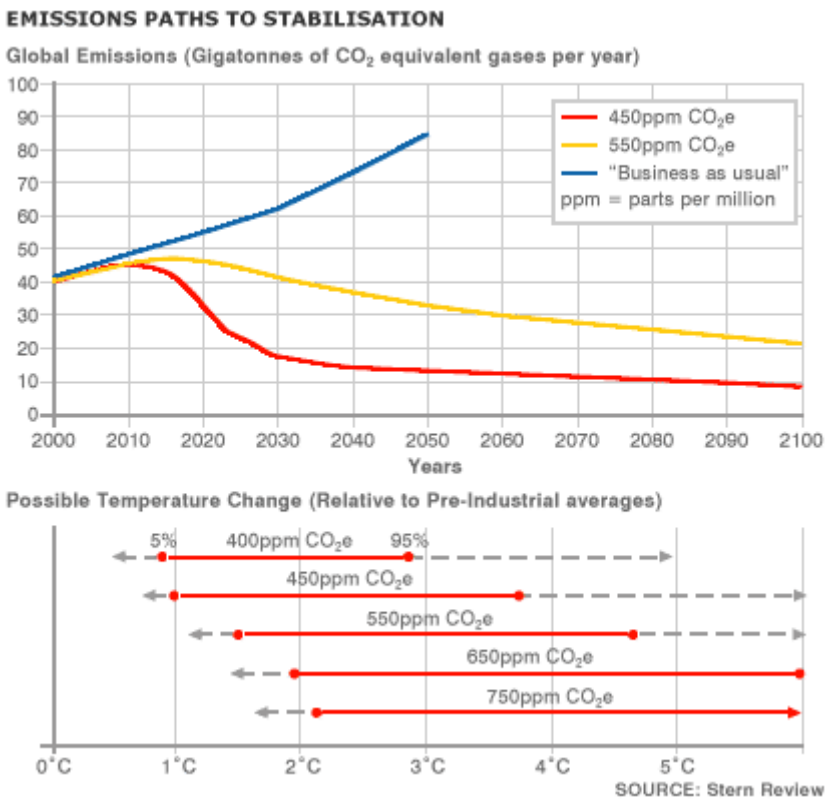
In 2003 the UK's Energy White Paper[27] committed the UK to reduce carbon emissions by 60% by 2050 with real progress by 2020. This was followed in 2006 by the UK Climate Change Programme[28], introduced as the key strategy for the Government's work on tackling climate change. It includes policies and measures to cut greenhouse gas emissions and explains how the UK plans to adapt to climate change.

In 2006, the Stern Review, commissioned by HM Treasury, concluded that global warming could shrink the global economy by 20%, but taking immediate action to reduce carbon emissions would cost only 1% of global gross domestic product. The Review gave the starkest warning yet of the potential catastrophic consequences of doing nothing. Two graphs from the Stern Review illustrating the relationship between carbon emissions and possible temperature changes and are shown in Figure 9.

[26] Kyoto Protocol to the United Nations Framework Convention on Climate Change, 1997 http://www.defra.gov.uk/environment/climatechange/internat/un-kyoto.htm

[27] 'Our Energy Future – Creating a Low Carbon Economy, HMSO, 2003. http://www.dti.gov.uk/energy/policy-strategy/energy-white-paper-2003/page21223.htm

[28] Climate Change, The UK Programme, 2006, HMSO http://www.defra.gov.uk/ENVIRONMENT/climatechange/uk/ukccp/index.htm



Source: Stern Review. Diagram available on http://news.bbc.co.uk/2/hi/business/6096084.stm#graph

Figure 9: The relationship between CO_2 emissions and possible temperature change. These two graphs should be read together.

One of the most influential publications has been the Fourth Assessment Report of the International Panel on Climate Change[29]. Considered to be a very conservative assessment of climate change, the Panel has concluded that global warming is destined to have a far more destructive and earlier impact than previously estimated.

Mindful of the IPCC report and driven by both the Energy White Paper and the Stern Review, the Government has introduced a Climate Change Bill, which when enacted, will enshrine the 60% target into legislation and develop 5-year carbon budgets. The UK will be the first country in the world to legislate for carbon dioxide reduction targets. But even before enactment the Government is asking the Climate Change Committee[30], to investigate a target of an 80% cut in carbon emissions by 2050.

A summary of the main points of the Climate Change Bill can be found in Appendix Three.

[29] http://www.ipcc-wg2.org/

[30] The Climate Change Committee is an independent, expert body set up to advise the Government on the pathway to the 2050 target and to advise specifically on: the level of carbon budgets; reduction effort needed by sectors of the economy covered by trading schemes, and other sectors; and on the optimum balance between domestic action and international trading in carbon allowances.

3.2 The Regional Perspective

As part of the Integrated Regional Framework[31] the East Midlands Regional Assembly has produced a number of policy documents relating to sustainable energy and climate change including the Regional Spatial Strategy (the Regional Plan), RSS8,[32] which has objectives for both energy efficiency and renewable energy, whilst the Regional Energy Strategy[33] is supported by an East Midlands Programme of Action on Climate Change[34]. In addition, the East Midlands Regional Economic Strategy[35] sets out a vision for a flourishing region where one of the strategic priorities is "To transform the way we use resources and use and generate energy to ensure a sustainable economy, a decent environment and lessen the impact on climate change". However, it is recognised that complementary action is needed both nationally and locally if the vision for the region is to be achieved.

3.3 The Local Framework

The Local Government White Paper 'Strong and Prosperous Communities'[36] places a duty on local authorities to "lead their community and their local partners… on climate change" and also "gives local government new opportunities to drive local action on climate change mitigation and adaptation through…coordinating innovative partnerships which can deliver real changes"[37]. The White Paper also committed the Government to develop a new indicator set for inclusion in the new Comprehensive Area Assessment performance framework, the successor to the Comprehensive Performance Assessment. Three indicators relating directly to climate change are part of the 198-indicator set. They are:

NI 185 – CO2 reduction from local authority operations
NI 186 – Per capita reduction in CO2 emissions in the local authority area
NI 188 – Planning to adapt to climate change.

A fourth indicator relates to reducing fuel poverty by improving the energy efficiency of housing within an area:

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[31] England's East Midlands, Integrated Regional Strategy – Our Sustainable Development Framework, January 2005. http://www.emra.gov.uk/what-we-do/regional-communities-policy/irs-framework

[32] Draft East Midlands Regional Spatial Strategy (RSS8), Consultation, September 2006, East Midlands Regional Assembly. http://www.emra.gov.uk/publications/housing-planning-and-transport/rss-review/draft-regional-plan/draft-regional-plan-part-1-regional-strategy and http://www.goem.gov.uk/goem/psc/suscom/rss/eastmidlandsplan/

[33] The Regional Energy Strategy (Part 1), March 2004East Midlands Regional Assembly. http://www.emra.gov.uk/publications/housing-planning-and-transport/rss-review/natural-and-cultural-resources/energy/regional-energy-strategy

[34] Draft Regional Programme of Action on Climate Change, October 2007, East Midlands Regional Assembly. http://www.emra.gov.uk/what-we-do/regional-communities-policy/sustainable-development/east-midlands-expo/east-midlands-expo-2007/programme-2007/launch-of-regional-climate-change-programme-of-action

[35] A Flourishing Region – Regional Economic Strategy for the East Midlands, 2006-2020. http://www.emda.org.uk/res

[36] Strong and Prosperous Communities, The Local Government White Paper, Vol 2, F11/F14, p 49, October 2006, http://www.communities.gov.uk/publications/localgovernment/strongprosperous

[37] Ibid., p 47.

NI 187 – Tackling fuel poverty – People receiving income based benefits living in homes with a low energy efficiency rating.

There are a number of other indicators in the national set which are related to mitigating or adapting to climate change. These are listed in Appendix Four.

In addition, the Local Development Framework[38], which is now the regulatory control mechanism on which Local Planning Authorities work, is a crucial delivery mechanism for mitigating and adapting to climate change and covers many of the themes and issues referred to in Part Two of the strategy.

The existence in Derbyshire of a county-wide Local Strategic Partnership[39], the Derbyshire Partnership Forum which is guided by the Derbyshire Sustainable Community Strategy[40] provides an unprecedented opportunity to work together to make real inroads into tackling climate change in Derbyshire. Two of the Local Area Agreement's[41] 35 headline indicators set, include NI 186 and NI188. The inclusion of these two indicators will determine the direction of work on the crucial issue of climate change. The role of the DPF is explored further in section 4 below.

3.4 The Nottingham Declaration

One of the most important documents to come from the local authority climate change agenda is the Nottingham Declaration on Climate Change**.** Signatories to the Declaration commit to developing both climate change mitigation measures to reduce greenhouse gas emissions and adaptation measures to respond to the potential impacts of climate change such as flooding and heatwaves on the delivery of services.

As members of the Nottinghamshire and Derbyshire Local Authorities Energy Partnership (LAEP), all local authorities in both counties are signatories to the Declaration. LAEP is carrying out a programme of work to support its partner authorities in delivering their commitments to this agenda. As such, its expertise could be harnessed to bring similar benefits to all DPF partners.

4. The Derbyshire Climate Change Strategy

4.1 The role of the Derbyshire Partnership Forum

The situation regarding climate change, the peak oil concept and security of energy supply requires action to be taken by all organisations, communities and individuals everywhere. Many look to the public sector and to local government particularly, to provide leadership on crucially important issues such as this. The purpose of this strategy is to fulfil this wider expectation by providing a framework for action on climate change for the Derbyshire Partnership Forum (DPF) and its constituent partners.

[38] http://www.planningportal.gov.uk/england/professionals/en/1115310689347.html

[39] http://www.derbyshire.gov.uk/council/partnerships/local_strategic_partnerships/

[40] http://www.derbyshire.gov.uk/council/partnerships/strategy/

[41] http://www.derbyshire.gov.uk/council/partnerships/local_area_agreement/

The DPF[42] consists of a range of organisations working together across the county to deliver public services in a more coherent and integrated way guided by the Sustainable Community Strategy. Service delivery has an impact on greenhouse gas emissions, such as operating corporate buildings and travel. Therefore action can be taken to mitigate these effects. Some services may also be affected by climate change, for example through increased risk of injury and damage from flooding, higher temperatures, drought and wind. Service delivery will then need to be adapted to improve effectiveness, for example, in the case of landscape management or approaches to health service delivery.

Figures 4 to 7 show the scale of the task in hand and the National Indicators, particularly 186 and 188 require all local authorities to take action in conjunction with their partner organisations to reduce per capita CO_2 emissions across the business, travel and domestic sectors and to plan to adapt to climate change to across the area in question (administrative Derbyshire). By developing initiatives with wider Derbyshire partners and neighbouring authority areas the DPF can influence and encourage key sectors of industry and business services, travel and transport, communities and individuals in the reduction and avoidance of emissions as well as take action to adapt to changes in the climate.

Targets of 60% reduction of greenhouse gas emissions, possibly rising to 80%, which are expected from the imminent enactment of the Climate Change Bill indicate the degree of priority and focus which should be accorded to this crucially important issue.

There are many examples across Derbyshire of excellent work being carried out with direct and positive outcomes for the climate change agenda. Some of these examples are detailed as case studies throughout the text of the document. However, there can be no complacency. Urgent work is needed and indeed will be required from all of us, everywhere, if we are to succeed in tackling this agenda. The Objectives set out in section 5.3 are the first step in this process.

4.2 The Purpose of the Strategy

This strategy provides a background on climate change issue both globally and in Derbyshire. Guidance to be developed on writing climate change action plans will cover the main activities and concerns for partners, illustrated in Part Two, as well as examine issues for the wider Derbyshire community. These will be set out to steer our collective and individual organisational responses to climate change.

It is intended that a detailed action plan will be developed for the DPF to facilitate collaborative working on this issue, but also that the strategy, with guidance, will enable partner organisations operating in an individual capacity to respond positively to the climate change agenda for their own organisations in line with this strategy

Partners working together on climate change mitigation and adaptation issues will not only reduce future risk to their organisations but by doing so will build resilience as a further insurance against declining fossil fuel reserves and potential security of supply issues. This in turn will provide leadership and encourage action amongst the wider Derbyshire community.

[42] http://www.derbyshire.gov.uk/council/partnerships/derbyshire_partnership_forum/default.asp

Mitigation, adaptation and community leadership are crucial elements of the climate change agenda and are defined here to support consideration of the themes below.

The Derbyshire Partnership Forum will work to meet the targets negotiated with the Government for NIs 186 and 188, as part of the Local Area Agreement. The LAA is the principal vehicle to drive forward the climate change agenda allowing partners to work together to offer mutual support, share best practice and network to deliver:

1. Fulfilment of the **Community Leadership role** to all Derbyshire communities including individuals, communities, businesses, the voluntary sector and other public sector organisations, which involves working in partnership with local people and organisations to develop a shared vision for the future.

   Approaches include:

   - working together to deliver the climate change strategy and other appropriate plans
   - leading by example
   - raising awareness about climate change and reflecting people's concerns
   - using the power of well-being to support action on climate change
   - supporting renewal and regeneration initiatives that contribute to sustainable development.
   - influencing, advising and demonstrating good practice to the business and community sectors and to individuals.

2. **Mitigation or reduction of greenhouse gas emissions** which cause climate change.

   Approaches include adherence to the energy and resources hierarchies:

   - reducing the need for energy use in buildings and on travel related activities.
   - using energy and sustainable resources more efficiently – getting more output for less input
   - using renewable and more sustainable resources to generate energy
   - if necessary, using non-sustainable fuels and resources in the most efficient manner possible.
   - avoiding increases in emissions from the mismanagement and erosion of ecosystems.

   Adherence to this hierarchy will also build resilience to the twin issues of declining fossil fuel reserves and security of energy supply.

   An energy hierarchy is described in more detail under the theme of Buildings, Facilities and Energy Management.

3. **Adaptation of service provision** to cope with changes in climate including influencing the supply chain in favour of more sustainable practices. This includes activity carried out to assess the risk of a changed climate to services and the planning of service delivery to cope with the expected impacts, both positive and negative. These issues are explored more fully in Part Two.

Approaches include:

- revisions to long term planning processes (e.g. corporate and local plans)
- production of operational guidance (e.g. to cope with variations in temperature or increased flood or fire risk) – these need to be prioritised in terms of investment
- infrastructure projects, such as construction of route-ways, to avoid areas subject to flooding
- raising awareness of the wide range of stakeholders to climate change impacts.

5. Strategic Aims, Themes and Objectives

It is essential that all organisations respond positively to the challenge of both mitigating greenhouse gas emissions and adapting service delivery for a changed climate. Responsibilities include the crucial role of communicating climate change issues to employees and service users and undertaking the vital community leadership role in raising awareness and enabling the wider Derbyshire community to take action.

5.1 Aims of the strategy

The Aim of this strategy is to address climate change in Derbyshire by:

- reducing greenhouse gas emissions in Derbyshire to the levels set out in the Government's climate change bill – a 60% reduction by 2050 against 1990 levels (this target may rise to 80%)
- preparing Derbyshire for the impacts of climate change
- raising awareness of climate change and where possible, helping all sections of the community to take action on this agenda.

5.2 Themes – issues and controls

The range of services and corporate activities carried out by the partners of the Forum; aspects within partners jurisdiction and the importance of these in the climate change agenda are illustrated in Part Two. Guidance on producing climate change action plans will to be written in due course and be based on taking action around these themes. The themes are listed here being some of the most important considerations relating to service delivery for all partners.

Services and operational mechanisms which have the greatest impact on climate change and can offer immediate benefit to the mitigating agenda are detailed in section 6.0.

Mitigating action is vital to reduce future risk to all services. Those services and operational mechanisms which have the greatest impact on climate change and can offer immediate benefit to the mitigating agenda include:

- Buildings, facilities and energy management
- Travel and local transport
- Waste management and resources
- Procurement.

Services, themes and some control mechanisms can have both an impact on climate change and need consideration of service planning to adapt to a changed climate. These are grouped in Section 7.0 and include:

- Planning, land-use and regulation
- Housing and fuel poverty
- Water resources
- Economic development and business activity
- Derbyshire communities
- Agriculture and farming.

Services and themes where the responsibility is predominantly one of identifying the impacts which climate change will have and which will require consideration of adaptation strategies to reduce potential future risk can be found in Section 8.0 and include:

- Health, welfare and occupational exposure
- Management of landscape and natural habitats
- Education and communication
- Crime.

5.3 Key strategic climate change objectives for Derbyshire

The objectives of this strategy necessarily have a broad focus but are intended to indicate where partners can achieve real value for money and can have a significant impact in the climate change agenda. There is also scope under this strategy for individual partners to develop action plans, with more detailed objectives and targets, specific to their organisational needs and requirements and this is to be strongly encouraged. Guidance on developing organisational action plans will be produced as part of the climate change work carried out in Derbyshire.

Solutions, relating to common themes, could be realised through a multi-agency approach, adding value to organisational working.

The key strategic climate change objectives for the Derbyshire Partnership Forum appear below.

By signing up to this strategy the partners of the Derbyshire Partnership Forum agree to:

1. Work together on climate change matters for mutual benefit and support and add value to existing activity where organisations are acting alone.

2. Commit to take action on climate change by signing the Nottingham Declaration, including developing a climate change action plan for mitigation and adaptation of greenhouse gas emissions, as soon as possible. (All Derbyshire local authorities are signatories already).

3. Undertake a climate impact assessment for Derbyshire in the short and medium terms.

4. Define a baseline carbon footprint for Derbyshire, and recommend emission reduction targets and measures to reduce both organisational and community emissions of greenhouse gases.

5. Undertake an investigation of the potential sites for standalone renewable energy generation installations in Derbyshire and take steps to realise this potential where appropriate.

6. Consider climate change mitigation and adaptation actions in the future review of the Local Area Agreement, appraise all ensuing plans and programmes for impact on and impact of climate change, as these are updated.

7. Identify where adoption of climate change objectives could help deliver existing Community Strategy/Local Area Agreement targets and any supporting plan and programme targets.

8. Reduce greenhouse gas emissions from services delivered jointly by DPF organisations through the Local Area Agreement.

9. Raise awareness and understanding of climate change throughout the wider Derbyshire community and amongst all staff of organisations within the DPF, creating the capacity to take action to mitigate and adapt to climate change.

10. Encourage and influence other Derbyshire organisations, beyond the DPF, to reduce emissions of greenhouse gases and prepare to adapt to a changed climate.

11. Take account of regional and national strategies and objectives and in turn influence them to ensure that energy use/carbon emissions are minimised through proposed national and regional programmes and plans.

12. Collaborate on action plan development to determine priorities to take forward the objectives in this strategy and to monitor their implementation.

5.4 Taking it forward

“It is time to act” (Stern Review) on climate change as a matter of urgency. We are prompted and motivated by a number of central Government initiatives involving the public sector. The DPF partners also have corporate social responsibility obligations to play their part locally for people in Derbyshire, in the rest of the world and for those who are very young or yet to be born.

A judgement necessarily has to be made on the scope and scale of action and the allocation of resources relating to the climate change agenda. However, we cannot do ‘business as usual’. This strategy must be seen as a first step to achieving much more than we are currently doing.

Direction of travel aspirations of the Derbyshire Partnership Forum will be influenced by a closer consideration of themes and issues to be detailed in guidance on writing climate change action plans. This in turn will assist in developing an action plan for the Partnership to take the first steps to implementing this agenda and fulfilling its commitments as a part of the national climate change agenda by meeting agreed targets in national indicators 186 and 188.

Part Two

This section of the strategy considers a number of themes, issues and mechanisms of regulatory control such as the planning system and sectors in Derbyshire which will effect and be affected by climate change. The intention of this section is to assist the development of climate change action plans for both the DPF and partners organisations, insofar as it hopefully points the way in which we should all be taking action on this crucial issue. The descriptions below are not comprehensive, but designed to encourage further research where appropriate and to that end references are given to assist.

Themes and issues are grouped into three reflecting firstly, those activities which have a huge impact on climate change and where mitigating action would serve to reduce that impact. This includes the operation of buildings, travel and transport activities, waste management practices and purchasing decisions.

The second group includes those themes and issues which can have both an impact on climate change by emitting greenhouse gases and which are also very likely to be affected by climate change and where some degree of adaptation to a changing climate in the form of more frequent and unpredictable severe weather events will be necessary.

Consideration is given to the role of regulatory control for example the planning system. Also considered are the activities of businesses, the farming community and individuals either on their own or working within communities which are important in mitigating climate change by preventing emissions of carbon as well as having a role to play in adapting to the climate change we will experience in the decades to come,

The third group of themes includes those which require an adaptation to the way in which they are delivered, such as health, landscape management and crime. In addition, it is vitally important that we begin educating people about this issue in both the formal education sector and through more informal mechanisms such as the community leadership role for the public sector, particularly for local authorities and their partners.

The management of landscape and natural habitats is included in this group mainly because of the impact which climate change will have on this activity. It is recognised that the Peak District Moors in Derbyshire, along with landscapes, soils and ecosystems everywhere are massive carbon stores which when degrades can release carbon dioxide into the atmosphere. Preventing this release by conserving and enhancing these landscapes is crucial element in adapting to climate change.

The division of themes referred to above, is far from perfect and it could be argued, unnecessary. An explanation of potential mitigating actions and possible effects including adaptation activities is given under the appropriate headings. The suggested activities need to be applied at all levels, from the public sector, business and commercial sectors to communities and even individuals. Everyone has a part to play in reducing greenhouse gas emissions and adapting to climate change in any way possible.

6.0 Mitigation

Themes important in mitigating climate change

These themes are deemed to be the most important in offering an immediate impact in mitigating greenhouse gas emissions. They include:

- Buildings, Facilities and Energy Management;
- Travel and Transport
- Waste Management and Resources
- Procurement.

6.1 Buildings, Facilities and Energy Management

An estimated 50% of total UK carbon emissions arise from energy used in heating, lighting and cooling buildings. With a small number of notable exceptions, most of these buildings, including the county's schools, are heated by fossil fuels either directly, in the form of coal, oil or gas and lighted by electricity generated from fossil fuels in the UK's power stations.

The energy hierarchy provides a useful guide for taking effective action to reduce carbon emissions. Put simply, it encourages us to take a number of actions in a particular order based upon least cost and greater carbon emission reduction. In financial terms it is more pertinent than ever given 'Peak Oil' (see section 1.2) and virtually certain further increases in energy prices in the future.

This hierarchy should inform corporate, business, domestic and individual action, but for the DPF organisations, it should be particularly useful where the use of heat, light and motive transport is necessary to deliver our services.

The energy hierarchy:

- **reduce the need for energy use**

  Typically around 20% of energy used in offices is wasted[43]. Reducing our demand for energy through employee education and more sustainable purchasing decisions could radically reduce carbon emissions and lead to immediate financial gain.

- **use energy more efficiently**

  The way in which we construct new buildings and maintain and refurbish existing ones is the key to reducing both emissions and waste. New buildings should be of low-carbon design including passive solar heating and natural ventilation. Also the retro-fitting of insulation to the highest standards available within existing buildings must be one of the first priorities in mitigating climate change.

- **use renewably generated energy**

  Renewable energy generation in the UK is increasing very slowly, forming only around 4.7% of the total generated, despite a target of 10% by 2010. Renewable energy if available can often be purchased at the same rate as conventional energy and is one of the main ways in which corporate carbon emissions can be reduced very quickly. However, if this electricity, for contractual or other reasons becomes unavailable, the percentage of corporate carbon emissions could very rapidly increase.

[43] http://www.sd-commission.org.uk/

Partners should consider installing renewable generating technologies either as an integrated aspect of new buildings where a zero-carbon target is sought or as a retrofit to existing buildings at levels where excess electricity can be sold to the grid and resultant carbon credits can be traded for financial gain. In addition, renewable fuels, such as wood, may be used to provide direct heat to buildings. These installations must be seen in the long term as 'invest to save' measures, as demands on the public and private sectors to reduce carbon emissions grow and conventional fuels become more expensive.

- **use fossil fuels in the cleanest and most efficient manner possible**

  Currently 74% of electricity generated in the UK uses fossil fuels[44]. Improved technologies, such as fluidised bed coal combustion have increased efficiencies. A combined heat and power (CHP) installation, a facility akin to a small electricity generating station, using fossil fuels, massively increases these efficiencies by generating electricity and using the 'waste' heat for other applications. CHP presents an opportunity to reduce carbon emissions overall, particularly when replacing existing facilities or in new build.

In addition to adhering to the energy hierarchy in existing and new building stock, we must also turn attention to considering the use of more sustainable building materials with lower embodied energies or natural, re-useable and recyclable materials, as well as practising efficient waste management techniques including harvesting and recycling water.

All partner organisations and the business and commercial sector in Derbyshire have the potential to improve the energy efficiency of their corporate buildings. Procedures are available to assist this process such as the Carbon Trust's Carbon Management Programme[45] and the Nottingham Declaration Toolkit.

Actions which can be taken to begin the process of reducing greenhouse gas emissions to mitigate climate change include:

- Making a commitment to take action on climate change by signing the Nottingham Declaration.
- Developing a climate change action plan based on the energy hierarchy within 2 years of the date of signing. (All Derbyshire local authorities are signatories). The action plan should be based on measures to mitigate greenhouse gas emissions and climate proof buildings to reduce risk from extremes of weather.
- Beginning a programme of implementing these measures to achieve a reduction in carbon emissions of in line with those required in the Climate Change Bill when enacted in 2008.
- Setting up 'invest to save' funds to encourage sustainable energy measures with low or no-cost loans. Salix funding[46] is available to support many public sector organisations. National Indicator 185: CO_2 reduction from local authority operations

[44] An additional 20% is generated by nuclear fuel. Source: The Environment in your pocket 2007, DEFRA

[45] http://www.carbontrust.co.uk/carbon/

[46] Salix is an independent, publicly funded company that provides interest-free match funding to the public sector to invest in energy efficiency measures and technologies that will reduce carbon emissions http://www.salixfinance.co.uk/home.html

will guide the actions of Derbyshire local authorities on this issue. Although NI 185 is not included in the list of 35 headline indicators chosen by the LAA, outputs will feed into the work done on NI 186: per capita reduction of CO_2 emissions in the local authority area. Action taken to reduce carbon emissions by all public, private and voluntary sector partners in the Derbyshire Partnership Forum will contribute to the overall reduction in per capita emissions of 0.5% per year of total Derbyshire emissions, which the DPF has committed to over the 3 year course of the LAA from 2008 to 2011.

It should also be noted that the installation of energy efficiency and renewable electricity generating measures, leading to an overall reduction in carbon emissions, apply also to the business and commercial sector, the housing sector and on a smaller scale to householders.

Case Study 1: Approaches to Carbon Management

There are a number of approaches organisations can use to mitigate carbon emissions from corporate property for example: using an Environmental Management System (High Peak Borough Council is using the Eco-Management and Audit Scheme such as, EMAS or ISO14001) or developing a programme under the Carbon Trust's Carbon Management Programme (Derbyshire County Council) or using the mitigation section of the Nottingham Declaration Toolkit.

Derbyshire County Council joined the Carbon Management Programme in 2006 and with assistance from the Carbon Trust has produced a Strategy Implementation Plan to reduce its carbon emissions from its buildings, travel and transport activities related to delivering services, including the procurement of vehicles; better waste management practices and more efficient street lighting which the county council provides throughout Derbyshire.

The objective of the Carbon Management Programme is to reduce the authority's carbon emissions by 15% by 2010 from a 2005/6 baseline of 32,842 tonnes (excluding schools; schools emissions increase the total to 77,071 tonnes).

The county council is being helped in this process by its membership of the Nottinghamshire and Derbyshire Local Authorities Energy Partnership (LAEP). This partnership has run a series of workshops designed to assist its partner members (all local authorities in the two counties) to gather baseline information such as building a carbon inventory and self-assessing performance on carbon for each authority as a preliminary to developing a programme of action to reduce carbon emissions.

http://www.carbontrust.co.uk/carbon/PublicSector/
http://www.derbyshire.gov.uk/environment/sustainable_development/climatechange/whathtecouncilisdoing/default.asp

6.2. Travel and Local Transport

In the UK, this sector is the third largest source of greenhouse gas emissions accounting for around 25% in total, 96% of which are carbon dioxide. Transport is also the fastest growing source of greenhouse gas emissions and, if left unchecked with increased car traffic predicted, could grow by more than 20% over the next two decades. Van and lorry traffic is predicted to grow by more than 22% over the same period.

In 2005 estimates of emissions from road traffic in Derbyshire were 1.6 million tonnes of CO_2e (excluding emissions from motorways) which accounted for around 25% of Derbyshire's total emissions for that year (see Figures 1 & 4). The Derbyshire County Council Household Survey shows that up to 22% of car journeys were less than 3 miles (5kms) and up to nearly 38% were less then 6 miles (10kms) in 2007.

There are two major aspects to transport and climate change. One is the impact of greenhouse gases emitted from transport and the other is the effects of climate change upon travel. Although modern methods of transport have been understood to improve our quality of life, it is now recognised that there are negative effects such as road congestion, noise, reduced air quality, road accidents and people walking less which impacts negatively upon health.

'Better air quality' is one of the four central/local government shared priorities for transport for the period 2006-2011, and this is reflected in the Derbyshire Local Transport Plan (LTP)[47]. This plan was also subjected to a Strategic Environmental Assessment which includes consideration of climatic factors. The Derbyshire Local Transport Plan includes objectives to reduce the environmental impacts of transport, to improve access to facilities by healthier and more sustainable travel modes, and to encourage the use of healthier and more sustainable travel opportunities. Both Bolsover District and Erewash Borough Councils have declared Air Quality Management Areas related to road traffic, and Chesterfield Borough Council is developing an Air Quality Strategy based on evidence of emerging problems, combined with land use developments.

The challenge is to encourage walking, cycling and use of public transport (bus and rail) in place of car journeys without reducing accessibility to local services. This would move us towards a 'win-win' situation which is better for safety, health and the environment. Measures to improve the situation include implementing demand management measures to influence behavioural change, which can vary between what is often referred to as 'hard measures' and 'soft measures.'

Hard measures include road pricing/congestion charging and traffic management, including parking control. The three cities sub-area of the East Midlands region (Nottingham, Leicester and Derby) which includes parts of the three shire counties is the subject of a study to address congestion problems through the Government's Transport Innovation Fund[48].

Soft measures include a range of techniques from school, and business travel plans to encourage sustainable travel, personalised travel planning, including walking and cycling, public transport information and marketing, to travel awareness campaigns (e.g. Bike Week) and car sharing schemes. The range of soft measures has been branded 'Smarter Choices' by the Department for Transport. In particular, there is a focus on school journeys

[47] http://www.derbyshire.gov.uk/transport_roads/transport_planning/
[48] http://www.6cscongestionmanagement.co.uk/

through the development of School Travel Plans. There is a target for all schools to have a School Travel Plan in place by 2010.

There is also scope to influence travel planning and implementation through the land use planning process. Other measures to address the issues include improved local networks for walking, cycling and public transport, transferring or moving freight by rail where possible, reducing vehicle emissions through cleaner vehicle technologies and driver training, reducing the traffic impact of new developments, and adaptation measures to deal, for example, with risk of flooding.

Local transport policy has only limited potential to influence the level and mode of travel for long distance journeys, which in part is dependent on national policy.

Recent changes at national level to promote mitigation of carbon emissions include:

- graduated Vehicle Excise Duty (VED) based upon CO_2 emissions.
- a voluntary agreement with motor manufacturers to reduce CO_2 emissions from new cars by 25% by 2008-2009.
- the Government's Sustainable Distribution Fund (SDF)[49] which has two main elements; the mode shift programme (encouraging the use of rail and water to transport goods) and the efficiency programme (encouraging the more efficient use of all transport modes).

However, a number of trends, which are very likely to offset these gains include:

- the growth in the number of vehicles on the roads, as mentioned above[50].
- increasing numbers of larger and heavier vehicles as more accessories and safety features are fitted.
- an increase in vehicle air conditioning which increases fuel consumption and is a significant source of HFC's, both of which could more than offset any gains from increasing fuel efficiency.
- vehicles fitted with catalytic converters produce more CO_2 and N_2O, which has a greater global warming potential than CO_2.

Greenhouse gas emissions from transport can be reduced by lessening the need to travel and lessening dependence on the car and other vehicles both for commuting and for work related travel.

Partners should consider what contribution they can make to reducing the impact of work related travel, by assessing the effects of their fleets, staff travel and commuting on climate change and through their own services and influence. Also, consideration should be given to how decision-making about service provision affects travel in order to ensure that decisions are made in line with the Local Transport Plans.

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[49] http://www.dft.gov.uk/pgr/freight/sustainable/thesustainabledistributionfu3246

[50] The proposal to increase the operating weight and size of commercial vehicles should in the longer term reduce the overall number of large vehicles when charted against potential trends of keeping vehicle weights the same as they are currently. Also the introduction of Euro V (mandatory in late 2009 http://ec.europa.eu/environment/air/transport.htm) will significantly reduce both CO_2 and N_2O emissions which should not be overtaken by the introduction onto the roads of more vehicles with air conditioning. In addition the energy requirements on new air conditioning units is less than those produced three to four years ago. (Eddie Foulds, County Fleet Manager, Derbyshire County Council, December 2007)

Actions to be encouraged:

- Reducing the need to travel – by the location of facilities, raising awareness about transport choices or the use of electronic systems to access services, as an alternative to travelling.
- Encouraging travel by healthier and more sustainable methods e.g. walking, cycling, car sharing, use of public transport – particularly for journeys to school and work, workplace travel, and more sustainable tourism.
- Making a contribution towards the Local Transport Plan's aims of improving local accessibility, safer roads, reduced congestion and better air quality and environment.
- Reduction of business mileage or more business use made of public transport without detriment to service provision.
- Accessing a free Energy Saving Trust green fleet review.

Actions to be discouraged:

- Changes which are likely to increase the amount of private car use.
- A reduction in the potential to provide (and for people to use) public transport services.
- A reduction in the scope for people to walk or cycle to local facilities.

The Changing Climate: Impact on the Department for Transport - April 2004
This report sets out the key impacts which climate change could have on transport and makes recommendations to ensure that the Department for Transport and others are ready:
http://www.dft.gov.uk/strategy/climatechangeimpacts/dftreport

Information on what the Government is doing to reduce greenhouse gas emissions from transport can be found in the 'Sustainable Travel', 'Aviation' and 'Vehicles and the Environment' sections of the DfT website.
http://www.dft.gov.uk/

Rail Safety and Standards Board (RSSB) report - Railway Safety implications of weather, climate and climate change - April 2003
http://www.rssb.co.uk/pdf/reports/research/

Climate Change and Transport:
http://www.dft.gov.uk/pgr/sustainable/climatechange/climatechangeandtransport?page=1#a1000

Case Study 2: Car Share Derbyshire is an internet-based car sharing program that matches up potential sharers with people who are offering or require a lift. The program is available to any member of the general public within Derbyshire to use, including those who don't drive. Individual companies and organisations paying a contribution fee have a closed network set up which only allows people belonging to that organisation to use it.

The scheme, which includes a website, was set up in 2003 by High Peak Borough Council (HPBC) with funding assistance from the Countryside Agency and Derbyshire County Council (DCC). It is now operated by Liftshare.

The benefits of car sharing include a better environment and saving money as the cost of travelling is shared by others. Reducing the number of cars on the road reduces congestion and decreases the problems associated with air pollution. It also provides a real solution to reduced provision of public transport in some rural areas.

DCC has seen an increase in active car share users since 1997 and the percentage of employees' single occupancy car journeys has decreased as a result of the scheme. Since January 2008 the county council's closed network, which has a total of 238 members, delivered an estimated total annual saving (all users) of £51,361; 53,497 litres of fuel; 411,899 miles driven and nearly 203 tonnes of CO_2.

Benefits of car-sharing are being promoted to large organisations across Derbyshire including district and borough councils and hospitals, to increase the scheme's uptake.

DCC aims to increase car sharing through greater marketing and promotion of the new web-based system and the provision of a greater number of designated car-share spaces at county hall.

http://www.liftshare.org/uk/comstart.asp
www.carsharederbyshire.com

6.3. Waste Management and Resources

"As a society we are consuming natural resources at an unsustainable rate. If every country consumed resources at the same rate as the UK does we would need three planets to live on[51]. The most crucial threat is from dangerous climate change"[52].

DEFRA's stark statement sums up the situation in the UK which every year generates 100 million tonnes of waste from households, commerce and industry. It further suggests that successful implementation of the Waste Strategy for England 2007 will reduce greenhouse gas emissions by 9.3 million tonnes of carbon dioxide equivalent (CO_2e) every year. This is equivalent to the annual use of around 3 million cars. The minimisation and

[51] See the Glossary for a fuller explanation of 'One Planet Living': http://www.oneplanetliving.org/

[52] Waste Strategy for England 2007, Executive Summary, p1, DEFRA.
www.defra.gov.uk/environment/waste/strategy/

management of waste resources is therefore an area where large greenhouse gas savings can be made both at organisational and individual levels.

In Derbyshire, all local authorities, including the county council as the waste disposal authority, the district and borough councils as collection and recycling authorities and Derby City Council, as a unitary authority carrying out both collection and disposal functions, work in partnership to manage waste resources effectively, promoting minimisation, re-use and recycling of waste resources and ultimately the safe disposal of household waste to landfill.

No-where is this more in evidence than in Derbyshire's Joint Municipal Waste Management Strategy – "Looking After Derbyshire's Waste"[53] which provides a framework for strategic decisions to be taken on the management of Municipal Solid Waste (MSW)[54] in the whole of Derbyshire over the next 20 years.

In 2006/7, Derbyshire's 318,000 households (administrative county) generated more than 370,000 tonnes of waste. This equates to just over 1 tonne of waste per year or 22kg per week for each household. Currently 31.6% of this total is recycled or composted. But around two thirds of the remaining waste which is biodegradable, is sent to landfill, contributing around 71,315 tonnes of CO_2e to the carbon burden of Derbyshire[55].

This is equivalent to the greenhouse gas emissions of every one of Derbyshire's 374,000 cars driving 667 miles a year[56] showing that changes in householder practice have the potential to make significant contributions to reducing the carbon footprint of the county.

A plethora of EU and UK legislation is driving the waste agenda forward. Whilst measures are in place to improve household recycling and composting rates, the UK Government has also produced targets to reduce MSW sent to landfill. By 2010 the amounts of Biodegradable and Municipal Waste (BMW)[57] sent to landfill should be 75% of the 1995 figure. In 2013 this amount reduces to 55% and by 2020 we are required to reduce the amount of BMW sent to landfill to 35% of that produced in 1995. Achieving these rates will contribute to a reduction in greenhouse gas emissions through more effective waste minimisation, composting, recycling and treatment of biodegradable waste schemes.

Whilst all local authorities in Derbyshire are working in partnership to meet these targets, municipal waste arisings in the county are predicted to reach 470,000 tonnes per annum by 2020, based on current and forecast growth levels, contributing to additional burdens on waste management and adding significantly to greenhouse gas emissions. Adherence to the recommendations of the waste hierarchy is clearly necessary and continued

[53] http://www.derbyshire.gov.uk/Images/Strategy%20web%20version_tcm2-89570.pdf

[54] Municipal Solid Waste is that collected from households, commercial premises and from street cleaning and fly tipping, by Waste Collection Authorities (districts and Unitaries), and collected at Household Waste Recycling Centres which are operated by Waste Disposal Authorities (counties and unitaries), and some third party collections, for example by voluntary groups.

[55] Information and methodology provided by the Centre for Alternative Technology, Machynlleth, Wales. http://www.cat.org.uk/information/catinfo.tmpl?command=search&db=catinfo.db&eqSKUdatarq=InfoSheet_CompostingForClimate.

[56] Ibid.

[57] Biodegradable Municipal Waste is that part of the waste stream which is biodegradable, for example paper and green waste.

encouragement through educational and practical initiatives to reduce waste, the way forward. Both public and private sector organisations, dealing with their waste through the best practicable environmental option (BPEO), are likely to make significant financial savings as well as reduce their own organisation's carbon footprint.

There is no substitute however, for not producing the waste in the first place. The National Academy of Science in the USA estimates 99% of original materials used in production or contained in goods produced in the USA become waste within 6 weeks of sale[58].

We all have a responsibility to avoid producing waste through more effective purchasing and procurement activities and applying pressure through the supply chain to reduce the carbon footprint of our suppliers and contractors.

Applying the waste hierarchy (detailed below) to corporate activities, using the BPEO principle, will lead to more effective waste management practices.

- **Eliminate**: the waste by not producing it: including reducing unneccessary packaging.
- **Reduce**: the waste by buying fewer goods and buying goods with less packaging.
- **Re-use**: make opportunities to re-use items normally thrown away after their initial use. For example: Take unwanted clothes, books, china etc. to the local charity shop or advertise on Freecycle[59].
- **Recycle**: Many items can now be recycled through many different routes. See Derbyshire County Council's website[60] and Derbyshire district and borough council websites.
- **Compost**: Composting kitchen and garden waste can reduce waste by over 30% and the compost produced is a useful soil improver.
- **Recovery**: Where possible the energy or other value of the remaining wastes should be recovered prior to considering the disposal option.
- **Disposal**: It is recognised that there will always be some need to dispose of some residual wastes; however, the landfill option should only be considered once all possible processes in the waste hierarchy have been applied.

Significant amounts of waste are also produced by both public and private sector organisations in Derbyshire. With an estimated county-wide tonnage of waste produced of 4.5m tonnes per annum, it is vital that partners introduce minimisation, reuse and recycling initiatives to massively reduce the waste produced in the first instance and to reuse, recycle and recover unavoidable waste.

In addition, householders and individuals can do much to reduce waste by engaging in recycling and composting activities.

Partners are encouraged to adopt the waste hierarchy in their operations which will lead to increasing resource efficiency and reducing waste and carbon emissions ultimately leading to operational and financial savings.

[58] Paul Hawken, quoted in E. U. Weizsacher, et al, Factor Four – Doubling Wealth, Halving Resource Use, Report of the Club of Rome, 1997, (See Appendix Five)

[59] http://www.freecycle.org/search

[60] http://www.derbyshire.gov.uk/environment/rubbish_waste/

Case Study 3: Minimizing, composting and recycling wastes in Derbyshire

Waste collection and disposal authorities in Derbyshire are working with other partners throughout the county to devise and establish a wide variety of schemes that help reduce the waste that we all generate. Over 46,000 home composters have been sold in the county in the last three years at heavily discounted prices through the Recycle Now! initiative. This has helped many thousands of householders to compost their garden waste and fruit and vegetable peelings to use as garden soil conditioner rather than the waste going to landfill. In addition, Derbyshire's local authorities have provided a further 150,000 green wheeled bins for household garden waste, which can be composted rather than sent to landfill.

Derbyshire County Council is now analysing its own wastes and is establishing various pilot schemes which will help to reduce and recycle office paper, recycle ink cartridges, toner cartridges cardboard, cans, CDs and plastic bottles. These initiatives are currently being extended into area offices, schools and depots around the county to enable full recycling schemes to be established.

Pilot schemes are also being developed in Derbyshire introduce recycling facilities for Tetra Pak drinks cartons and batteries. Additionally, some local authorities are developing pilot recycling services for businesses to enable them to reduce waste sent to landfill.

All local authorities in Derbyshire are working hard together and with their partners to develop and provide more and more opportunities for us all to minimise the wastes we generate and realise the value in our waste resources through reusing, recycling and composting.

http://www.derbyshire.gov.uk/environment/rubbish_waste/default.asp
http://www.recyclenow.com/

6. 4. Procurement

In the UK, the public sector spends around £248 billion pounds per year. In Derbyshire this translates to an estimated £3,090 million per year, some of which, particularly equipment and consumables has a direct carbon impact through its manufacture and usage.

In general terms consumers have the ability to make sustainable choices through the products and services they buy. In the same way the public sector, with its capital, procurement and operational expenditure choices has enormous potential to promote sustainable development and reduce climate impact.

In March 2007 the Government presented a package of actions to deliver the step change needed to ensure that both supply chains and public services will be increasingly low carbon, low waste and water efficient, protect and enhance biodiversity and deliver wider sustainable development goals (See the links in the case study box).

The procurement process is key function in tackling climate change for the public sector. This will be reflected in sustainable procurement policies, performance frameworks and procurement practices, including working with supply chains to provide innovative and sustainable solutions.

In practical terms for individual organisations, the process of procuring more sustainably and to reduce climate change impact is complex. It ranges from decisions on purchasing, say, paper made from 100% post-consumer waste and renewably generated electricity as opposed to brown electricity, to commissioning large contracts leading to regeneration of a local area. The tendering process could also be used to ensure that others who provide services for us are using low emission vehicles and saving energy on processing.

However, much progress can be easily made, as specified in the Quick Wins 2007[61] document. Key decisions for partners can also be used to support economic development and community strategies containing commitments to source locally.

Benefits to organisations carrying out sustainable procurement to mitigate climate change include:

- more efficient and effective use of resources, including reductions in waste and greenhouse gas emissions.
- financial efficiencies in the long term especially with invest to save initiatives.
- minimised future environmental and climate change liabilities.
- reduced corporate risk.
- enhanced business reputation.

Partners should consider applying sustainable procurement principles to commissioning services to support the Local Area Agreement.

[61] **Procurement Quick Wins 2007**
http://www.sustainable-development.gov.uk/publications/pdf/QuickWins2007vr3.pdf

Case Study 4: Progress in Local Authority sustainable procurement practices

The Nottinghamshire and Derbyshire Local Authorities' Energy Partnership (LAEP), which includes all local authorities in Derbyshire (and Nottinghamshire), started an initiative in conjunction with Nottinghamshire County Council in 2006, designed to assess the progress of sustainable procurement practices developed by each local authority in the East Midlands region, using LAEP local authorities as a pilot study. The project was supported financially by the East Midlands Regional Centre of Excellence for Procurement (EMRCE).

Progress towards sustainable procurement in each authority was measured against a sustainable procurement matrix 'The Flexible Framework' developed by the Sustainable Task Force as part of the Government's Sustainable Procurement Strategy.

Examples of best practice in local authority sustainable procurement practices are now showcased to share with partners across the region and the wider UK on the Sustainable Procurement Information Network website.

Following this work, the EMRCE has invited authorities and partners from across the East Midlands to deliver a regional approach to Sustainable Procurement. Derbyshire County Council has a place on the project board and is working with partners to develop the bid to access funding. If successful, there are a number of targets that will be delivered including assistance for local authorities to reach level 1 and work towards level 3 of the Flexible Framework. In addition, work will also be taking place with Small and Medium Enterprises (SMEs) and local suppliers in a delivery programme for supplier development and engagement with local authorities.

Sustainable Procurement Information Network: http://www.s-p-i-n.co.uk/

Sustainable Procurement Task Force: Procuring the Future: http://www.sustainable-development.gov.uk/publications/procurement-action-plan/documents/full-document.pdf

Sustainable Procurement Action Plan: http://www.sustainable-development.gov.uk/publications/pdf/SustainableProcurementActionPlan.pdf

Environment Agency Environmental Purchasing
http://www.environment-agency.gov.uk/commondata/103603/1

7.0 Mitigation and Adaptation

The following themes, issues and controls can have both an impact on climate change and need consideration of service planning to adapt to a changed climate. They include:

- Planning, land-use and regulation
- Housing and fuel poverty
- Water resources
- Economic development and business activity
- Derbyshire communities
- Agriculture and farming

7.1. Planning, Land Use and Regulation

The new planning system of Local Development Frameworks (LDFs), introduced in 2004, changed the way in which local planning authorities (LPAs), including in Derbyshire the Peak District National Park Authority, plan for future development and the needs of their communities. Tackling climate change is a key priority for the new system which provides a powerful tool in enabling us to limit and adapt to climate change. It regulates development in the public interest exercising influence and control over land use and design aspects of proposed development. Increasingly, it is supported by revised national planning guidance set out in a number of Planning Policy Statements (PPS) and other documents which relate to sustainable development and climate change.

Planning Policy Statement 1 (Delivering Sustainable Development)[62] together with a supplementary paper on Planning and Climate Change published in December 2007[63] sets out how planning should contribute to reducing emissions, stabilise climate change and take into account its unavoidable consequences. It also describes how spatial planning at regional and local levels can determine location, siting and design of new development and can contribute both to the reduction of emissions and the delivery of zero carbon development and to the shaping of communities where vulnerability is minimised and which are resilient to the climate change now accepted as inevitable[64]. A working draft of Guidance that will accompany PPS Planning and Climate Change has been published[65].

PPS 1 and PPS 25 (Development and Flood Risk)[66] also require regional planning bodies and local planning authorities to ensure that development plans contribute to global sustainability by addressing the potential of climate change impacts, such as consideration of flood risk in the location and design of development through the production of Strategic Flood Risk Assessments (SFRAs), which refine information on areas that may flood, taking into account sources of flooding and the impacts of climate change. In addition, the promotion of water efficiency and use of sustainable urban drainage systems also need consideration.

Other Planning Policy Guidance (PPG) such as PPG 13 on Transport[67], whose objectives are to integrate planning and transport at the national, regional, strategic and local levels and to promote more sustainable transport choices both for carrying people and for moving freight, and PPSs such as PPS 9 on Biodiversity and Geological Conservation[68]

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62 http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps1/

63 http://www.communities.gov.uk/documents/planningandbuilding/pdf/153119

64 Building a Greener Future – Towards Zero Carbon Development (DLGC December 2006) http://www.communities.gov.uk/documents/planningandbuilding/pdf/153125

65 http://www.erm.com/practiceguidance "

66 http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps25/

67 http://www.communities.gov.uk/publications/planningandbuilding/planningpolicyguidance6

68 http://www.communities.gov.uk/publications/planningandbuilding/pps9

and PPS 22 on Renewable Energy[69] will guide the planning process in contributing to greater sustainability including mitigation and adaptation to climate change.

The development of Supplementary Planning Guidance (SPG) or Supplementary Planning Documents (SPD) under the new LDF arrangements allow LPAs to cover a range of issues, thematic or site specific and provide further detail of policies and proposals in the 'parent' LDF. An existing example in Derbyshire is the SPG on Renewable Energy developed by the Peak District National Park Authority. It may be appropriate for Derbyshire LPAs to consider developing such documents to further inform the planning process on energy use and renewables provision in the wider climate change agenda.

National planning guidance feeds into the development of the East Midlands Regional Plan which provides the statutory framework for the preparation of documents for Local Development Frameworks by county, borough, district and unitary councils.

Addressing climate change is central to the draft Regional Spatial Strategy (RSS) which aims to reduce the causes of climate change by maximising resource efficiency, promoting the development of renewable energy generation promoting sustainable design and construction and encouraging patterns of new development which reduce the need to travel. The RSS also contains targets for enhancing biodiversity and green infrastructure policy. This strategy is therefore the first stage of a process to reduce the impacts of climate change, in particular the risk of damage to life and property from flooding, by decisions on location, design and construction of new developments.

The National Planning Forum's Good Practice Guide on Climate Change[70] provides a brief overview of relevant policies and tools, showing that most of the PPSs which exist link to the impacts of planning on climate change. Also, the Government's Planning Response to Climate Change 'Advice on Best Practice'[71] provides planning professionals with an overview of the current thinking and state of knowledge on planning and climate change, including a climate-sensitive development checklist.

Climate change is not granted special consideration over other land use planning objectives and but must be considered amongst other policy issues to balance the needs of the locality. Many of these policies, including encouraging mixed developments, reducing demand for travel, reducing social polarisation, adoption of renewable energy resources and improving the quality of life for people in Derbyshire are fundamentally in line with policies supporting action for climate change.

Section 106 Agreements have been used to secure those items which are necessary to render a planning application acceptable, but which cannot be required as a condition of the planning permission. These could be used to implement measures within a development which reduce its climate impact, secure climate change adaptation and which promote more sustainable development. For example, requirements relating to energy efficiency and integrated renewable energy installations in buildings, green infrastructure and the delivery of biodiversity targets would reduce climate impact within a development.

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[69] http://www.communities.gov.uk/publications/planningandbuilding/pps22)

[70] http://www.idea.gov.uk/idk/aio/1203535

[71] http://www.communities.gov.uk/documents/planningandbuilding/pdf/147597

Section 106 agreements can also provide for potentially huge changes in travel habits. For larger developments, they can provide funding for the development and implementation of business and residential travel plans in order to reduce car travel.

Additionally, public transport improvements can be provided for a development. Such developments can be phased, in conjunction with an agreed number of units being completed, when a bus service can begin to operate through the development. This will ensure that the bus service and associated facilities are on site before new occupants develop their travel habits and buy their second or third car. Such developments can be funded over a number of years on a reducing basis so that by the end of the 5 – 10 year funding period, the additional (or amended) bus services are commercially sustainable.

The potential to reduce both climate impact and risk is huge if Section 106 Agreements are used in this way.

The Planning Bill has proposed enabling powers to establish the Community Infrastructure Levy, giving local authorities the ability to 'charge' developers in order to support infrastructure delivery. The Levy's overall purpose is *"to ensure that development contributes fairly to the mitigation of the impact it creates: to ensure that development is delivered, and in a more sustainable way" [72]. It would cover not just strategic and transport infrastructure but also adequate local facilities to serve families such as schools, parks, health centres; good public transport and provision for pedestrians and cyclists; and flood defences to protect development from the impact of climate change.

The Code for Sustainable Homes[73] was introduced in December 2006 to drive a step change in sustainable home building practice. It provides a standard for key elements of design and construction which affect the sustainability of a new home. It will also form the basis for future improvements to the Building Regulations[74] in relation to carbon emissions from, and energy use within, homes, offering greater regulatory certainty to developers.

The Code will also complement the system of Energy Performance Certificates[75] which was introduced in June 2007 under the Energy Performance of Buildings Directive (EPBD) which itself requires that all new homes have an Energy Performance Certificate, providing key information about energy efficiency/carbon performance of homes.

The Code's limitations include its voluntary status and arguably its recommendations for sustainable standards which do not reach the status of the best available within the UK. Notwithstanding this, the current Building Regulations are mandatory and in addition the Government has deemed that all new homes in England will be carbon neutral by 2016. Other targets have been set for low-carbon homes before that date, for example Eco Homes Level 3 by 2010[76].

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[72] The Community Infrastructure Levy, DCLG January 2008 - http://www.communities.gov.uk/publications/planningandbuilding/infrastructurelevyguidance

[73] http://www.planningportal.gov.uk/england/professionals/en/1115314116927.html

[74] http://www.communities.gov.uk/planningandbuilding/buildingregulations/

[75] http://www.energysavingtrust.org.uk/housingbuildings/localauthorities/newsitems/EPClaunch/

[76] The Eco-Homes Standard is an environmental rating for homes. This straightforward, flexible and independently verified assessment method seeks to improve the overall environmental performance of new and existing homes. It forms part of the Building Research Establishment's (BRE) suite of environmental assessment tools. http://www.sustainablehomes.co.uk/ecohomes.htm

This climate change strategy for Derbyshire has its roots in partnership working which can provide additional benefits when planning and other policies are applied more consistently by neighbouring authorities and other organisations. This enables best practice to become mainstreamed. This consistency also provides developers with clear indications of the environmental standards which will be required. By including adaptation to climate change measures within policy decisions, all planning authorities are acting to safeguard buildings against future climate risks which will increasingly be reflected in the economic and social wellbeing of Derbyshire.

Planning and other policies which support Eco-homes and BREEAM[77] standards, incorporate the Merton Rule[78], provide a climate risk assessment and demonstrate the use of whole life costings analysis, are those which will have the greatest impact on reducing climate impact and risk throughout Derbyshire. They also provide the proper framework for advancing best practice for all new developments.

Together these documents can be used to control and influence land use and development to favour the reduction of greenhouse gas emissions and promote development which is adapted to a changing climate.

It is expected that the planning system, the Code for Sustainable Homes and the building regulations together will work to achieve some of the desired climate change outcomes.

Whilst adherence to the principles of planning and design contained in these documents will assist in mitigating future potential carbon emissions the planning system also needs to consider the actual design of whole developments in order to decrease the risks, and improve the future quality of life of users. A recent Town and Country Planning Association report[79] suggests that small-scale green spaces, such as private gardens, small parks and large canopy trees, can make a big difference to mitigate rising surface temperatures. Green spaces, particularly in urban areas, enable water evaporation which acts to cool the air. Whereas hard surfaces such as roads or buildings are more likely to retain heat and contribute to flooding.

There is recognition in the report that buildings and design of developments must be adapted to cope with uncomfortably high temperatures, strain on water resources, less and less stable ground conditions and more flooding.

There is no doubt that the Local Authority planning system and associated regulation has a crucial role to play in addressing climate change. Not only should there be detailed core strategy policies on climate change but this is the fundamental issue on which the local development framework should be built and, on that basis, climate change needs to inform all policies within the core strategy, whilst achieving Key Planning Objectives set out in the supplement to PPS1.

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[77] http://www.breeam.org/page.jsp?id=41

[78] The 'Merton Rule' is the groundbreaking planning policy, pioneered by the London Borough of Merton, which requires the use of renewable energy onsite to reduce annual carbon dioxide (CO_2) emissions in the built environment http://www.themertonrule.org/

[79] *'Green spaces mitigate climate change'*, Town and Country Planning Association, reported in 'Planning Resource, 24 September 2007.

Case Study 5: Incorporating carbon reduction requirements into the planning process

High Peak Borough Council is currently selling a piece of land for a housing development of around 100 homes. When the sale was advertised, the planning team drew up a Concept Statement for the site, setting out requirements for any development on the land. The statement included the stipulation that all homes are to be built to Code for Sustainable Homes (CSH) level three and that 10% of the homes' predicted energy demand must be generated on site by renewable means.

The concept statement stated that sustainable design should be a fundamental part of the scheme and the development should be designed to mitigate and adapt to the causes and effects of climate change. The statement included a requirement for the development to be designed and laid out to maximise the potential for passive solar gain.

Issuing a detailed concept statement at the time that the site was advertised meant that all bids received incorporated the Council's sustainable design requirements into the proposed site layouts, house types and costings included with the tenders.

The council has now given outline planning approval for the site which includes the condition that the development will achieve level 3 of the CSH. The homes will be also be fitted with solar hot water panels. As 50% of the units on site will be affordable homes, this will make a valuable contribution to affordable warmth for residents.

The council continues to negotiate over the selection of the preferred bidder for the land, but treating the sale in this way has guaranteed that the final development will contribute towards mitigation of carbon emissions.

This process has also helped the council to understand how to incorporate CSH criteria into the tendering process so that developers take the concept seriously and clearly understand the weighting given towards these issues during the tender stage. The process has also given the council a greater understanding of the additional development costs involved in meeting CSH levels and what to expect in the future as it strives for higher CSH levels. The project will send a signal to other developers and local residents that this level of code is achievable.

7.2. Housing and fuel poverty

Together Britain's 25 million homes are responsible for emitting around 28% of the UK's total CO_2 emissions. The average UK home emits more greenhouse gases every year, mostly as carbon dioxide, than a car doing an estimated average annual mileage of 12,000 miles (19,200 kms). These emissions come from natural gas, used for heating and cooking and combustion in power stations to produce electricity for homes; space heating accounts for 57%, water heating a further 25%, cooking 5% and lights and appliances 13%[80].

[80] http://www.admin.ox.ac.uk/po/050323.shtml

In Derbyshire there are 381,765 homes in both public and private ownership and in the private rented sector. According to the Best Foot Forward method of carbon emission calculations, average carbon dioxide emitted per dwelling per year is 4814 kilograms. This produces an estimated carbon dioxide total around 1.8 million tonnes of CO_2 per annum[81]. (See figures 4 to 7.)

The Home Energy Conservation Act 1995 [82] (HECA) has served to focus the attention of local authorities more closely on the energy efficiency of all residential accommodation, developing an integrated approach to their housing and energy efficiency strategies. It is for this reason that homes in the publicly-owned social sector are most likely to meet or exceed current energy efficiency standards set by the building regulations. It is estimated that 98% of housing association properties meet these standards whereas in the private sector only 2% of properties comply. There is clearly a need to raise awareness, amongst private sector owners both in the owner-occupier and rented sectors, of the urgency of increasing energy efficiencies within all the existing housing stock in order to meet the Government's target of cuts of 60% of greenhouse gas emissions by 2050.

Community leadership responsibilities could be exercised to this effect. It is argued in 'The 40% House' report[83] that this needs to be backed up with specific Government policies. The report also argues that in implementing these requirements it will be possible to have both a higher standard of living and reduce the threat of climate change.

Over the coming years the UK government will be embarking on a massive new house building programme based upon a predicted increase in demand from a growing population and a trend to decreasing household size. Additional homes will be needed across Derbyshire, including affordable housing, in the coming decades. Increased demand will increase energy use, leading to further increases in CO_2 emissions. However, this represents a critical opportunity to reverse the trend of growing emissions from homes as well as reduce their embedded energy and energy used in their construction and the transport of building materials.

All new homes in the UK should be built to the highest possible environmental standards and indeed it is the Government's intention that all new homes will be carbon neutral by 2016. It is technically feasible for this process to begin immediately with a consequent reduction in the UK's future carbon burden. The extended use of district CHP schemes could assist in this process but it is also possible that homes could be built to zero carbon emission standards now, with building integrated renewable electricity generating facilities exporting excess electricity to the national grid. The planning system could be used to further this process and the enactment of the Climate Change Bill will provide the necessary legislative support to drive new development towards this end.

The introduction of central Government fiscal policies could be used to assist action to increase energy-efficiency standards for the current UK housing stock, including financial incentives and further grants provided, in addition to those such as Warm Front, to encourage energy efficiency improvements in existing buildings. Energy-efficient housing could also be eligible for reductions in council tax and stamp duty. It has also been

[81] http://www.bestfootforward.com/

[82] The Home Energy Conservation Act 1995
http://www.defra.gov.uk/environment/climatechange/uk/publicsector/localauth/heca95/index.htm

[83] The 40% house: http://www.eci.ox.ac.uk/research/energy/downloads/40house/40house.pdf

suggested that a zero-VAT rating on energy-efficient building and insulating products would encourage greater uptake and reduce climate impact.

In addition to potential reductions in carbon dioxide through a combination of construction and maintenance, design and energy performance of buildings as well as occupant behaviour needs to be addressed in the context of climate change, with particular emphasis on the adaptive potential of buildings.

Improvements to energy efficiency in all housing could also end fuel poverty and bring other attendant benefits such as improvements in health and potentially additional disposable income. This in turn could have positive benefits to the local economy of communities with potentially increased spending power. The requirement to improve housing to improve health might be developed through the medical prescription system, where it is possible for a GP or other medical practitioner to prescribe energy efficiency improvements to bring about commensurate improvements in the health of a dwelling's occupants.

Case Study 6: Improvements in council housing energy efficiency.

One of High Peak Borough Council's four corporate aims is to 'enhance the quality of the local and global environment'. To meet this aim the council and its partners deliver a range of environmental projects within the strategic framework provided by the Eco-Management and Audit Scheme (EMAS).

The council takes responsibility with EMAS for the delivery of sustainable energy initiatives as its contribution to managing the impacts of climate change, fuel poverty, energy efficiency, fuel costs and air quality. In March 2001, High Peak Borough Council became the 12th EMAS accredited council in the UK and as more councils are now adopting EMAS, the Borough is confident in its ability to demonstrate its strategic approach to managing sustainable energy issues in a holistic way through this process. The council's focus is on generating financial, health and energy related benefits for the wider local economy and community.

As part of this programme High Peak Borough Council has improved the Standard Assessment Procedure (SAP) rating of council-owned dwellings from 54 to 72 in 2005/2006 (Best Value Indicator 63) over 3 years, placing the council in the top quartile nationally.

The high SAP rating has been achieved using a number of initiatives which include:

- replacing electric heating systems with gas-fired systems
- installing high standards of cavity wall and loft insulation
- converting sheltered housing-block boilers to condensing gas boilers
- replacing back boilers in other council housing with condensing gas boilers
- installing double glazing, improved, heating controls, thermostatic radiator valves (TRVs) and compact fluorescent lighting (CFLs) for all properties
- providing energy efficient information and advice to residents in a handbook.

High Peak Borough Council has spent some £6 million via the capital programme on improving its housing stock in the Borough over the last few years.

Standard Assessment Procedure: http://www.sapratings.com/home.html

7.3. Water resources

The impacts of climate change on freshwater systems and their management are mainly due to the observed and projected increases in temperature, sea level, and precipitation variability[84]. Climate and freshwater systems are interconnected in complex ways; any changes in one of these systems, induces a change in the other. Changes in population, lifestyle, economy and technology and in particular food demand, coupled with climate change impacts may require serious and continuing adaptations in the management of water resources.

Worldwide the IPCC Working Group 2 report[85] says that the most serious effects of climate change on human populations will be through impacts on the world's water.

[84] http://www.ipcc-wg2.org/ page 175

[85] http://www.ipcc.ch/ipccreports/ar4-wg2.htm

In the UK some of the expected climate impacts will be characterised by:

- warmer and drier summers leading to more summer water shortages and potential droughts with the higher temperatures leading to a greater demand whilst the overall water supply falls.
- greater costs imposed on the economy and on communities and greater stresses on the environment and ecosystems as river and groundwater levels fall.
- more intense storms, particularly in summer where short bursts of heavier rainfall could cause flash flooding on already parched ground and in watercourses, harming biodiversity.
- unusual weather events such as the heavy rainfall across large areas of the UK in summer 2007.
- milder, wetter winters leading to the potential for increased flooding – six of the seven rivers used by the Environment Agency to indicate flooding show an increase in frequency of peak river levels.
- deteriorations in water quality due to lower river flows and potential increases in concentrations of agricultural chemicals such as nitrates.
- potential for deterioration in health caused by greater numbers of nutrients, pathogens and toxins being washed into water bodies during more intense rainfall.
- permanent damage from widely fluctuating levels in watercourses, harming biodiversity, causing odours, and possibly concentrating pollutants.

Derbyshire can begin to adapt to a changed climate by adopting a new approach – the use of water cycle studies – which support the provision of sustainable urban areas in relation to supply of drinking water, disposal of storm and wastewater and impacts on downstream rivers. Water cycle studies adopt an integrated approach to water infrastructure planning which helps all stakeholders meet the challenge of urban growth, climate change and the tightening of water quality standards, for example, through the Water Framework Directive.

Such an approach could incorporate a water hierarchy, similar to the energy hierarchy mentioned above, by enabling action on the following:

- assessing future water demands; sustainable urban drainage systems and rainwater harvesting systems need to be considered in the early stages of planning for development and beyond that, need to be nested within planning authorities' Local Development Frameworks.

- reducing demand for water not only conserves water it also reduces the greenhouse gas emissions from the energy used to treat and transport water and deal with wastewater. The water industry uses around 3% of the total UK energy supply and contributes around 4m tonnes of CO_2 each year to the atmosphere[86].

- using water more efficiently. This would reduce the daily average of around 147 litres per individual in the UK[87]. There are many simple measures individuals can take to reduce demand such as installing water saving devices, water butts, taking showers instead of baths, turning taps off during teeth brushing. The installation of domestic

[86] UK water industry figures: www.water.org.uk

[87] www.ofwat.gov.uk

water meters is likely to become more commonplace although protection of vulnerable households is vital.

Both the public and private sectors can do much to reduce demand by installing a number of water saving devices. Well maintained buildings and employee education are key areas to reduce not only water demand but demand for other resources as well.

Activity could also include:

- increasing the resilience to lower water availability by involving resource planning by water companies to assist in the adaptation to climate change. The population in Derbyshire is projected to increase by 5% by 2016[88]. Assuming no increase or decrease in current demand, water companies need to take account of this 5% rise which will mostly be concentrated in South Derbyshire. This alone will increase stress on the county's water resources.

- securing the supply of water in conserving and developing water resources. The Environment Agency is developing a new water resources strategy for publication in 2008 which will be an effective tool in the future management of water resources. Such an approach may also need to consider the landscape implications of providing additional reservoirs in upland areas.

- making plans to prepare for potential extreme drought conditions. To reduce their impact, water companies have to produce drought plans. Other organisations need to develop emergency response strategies and measures to cope with both drought and flooding.

- planting drought resistant or shade giving plants in parks, gardens, and gardens attached to publicly owned buildings which care for older and more vulnerable people.

- creating larger more robust wetland habitats to safeguard biodiversity from drought and floods events, and to act as water storage to reduce flood risk.

- improving moorland catchment areas and encouraging better soil management practices to reduce run-off, erosion and to channel water appropriately.

- installing measures to enable rainwater harvesting and where possible, to encourage grey water recycling.

Increasing water demand in Derbyshire and particularly the Peak District could arise from increased tourism with people taking advantage of warmer summers. These areas are already recognised as significant tourist destinations.

Derbyshire is already experiencing the impacts of climate change and its effects on water resources. Both droughts and floods have been experienced in recent years. In addition, the effect of climate change on insurance premiums needs to be assessed. Increases in insurance premiums to cover claims for damage brought about by climate change can be

[88] Source: 2004 Revised ONS population projections and mid-2006 population estimates http://www.statistics.gov.uk/

expected; for instance in the UK in 2003, soaring temperatures combined with low rainfall doubled the previous year's insurance claims for subsidence to £390m[89].

Taking advantage of opportunities relating to water and climate change could mean both the public and the private sector benefiting from increased efficiencies in water usage. Also businesses involved in designing and manufacturing water saving or water efficient products could benefit from increased market reach.

Case Study 7: Wastewater Recycling – Toyota Motor Manufacturing (UK) Limited

Toyota recognises the value of water and puts water consumption in its top five corporate environmental key performance indicators.

Toyota's project tackled the handling of wastewater discharged from the car painting process at the company's Burnaston plant in Derbyshire. After treatment in a reverse osmosis plant, recycled water is used in the factory's boilers and compressors. Some 72,500 cubic metres of water are recycled in a year.

The installation took place in August 2004. The new plant takes wastewater discharged from the paint coating process and pumps it through overhead pipes to a treatment plant. If the quality is acceptable, the water enters a 75 cubic metre storage tank and passes through a series of filters to further improve its quality. This water then transfers to a holding tank that supplies water to a compressor for cooling, and to boilers to produce steam that heats processes in the paint shop.

Fully operational since 2005, the total water consumed by the site has dropped from 679,000 to 554,000 cubic metres per year. This represents an 18% water saving even though vehicle production has increased. Water consumption per manufactured car is down from nearly three cubic metres to just under two. Total site discharge to foul sewers has also reduced by 19%. Added benefits include increased efficiency of the compressor and boilers, reduced labour costs and elimination of the need for descaler chemicals and hydrochloric acid previously use to soften the water.

The project has reduced water costs at the factory by more than £100,000 a year and will return start-up costs in under five years. Toyota plans to install further reverse osmosis plants in other parts of its business as part of its five-year plan to further reduce water consumption.

As a result the project achieved 'finalist' status in the 2007 Environment Agency Water Efficiency Awards.

http://www.environment-agency.gov.uk/commondata/acrobat/wea2007_final_1727685.pdf

[89] Contracts Journal, Plant News, p20, 28 June 2006, http://www.asuc.org.uk/Documents/CJ29Jun06.pdf

7.4 Economic Development and Business Activity

"Climate change… is the greatest and widest-ranging market failure ever seen."
Stern Review October 2006

In the UK, business and commercial activity produces around 39% of carbon emissions directly from production processes and from the service sector and of course, from its own corporate property and facilities. In addition, further emissions are produced by transporting raw materials and goods in finished and semi-finished states both within and across the UK's borders. Within the UK total travel and transport produces around 30% of carbon emissions, which also includes leisure and commuting travel (see section 6.2 above).

This is set against some of the Government's key policy outcomes for economic development which are to:

- raise the productivity of the UK economy
- maximise job opportunities for all
- improve the economic performance of all English regions and reduce the gap in economic growth rates between regions
- deliver sustainable development, the key principles of which, including responding to climate change, are set out in Planning Policy Statement 12 and the annex to PPS1 on Climate Change
- build prosperous communities by improving the economic performance of cities, sub-regions and local areas, promoting regeneration and tackling deprivation.

Further, as set out in the *Review of Sub-National Economic Development and Regeneration*[90], the Government aims to support its economic growth objectives and tackle deprivation at every level, by empowering all local authorities to promote economic development and neighbourhood renewal, and better incentives for achieving economic growth and for ensuring disadvantaged areas gain benefit from and contribute to economic development.

These aims and objectives for economic development are entirely laudable, however, the key to sustaining such developments and to maintaining the level of economic activity already present in the UK, is to decouple economic development from carbon emissions[91] to avoid any growth in the economy being directly linked to rising emissions from the use of fossil fuels to power both existing and developing industry and commerce.
The consequences, mainly in financial terms, of not doing this are set out in the Stern Review (see footnote 1), commissioned by the UK Government and published in October 2006.

Stern estimates that the overall risks and costs of climate change will be equivalent to losing at least 5% of global Gross Domestic Product (GDP) each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more. In contrast the costs of action to reduce greenhouse gas emissions to avoid the worst impacts of climate change can be limited to around 1% of global GDP each year.

[90] http://www.hm-treasury.gov.uk/spending_review/spend_csr07/reviews/subnational_econ_review.cfm

[91] http://www.hm-treasury.gov.uk/media/2/1/climatechange_drjatooze_1.pdf

The Stern Review also recognises a £30 billion opportunity for British businesses to profit over the next 10 years as we adapt to the threats of climate change. These opportunities exist primarily for businesses in the environmental technology sector, such as waste management, renewable energy, pollution control and energy efficiency although there are distinct benefits from operating all businesses more efficiently by using these technologies to reduce energy and resource demands. Whilst the findings of the Stern Review could be applied to all economies in the world, what the Review doesn't consider is the issue of exported carbon emissions in the UK. It has been argued that calculated carbon emissions are not falling as rapidly as reported by the Government, because carbon emissions are being exported as manufacturing is located offshore, but the goods produced are still being imported into the UK[92].

The impact of Stern's projections on Derbyshire's economy will be focused on the county's major industrial and employment sectors, including manufacturing, distribution, hotels and catering, banking, finance and insurance. Carbon emissions for this sector in Derbyshire amount to 47% (See figures 1 & 4) of the total of 6.6 million tonnes, excluding those industries which are a part of the EU ETS.

In Derbyshire, the average size of a business unit is 11.9 employees, with small and medium-sized enterprises (SMEs) making up nearly 80% of the GDP. The challenge of helping the Derbyshire business sector adopt best practice and reduce the business carbon footprint will be linked to the challenge of providing information, training and follow-up support to SME's and micro-businesses. The Footprint Navigator Programme case study below illustrates one method of how this challenge can be approached.

In order to maintain market positions and ensure continuity, businesses need to mitigate climate change by reducing emissions of greenhouse gases and begin the process of adapting to operating in a changed climate. Applications of both the precautionary and polluter pays principles to economic decision-making in the context of climate change could support the mitigation of greenhouse gas emissions as well as climate change adaptation activities. The early introduction of national, and preferably EU-wide, carbon taxes are could focus attention away from purchasing decisions based on cheapness and convenience to the genuine development of a more sustainable local economy which is less reliant on oil. In addition, the rewarding of processes and activities which are zero-carbon or which move towards it is likely to change behaviour in the longer term.

The themes above, encouraging mitigation of carbon emissions through buildings, transport, waste management and procurement practices set out in Section 6.0 are as relevant for the business sector as they are for all public sector organisations. Planning for adaptation to a changing climate is the subject of an East Midlands Development Agency study into the potential impacts of climate change on the region's economy.[93]

[92] http://www.dieterhelm.co.uk/publications/Carbon_record_2007.pdf

[93] http://www.emda.org.uk/environment/default.asp

Case Study 8: The Derbyshire Footprint Navigator Programme

The Navigator programme operated by Groundwork Derby & Derbyshire was devised to bring Small and Medium Enterprises (SMEs) towards an understanding of Environmental Management Systems and provide knowledge and skills necessary to help reduce resource usage and minimise environmental footprint. Programmes are delivered as locally funded, locally managed clubs working with SMEs in groups of 8 to 10. The Navigator approach is accessible and flexible allowing 'clubs' to move at the pace of participating SME workers.

The programme begins with a confidential environmental audit of the company followed by a half-year programme involving seven half-day club meetings. Meetings focus directly on the problems identified in the audit and, under professional guidance, the group works towards finding and achieving solutions. Presentations from local specialists and experts who can add expertise and hands-on experience are factored in by the organisers as appropriate for each club of SME managers.

A new, more accessible programme 'Footprint Navigator' has been designed by Groundwork to help Derbyshire retailers and small charitable organisations to address their carbon footprint. Also run through local 'clubs' the programme will prepare traders and voluntary organisations for new regulations emerging from the Climate Change Act, obliging them to reduce their CO_2 emissions.

Source: Groundwork Trust Footprint Navigator programme. For further information see: http://www.gdd.org.uk/information/contactus.html

7.5 Derbyshire Communities

Communities, households and individuals have a crucial role in tackling climate change. The domestic sector currently produces around 27% of carbon emissions in the UK from activities such as heating, lighting and cooking. Further emissions come from commuting and leisure related travel, and additionally purchasing choices have further impacts on carbon emissions. There is much scope for householders to install insulation, to purchase energy efficient equipment, including cars, where appropriate and to make small but significant lifestyle changes such as walking instead of taking the car on short journeys. Further information can be found on the Energy Saving Trust website[94].

Many individuals in Derbyshire belong to community groups which are well placed to play a major role in tackling climate change, for example by raising awareness locally or through local projects on cleaner transport or the development of sustainable energy initiatives, although it must be said that many such community initiatives are still at the pioneering stage of this process. Many community groups look to their local authorities and national governments for support and assistance in this arena. Nonetheless, starting such as process can bring renewed community cohesion. All types of community groups can engage and make a difference to this agenda including neighbourhood groups, residents groups, sports or social groups, faith groups and tenants groups.

[94] http://www.energysavingtrust.org.uk/

Many communities have begun to make a difference through programmes such as the Energy Saving Trust's *Community Action for Energy* initiative[95] which is designed to promote and facilitate local community-based energy projects. Other communities, such as Bonsall, Winster, Wirksworth and Youlgrave, set up initially through a real concern about the environment and a desire to take local action, have been inspired by Ashton Hayes in Cheshire which declared it would be the first community in England to become carbon neutral. Each community has set up a sustainable energy project which is working towards bringing lower carbon benefits to each village.

A further exciting and very welcome development is the Transition Town[96] movement; a real grass-roots declaration by communities to plan for adaptation to climate change and peak oil by engaging in a 12-step process to reduce carbon emissions and adapt lifestyles to a changed climate and develop a more sustainable local economy in the face of declining availability of oil and rising prices for goods and commodities, including food. In Derbyshire, communities in both Chesterfield and Buxton have begun to engage in this process.

Whilst the role of communities is vital in meeting this agenda, it is recognised that communities and the individuals within them acting alone, will only be able to achieve a proportion of the mitigation measures required to reduce Derbyshire's total carbon emissions. Action by other sectors highlighted in Part Two of this strategy is also necessary.

There is much that the Partner organisations can do through their community leadership role to support communities and individuals taking action including using existing initiatives such as the DEFRA-funded 'Everybody's Talking About Climate Change'[97] initiative which is being brought to individuals schools and community groups, amongst others, as a way of raising awareness of climate change and realising a capacity for taking action on the issue.

In addition, Local Authorities in particular can use their place-shaping role to further encourage and support individuals and communities to take action on climate change, particularly groups who wish to develop sustainable and renewable energy initiatives within their communities.

[95] http://www.energysavingtrust.org.uk/cafe/welcome/

[96] http://www.transitiontowns.org/

[97] This project, a part of the DEFRA funded *Tomorrow's Climate, Today's Challenge* initiative is being run by the Nottinghamshire and Derbyshire Local Authorities' Energy Partnership consisting of all 20 local authorities in the two counties. (Case study somewhere else in the text) www.everybodys-talking.org

Case Study 9: Community Renewable Energy – Torrs Hydro at New Mills

In early 2007, Torrs Hydro New Mills Limited, was formed in New Mills in Derbyshire, to develop and own a hydro-electric scheme on Torr Weir on the River Goyt. A feasibility study was undertaken by Water Power Enterprises (a Community Interest Company) and discussed with the Town Council. After agreement with the Council the scheme now has planning permission and an abstraction license from the Environment Agency.

The technology installed is an Archimedes screw and it is hoped the installation will not only engender an interest from the community in sustainable energy and the threat of climate change but will also provide an educational resource and a boost to local tourism.

A community group at heart, membership of THNM Ltd also includes the New Mills Town Council and ownership of the project extends to anyone within and around the community who wishes to take out a share option.

Construction of the scheme began in March 2008 and the scheme, one of the first community owned renewable energy projects in the UK, is now generating renewable electricity which is being sold to the national grid. The net income from the scheme will be divided between a grant scheme for the economic regeneration of New Mills and the shareholders .

See www.torrshydro.co.uk. Contact Steve Welsh: steve.welsh@h2ope.co.uk or phone 01706 813663 for more information.

7.6. Agriculture and Farming

Farming contributes 7% of the UK's greenhouse gas emissions, including about 39% of methane released by natural livestock emissions and manure; around 67% of nitrous oxide emissions from the production and release of fertiliser and soil disturbance; and 1% of carbon dioxide, released from combustion of fossil fuels in tractors, farm vehicles, machinery and the production of agricultural chemicals and from changes in land use and land management.[98]

The projected changes in the climate in the UK will have impacts on farming. Changes in temperature, precipitation and length of growing season are already in evidence and; the latter can be expected to increase from 30 to 70 days in the north of the UK and from 50 to 90 days in the south by the 2080s.

There is considerable scope for mitigating greenhouse gas emissions within agriculture, from ensuring livestock is fed an optimal diet to reduce methane emissions (methane is a particularly potent greenhouse gas) to installing anaerobic digestion equipment.

Nitrous oxide, released from the production and application of fertiliser and from soil disturbance has a global warming potential of around 320. There are many ways in which these emissions can be minimised including: optimising fertiliser efficiencies; using manures and slurries more effectively including covering lagoons; applying fertiliser on damp days to increase absorption and reduce evaporation, but avoiding diffuse water

[98] Farming Futures fact sheet 1 http://www.farmingfutures.org.uk/x360.xml

pollution issues and using nitrogen efficient crop varieties and nitrogen fixing crops in rotations.

Carbon emissions can be reduced by operating more efficiently fossil fuels use in buildings and travel associated with farming; reducing soil erosion (where huge amounts of carbon is stored) and developing more effective land management techniques, one of which, the Moors for the Future project is illustrated in Case Study 11 below.

Climate change is already affecting farmers in a number of ways including reduced soil moisture in the growing season; greater yield variability due to unpredictable weather; a potential increase of pests and diseases, including Bluetongue, which has recently reached the UK and is thought to be an indirect result of increasing average temperatures which allow the virus to spread in the midges which carry the disease to farm animals.

Pesticide resistance is also predicted to increase due to increased numbers of generations of pests per year. This coupled with warmer winters improves the survival chances of the pesticide resistant pests, including plants and animals, micro-biota and viruses.

Other challenges include reassessing the times of resource intensive periods during planting and harvesting and a need to plan water management and irrigation.

However, a changing climate also brings opportunities for farmers including longer growing seasons and some increased growth rates which could promote a longer supply and greater availability of home-grown produce; an ability to introduce crops new to Derbyshire and the UK; reduced frost damage; and reduced heating and livestock housing needs.

The importance of carrying out farming and food production in a more sustainable way particularly using methods which do not exacerbate climate change has been recognised in a regional publication, the Strategy for Sustainable Farming and Food, which gives guidance on achieving a more sustainable future for the East Midlands farming and food industries. The plan also sets out a range of priorities and actions to assist development and to influence and direct change within the industry.

Farmers will also play an increasingly crucial role in the adaptation to climate change process by developing networks of natural habitats in rural areas through their approaches to land management. In the last two decades Government backed schemes have resulted in the restoration or planting of over 6800 miles of hedgerows and it is hoped that this will continue. However, rising food prices caused by a combination of climate change and rising oil prices, could lead to intensified production resulting in the biodiversity gains being lost very rapidly.

Case Study 10: Sustainable Youlgrave and the farming community

Sustainable Youlgrave (SY) began early in 2006 when a group of like-minded villagers in the Youlgrave, and surrounding parishes came together to discuss ways in which, by thinking globally but acting locally, they could do their bit to combat climate change and at the same time make their rural community fully sustainable.

Sustainable Youlgrave's three-pronged approach includes encouraging domestic energy saving, generating renewable energy from local natural resources and finding ways in which the community can adopt a more sustainable lifestyle.

One of the three approaches – generating renewable energy from local natural resources – involves the local farmers and landowners, who were recently invited to a SY meeting to examine the commercial possibilities of renewable energy in the Bradford Valley. Held at Youlgrave Reading Room and chaired by Matthew Parris, the event was styled 'Waste, Wind and Wood' and featured presentations into types of renewable energy that Sustainable Youlgrave is actively exploring for the local area. These include reports from consultants Celtic Composting on options for anaerobic digestion and from Dulas ReSolutions Ltd who examined the feasibility of capturing wind energy in the valley through small and medium size turbines. The Forestry Commission also outlined the energy possibilities of the wood fuel yield from local woodland, describing the environmental and social possibilities of biomass.

The focus remains very much on the viability of renewable energy in the farm context, with discussion on what is most likely to succeed and yield a realistic financial return. It is widely recognised that the farming community is currently under great pressure and that one way forward may be alternative 'green' solutions.

www.sustainableyoulgrave.org. Contact John Youatt (Chair) on 01629 936241 or email sustainableyoulgrave@sustainableyoulgrave.org

East Midlands Strategy for Sustainable Food and Farming: http://www.go-em.gov.uk/rural/sustainablefarming.php?x=0

8.0 Adaptation

The following themes illustrate some of the impacts which climate change will have and will require consideration of adaptation strategies to reduce potential future risk. They include:

- Health, welfare and occupation exposure
- Management of landscape and natural habitats
- Education and communication
- Crime

8.1 Health, welfare and occupational exposure

As the climate changes we are likely to experience more frequent extreme weather events. These events will increasingly lead both to direct and indirect health consequences, the impacts of which we will have to deal with. The effects of climate change are likely to be felt more acutely by those already suffering ill health.

The latest models predict a mean annual temperature increase in the UK of between 1.1 and 6.4 centigrade by the end of the 21st century. Heatwaves will become more common and perhaps present one of the most serious risks to human health particularly amongst older age groups. In the European heatwave of 2003, around an additional 2000 people died in Britain alone. (Compare this with France where excess deaths numbered around 15,000, including 2000 people who were already hospitalised.)

Predicting severe heatwaves and their effects is difficult but there is a 1 in 40 chance that by 2012 South Eastern England will have experienced a severe heatwave which will cause perhaps 3000 immediate heat related deaths and around 6350 heat-related deaths. A health risk of 1 in 40 is considered high. Future summer death rates in Derbyshire could reflect the occurrence of severe heat waves here.

The heatwave of 2003 prompted the Department of Health to launch its first National Heatwave Plan in 2004 in which a Heat-Health Watch system operates in England during the summer months, following advice from the Meteorological Office. This plan operates with four levels of response and appropriate advice[99]. Conversely, deaths from winter cold in the UK are likely to decrease as winters become generally milder.

Climate induced changes to wind and rainfall patterns are less certain but the incidence of sudden heavy rain is likely to increase, as is the risk of severe coastal flooding, although currently the risk remains low. It is not known what the long-term effects of these events will be on health.

Indirect effects of increasing temperatures and flooding may lead to outbreaks of vector-borne diseases such as malaria and dengue fever, although the risks are extremely low and the incidence is likely to remain rare. However, health authorities need to remain alert to the possibility of outbreaks in other European countries and to the possibility that more effective vectors may arrive in the UK. Rapid responses to such outbreaks will reduce the possibility of such diseases becoming endemic in the UK.

Warmer summers are likely to be associated with an increase in food-borne diseases such as salmonella, and drinking water supplies could be affected by increased rainfall, especially over short periods, leading to:

- increased numbers of bacteria in surface water;
- increased water temperature leading to an increase in algal blooms in reservoirs;
- a decrease in the effectiveness of chemical coagulation which is used to remove microbes from drinking water.

Although concentrations of a number of important air pollutants are likely to decline over the next century due to improved engine efficiencies and better management, the concentration of ozone at ground level is likely to increase in response to a warming climate. This will increase attributable deaths and hospital admissions across the UK, in the order of 1500 extra deaths and hospital admissions per annum. It is expected that a proportion of these deaths will occur in Derbyshire with the number of hospital admissions

[99] Health Effects of Climate Change in the UK, An Update of the Department of Health Report 2001/02, Preface 1.Department of Health and Health Protection Agency 2008. http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_080702

commensurate with population levels and ozone concentrations. A high number of summer visitors arriving by car, could increase these admissions.

Occupational exposure to climate impacts, apart from increased exposure to ozone is likely to take the form of increased incidence of heatstoke, both for indoor and outdoor workers. Those in the construction, agricultural and forestry industries are likely to have the highest incidences, and in addition could suffer from increased ozone exposure. Several deaths reported in Paris in 2003 were associated with occupational exposure to heat.

Exposure to ultra-violet light is also expected to increase as people spend a greater proportion of time out of doors. This will affect workers as well as those engaging in leisure activities. As a result skin cancer rates are expected to rise.

Hot interior working environments are not just a matter of greater discomfort but raise concerns for health protection and ability to perform both physical and mental tasks. Accident risk may increase and exposure to heat may lead to exhaustion and heatstroke. The installation of air conditioning to rectify the problem could lead to increased greenhouse gas emissions.

One further, and more positive aspect of health and climate change, lies in encouraging people to walk or cycle shorter journeys, which may be easier in higher temperatures throughout the year. The effects of these lifestyles changes could reduce obesity and improve health generally[100].

In conclusion, there is a need for greater emphasis to be placed on climate change and adapting to its impact by increasing the resilience of the health and social care infrastructure to cope with the effects of heat, gales and floods (Heatwave, Gale and Flood plans – see DCC Community Risk Registers[101]); to alert individuals through public information campaigns to take mitigating action to reduce the impacts of climate change upon themselves, particularly keeping cool in hot weather; and lastly in the need for further and continued research into climate change impacts.

8.2. Management of landscape and natural habitats

The landscape is one of Derbyshire's defining features and key natural assets having an important role in economic activity, human health, social well-being and quality of life.

The quality of Derbyshire's varied and diverse landscape, from the open moors of the Peak District to the floodplains of the Trent Valley, has long been recognised. The Peak District National Park is an internationally recognised landscape of huge importance and is a leading UK rural tourism and day visitor destination. Beyond the National Park boundary are areas of great and diverse landscape identified and described in the county council's publication '*The Landscape Character of Derbyshire*' (2003)[102].

[100] http://www.nhs.uk/Conditions/Exercise/Pages/Advantages.aspx?url=Pages/Lifestyle.aspx

[101] Community Risk Registers: http://www.derbyshire.gov.uk/community/emergency_planning/lrf/risk_assessment/community_risk_registers/

[102] The Landscape Character of Derbyshire: http://www.derbyshire.gov.uk/environment/conservation/landscapecharacter/

In promoting this strategy for climate change it is important to consider the effects of any proposals on the character of the landscape. Whilst tree planting will introduce many benefits to off-set climate change such as shade and shelter, CO_2 uptake, water management and soil stabilisation, many other proposals could have negative implications on landscape character such as potential impacts of:-

- woodland creation on traditionally un-wooded landscapes and valuable open habitats, including areas of nature conservation and characteristic habitats and species
- water management and flood alleviation schemes
- land-use change where large-scale renewable energy crop planting, such as short rotation coppice, impact on established landscape characteristics
- large scale energy developments such as wind farms
- novel pests and diseases on locally provenanced trees.

Public authorities have responsibilities under the European Landscape Convention[103] to recognise landscape in law and to develop policies dedicated to the protection, management and creation of landscapes. This applies to all landscapes in Derbyshire including those of special character and to the Peak District National Park, reinforcing existing requirements under existing law such as Section 62 of the 1995 Environment Act. It is important however, to recognise that the character of landscapes is partly determined by a diverse range of habitats and species, such as the raised peat bogs in the Peak Park. It is the potential effects of climate change on these in particular which may give cause for concern.

Worldwide, ecologists say that most species currently classified as critically endangered will become extinct, and the majority of those labelled as endangered or vulnerable will edge closer to extinction[104]. Predicted changes in temperatures and rainfall patterns in the UK increase the risk of damage to more vulnerable habitats and native species in Derbyshire. Reductions of summer rainfall and increasing temperatures could have marked effects, for instance, on limestone grassland habitats and potentially lead to the loss of the most south-easterly peat bogs. The latter situation would lead to increased carbon emissions as the carbon stored in the peat would break down and be released to the atmosphere. Both of these effects could have far reaching impacts on the established character of these landscape types.

Other likely effects of climate change on biodiversity in Derbyshire fall under several headings:

- Changes in distribution of species, including loss of species at the southerly edge of their distribution, such as Jacob's Ladder; spread of species at the northerly edge of their distribution, such as the Stemless Thistle in the Peak Park; the northerly spread of species could also include pests and diseases, such as mosquitoes and the Harlequin Ladybird.
- Changes in the composition of species within habitats, favouring more adaptable species and causing greater stress to more vulnerable species.

[103] http://www.countryside.gov.uk/LAR/Landscape/CC/convention.asp

[104] http://www.environment-agency.gov.uk/yourenv/639312/641094/642206/642371/642353/?version=1&lang=_e

- Effects of generally hotter, drier summers resulting in lack of water to support wetlands, water quality and temperature problems due to low dilution, low flows reducing aquatic habitat and increasing fire risk.
- Effects of wetter/warmer winters leading to increased flooding of wet grassland, and migratory birds moving north and east, perhaps out of the region altogether.
- Effects of seasonal/phenological changes, including a longer growing season, and out of phase emergence of flowers and their pollinators; the birth of predator young out of phase with the availability of prey species.
- Land use changes which require new management regimes and the ability to grow novel crops, which in turn could have some consequences for native wildlife.
- High rainfall events causing flash floods in watercourses which could harm biodiversity, such as reduction in water vole populations which are locally important in Derbyshire.

Targets included within Regional Spatial Strategy and Local Biodiversity Action Plans will try to ensure protection of biodiversity as well as making habitats more robust, networked and functionally linked to allow them and their constituent species to adapt to climate change. However, damage to ecosystems also reduces the services they provide and the species they support. Whilst there will be some biodiversity gains, the net outcome is likely to be an overall loss in Derbyshire as species and habitats struggle to adapt to the speed of change in the climate.

The East Midlands Biodiversity Forum's[105] paper "Climate Change and Biodiversity" explores the effect on specific habitats and species and what mitigation will be appropriate.

Within the context of a changing climate it is also possible to use flora to positively enhance microclimates by the growing of climate-adapted trees to provide shade for both people and buildings. Increased tree cover can also absorb carbon dioxide from the atmosphere, although this must be seen as a long-term ameliorative process and can only be useful if the overall result is a net gain in tree cover. The National Forest covering parts of Derbyshire, Leicestershire and Staffordshire is a case in point. Over 7 million trees have been planted since its inception in 1995 increasing tree cover in the area from 6% to 17% with the aim of increasing this to 33% in the long term[106].

In a wider context landscape is one of the defining features of Derbyshire. All these landscapes support a diverse range of habitats and species. The concern is that a changed climate could permanently damage the characteristics of some of Derbyshire's most important landscapes which currently have a benefit far beyond the physical characteristics which they currently display. The Regional Biodiversity Strategy "*Putting Wildlife Back on the Map*" (2006)[107] sees action for biodiversity in the face of climate change bringing benefits to regional economic activity, human health and welfare.

Every public authority, from unitary authorities to parish councils, from police and fire authorities to health authorities, is required under the Natural Environment and Rural

[105] http://www.leics.gov.uk/east_mids_biodiversity_forum_update.pdf

[106] http://www.nationalforest.org/document/stratpro/strategy.pdf p12.

[107] http://www.emra.gov.uk/publications/regional-communities-policy/environment/putting-wildlife-back-on-the-map-a-biodiversity-strategy-for-the-east-midlands

Communities Act 2006[108] to have regard to the purpose of conserving biodiversity. We all have a duty to raise the profile of biodiversity and give due consideration to it when developing other policies and making decisions.

In the context of management of landscape, habitats and species, it is important that local action plans to implement the strategy, on the one hand, take sufficient account of landscape character and that this provides the framework for addressing the more detailed aspects of the landscape such as biodiversity. On the other hand, the climate changes expected as a result of the accumulation of already emitted greenhouse gases will inevitably change the character of the landscape as species and habitats, currently at the limits of their distribution, become locally absent. Approaches need to be developed which guarantee the delivery of both biodiversity protection and enhancement, and development. The role that robust natural habitats will play in reducing greenhouse gas emissions and providing adaptation to a changed climate mean this is not only practical but essential.

DPF members have the opportunity to enhance the ability of Derbyshire's biodiversity and landscapes to adapt to climate change, and to mitigate the extreme weather associated with it by:

- Managing the sites in their ownership and improving their habitats, to make them more robust by extending the abundance and range of their natural communities and indicative species.
- Working together locally and regionally and by using development planning processes to create habitat networks in strategic locations, (for example by linking woodland blocks where woodland is a typical habitat, and by linking wetland habitats along river valleys and canal corridors) to enable the survival and migration of species in response to climate change.
- Supporting projects which conserve and extend those habitats that contribute significantly to CO_2 sinks and flood reduction, such as Moors for the Future, the National Forest and the OnTrent[109] initiative, and develop local markets for the products of good farm and woodland management to encourage good husbandry.
- Influencing the decisions of other land owners and managers to consider climate change mitigation and adaptation in their land management, land restoration and landscaping through partnerships and advice, and by setting an example.
- Educating people about the value of ensuring the extension and continuity of habitats and about the role of habitats in mitigating the effects of extreme weather conditions.

[108] Natural Environment and Rural Communities Act 2006
http://www.opsi.gov.uk/acts/acts2006/ukpga_20060016_en_1
[109] http://www.ontrent.org.uk/

Case study 11: **The Moors for the Future Project**

It is estimated that globally, peat stores twice as much carbon as forests, and the UK contains about 15% of the world's peat lands. According to the National Trust, British peat bogs store carbon equivalent to about 20 years' worth of national industrial emissions. Healthy peat is also a carbon sink absorbing carbon dioxide from the atmosphere and storing it as biomass. Degrading peat releases carbon, which is eventually converted to atmospheric CO_2. It is thought that increasing amounts of CO_2 in the atmosphere may accelerate this process. However, the process mechanism remains unclear and further research is needed into this important area.

In the Peak District the **Moors for the Future** partnership of organisations is taking action now to restore large parts of the internationally important Peak District Moors, which form a part of the global carbon store. Healthy peat on the moors is also important as a carbon sink and work is underway to repair the damage done to the landscape quality and biodiversity whilst at the same time mitigating climate change by reducing the carbon lost from this area. This initiative is the most significant biodiversity project in Derbyshire and Heritage Lottery Funding of £4.7 million makes this the biggest upland conservation project in Britain.

www.moorsforthefuture.org.uk.
Natural England in the East Midlands: http://www.naturalengland.org.uk/regions/eastmidlands/default.htm
The Derbyshire Biodiversity Website: http://www.derbyshirebiodiversity.org.uk/

8.3. Education and communication

One of the results of an Ipsos MORI survey, carried out in July 2007 showed that whilst 68% of people questioned believe we are seeing climate change, only 38% thought it would have an impact and over half thought if would have little or no effect. When placed in a national context the climate change issue came behind race, immigration, the NHS and crime. The survey concluded that there is a need to bring home to individuals the realities of climate change and although public understanding is increasing, the facts need reinforcing.

Education and awareness raising are indeed the essential first steps in tackling climate change. There is an increasingly urgent need to increase knowledge about the issue and build capacity to take action amongst all sectors including the Government, public sector, businesses, communities and individuals, and amongst people of all ages, particularly the young, who in future years, will inherit the legacy of decades of greenhouse gas emissions.

There is no more important sustainability issue than climate change[110]. The Department for Children, Schools and Families has taken up the challenge of integrating sustainable development education principles into the standard school curriculum and recognises that:

> "Education for sustainable development enables people to develop the knowledge, values and skills to participate in decisions about the way we do things individually

[110] http://www.dfes.gov.uk/aboutus/sd

and collectively, both locally and globally, that will improve the quality of life now, without damaging the planet for the future"[111].

A number of initiatives related to bringing sustainability and climate change into the class room are listed on the DCSF website[112].

The content of formal, informal and vocational education needs to adapt to encompass teaching and awareness raising about climate change. This needs to happen both in the direct sense, by developing courses on the issue in line with education for sustainable development principles, but also where every course offered in all educational institutions, needs to be built around developing knowledge of sustainability principles and in particular, the impacts that the skill or activity being taught, has on the earth's climate.

The Nottinghamshire and Derbyshire Local Authorities' Energy Partnership has also recognised this imperative by engaging with partner organisations such as the Groundwork Trust in both counties to deliver the DEFRA-funded 'Everybody's Talking About Climate Change awareness raising campaign during 2007 to 2008 (see Case Study 12). The campaign has included work with schools to bring climate change education to the classroom and has involved a number of teacher training sessions to up-skill teachers across the county in this important area. Further information relating to the campaign in schools can be found on the Everybody's Talking website[113].

Whilst it is important that the education sector incorporates teaching about sustainability and particularly climate change into curricula, it is also vitally important to raise awareness of the climate change issue and begin to build capacity within communities to take action to mitigate carbon emissions and adapt to changes in weather which climate change will bring (see also section 7.5 above). Changing behaviour amongst the general population in favour of taking action on climate change is a desirable aim, although one which is recognised as a major challenge[114].

Skills will be needed to assist communities in the broadest sense to deal with the issues of climate change and peak oil in the coming years The importance of teaching sustainability skills, which can be applied locally, has been recognised in the development of the College of the Peak in 2003, supported by a range of public sector organisations to develop traditional, heritage and sustainability skills and incorporate sustainability principles into its courses. The college is now part of the county council's Adult and Community Education Service and intends to offer courses in eco-friendly building skills and renewable energy[115].

The Derbyshire Partnership Forum, has an important part to play in furthering education and awareness raising as part of its community leadership role. It has already made

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[111] http://www.teachernet.gov.uk/sustainableschools/about/about_detail.cfm?id=3

[112] http://search.dcsf.gov.uk/kbroker/dcsf/dcsf/search/search.lsim?qt=Education+for+Sustainable+Development&sr=0&nh=10&cs=iso-8859-1&sc=dcsf&ha=1121&x=21&y=5

[113] http://everybodys-talking.org/schools

[114] From Warm Words – How we are telling the climate story and can we tell it better? by Gill Ereaut and Nat Segnit July 2006 IPPR.. http://www.ippr.org/publicationsandreports/publication.asp?id=485

[115] http://www.collegeofthepeak.org.uk/

inroads into this process by engaging in the Everybody's Talking About Climate Change campaign, mentioned above. It is intended to use this campaign to further promote awareness of the climate change agenda and support individuals, community groups and employees in both the public and private sectors, who want to take further action in this arena. (See Case Study 12). Taking such action as individuals or as communities can have other environmental, health and social benefits such as improved wellbeing and health through increased exercise, preparedness for increased incidence of flooding and heatwaves as well as greater community cohesion through reduced car use and shopping locally.

In addition to encouraging climate change education in the formal sector and raising awareness amongst the general public, many groups specifically promoting sustainable energy within their communities are springing up in Derbyshire illustrating that there is serious commitment to tackle climate change. The process necessitates awareness-raising to garner support for these initiatives within communities themselves and Partners may be able to offer support to these groups as appropriate.

Education in all its forms, from the formal sector to awareness-raising amongst all communities is vital if we are to take action on the crucial issue of climate change. Resources need to be mobilised to enable this to happen. Derbyshire's public sector will lead the way through its community leadership role and the development of this strategy is one of the steps taken to make this happen.

Case Study 12: Everybody's Talking About Climate Change

This awareness raising climate change campaign, which began in March 2007, was developed to positively shift people's attitudes towards climate change as a precursor to influencing behaviour and changing lifestyles. The campaign which is run by the Nottinghamshire and Derbyshire Local Authorities Energy Partnership (LAEP)*[1], won DEFRA Climate Challenge funding of £397,000 as a component of the Government's national 'Tomorrow's Climate, Today's Challenge Campaign.

The campaign has been designed to reach over 2m people across the two counties targeting householders, business employees including 110,000 council staff, schools children and community groups, encouraging engagement and personal pledges to take action to reduce CO_2 and to develop the belief that individual small changes are significant and can collectively make a big difference.

Key messages of the campaign are delivered using a purpose built campaign vehicle, a camp website, local and staff newspapers and local radio. In the first year of the campaign. 10,000 pledges were made, over 120 community groups were reached; 100 public events wer held, a high profile radio campaign has reached a potential audience of over 300,000 and ther were over 500,000 hits on the website.

For more details: www.everybodys-talking.org

*[1]The Nottinghamshire and Derbyshire Local Authorities Energy Partnership consists of all 20 Local Authorities, including the Peak District National Park Authority, in the two counties. In existence since 1996 its aims are to work on sustainable energy and the climate change agenda. Its partners in the this campaign include the Energy Efficiency Advice Centre, Groundwork Trust and the Rural Community Councils in both counties.

8.4 Crime.

In the mid 19th century the weather was a factor considered in the quest for the cause or causes of crime. Correlations were sought by early criminologists between types of weather and crimes against property and against people. Although, something of a 'forgotten factor' in 20th century criminology generally, one researcher has stated that "Apart from the criminological universals of age and gender, it would be difficult to find any other factor which is so consistently correlated with violent crime [than high temperature][116].

There is some evidence to suggest that the frequency of collective violence, including rioting, increases with an ambient temperature of up to 29°C and then decreases sharply as the temperature increases; that mean daily temperature is a significant predictor of assaults; that the number of days with a high Temperature-Humidity Index (the so-called discomfort point) has a strong effect on the probability of killings and that the occurrence of homicide appears to be limited by extremely cold weather. Similarly, American studies have shown significant positive correlations between monthly temperature averages and monthly average number of rapes and daily mean temperatures are a significant predictor of domestic violence. None of the American studies has found any significant relationships between high temperatures and robberies, which may be motivated more by economic need or drugs use.

However, Derbyshire crime statistics for April 2003 to March 2004 show that for some types of crime, such as 'sneak-in' or 'insecure' burglaries, there was a correlation with recorded ambient temperatures for the same period. The figures show that such crimes are much higher in the summer months 40 – 50%, compared with around 25% in the winter months. As the weather changes from very wet to very sunny the percentage of sneak-in or insecure burglaries rises from 28% to 54% as a proportion of total burglaries and during the hottest and sunniest days the number of burglaries is 50% higher than average.

Whilst the figures from studies and statistics do show correlations, caution is required when identifying the relationships as causal and further research is needed to establish the links between effects and possible causes. From both the practical and theoretical perspectives, daily, hourly, as well as monthly and quarterly fluctuations in crime could be important and might well be predictable. Knowledge of expected short-term increases or decreases in calls for services could facilitate more effective and efficient use of police and other resources. For this reason temperature data could become a standard control variable in any analysis of monthly or quarterly crime trends.

The potential links between crime and climate change may be predicted by looking at the expected trends of weather over the coming decades. The current climate models predict hotter summers and milder winters for the UK. This may well be reflected in changing patterns of crime requiring an evolutionary approach to service delivery and allocation of resources to cope with seasonal variabilities.

One aspect of crime which relates to climate change which is not weather-sensitive, concerns indictments against states, corporations and individuals who are implicated in causing damage such as release of harmful greenhouse gas emissions, destruction of rain

[116] Field, S., The Effects of Temperature on Crime', British Journal of Criminology, Vol 32, No 3, pp 340 – 351. http://bjc.oxfordjournals.org/cgi/content/abstract/32/3/340

forests and generation of air-borne pollutants. Perhaps the boundaries of conventional criminology need to be extended to embrace wider notions of harm towards the systems which continue to make life possible on the earth.

Because of the relative newness of this area of work no case study has been found to illustrate the relationship between crime and climate change in Derbyshire or in the rest of the UK.

"The Social Impact of Heatwaves", Science Report SC20061/SR6, Environment Agency
http://publications.environment-agency.gov.uk/pdf/SCHO0807BNCW-e-e.pdf

Appendices One to Five

Appendix One

Derbyshire Per Capita Estimates of Carbon Emissions by End User 2005.

Extracted from 'Analysis to support climate change indicators for local authorities'

Local Authority area	Estimates of Emissions by Sector, kt CO_2 2005								Per capita CO_2 emissions for 2005		Per capita CO_2 target for 2011
NUTS4 Area and Government Office Region - Derbyshire in the East Midlands	Industry and Commercial (1)	per capita emissions by sector - industrial and commercial	Domestic	per capita emissions by sector - domestic	Road Transport (2)	per capita emissions by sector - road transport	Total		Population (thousands) - Mid 2005 estimates	Total emissions per capita (tonnes CO_2/cap)	Target of 9.69% reduction of CO_2 emissions by 2011 (3)
Amber Valley	564	4.8	305	2.6	252	2.1	1120		118.6	9.4	8.6
Bolsover	233	3.2	179	2.4	117	1.6	529		73.2	7.2	6.6
Chesterfield	342	3.4	243	2.4	126	1.3	711		100.0	7.1	6.5
Derbyshire Dales	478	6.8	196	2.8	292	4.2	966		69.8	13.8	12.6
Erewash	281	2.6	265	2.4	147	1.3	693		109.8	6.3	5.7
High Peak	581	6.4	247	2.7	192	2.1	1020		91.1	11.2	10.2
North East Derbyshire	282	2.9	247	2.5	169	1.7	698		97.3	7.2	6.6
South Derbyshire	337	3.8	210	2.4	364	4.2	911		87.7	10.4	9.5
Derbyshire TOTALS	3098	4.1	1892	2.5	1659	2.2	6649		747.5	8.9	8.1
East Midlands TOTALS	14572	3.5	10461	2.5	9553	2.2	34586		4172	8.0	
UK TOTALS	202055	3.4	149504	2.5	114237	1.9	465796		58785	7.9	

Appendix One: Notes for Derbyshire Per Capita Estimates of Carbon Emissions by End User 2005.

(1) Industry and Commercial totals include carbon emissions from the public sector and from agriculture (58 kilotonnes) but exclude emissions from diesel railways, industries belonging the EU ETS, aviation and shipping.

(2) Excludes emissions from motorway traffic and diesel railways.

(3) Reduction of 9.06% by 2011, agreed with the Government Office for the East Midlands acting for DEFRA. Yearly reductions in CO_2 emissions from 2008 to 2011 are 3.02%. Over four-fifths of this figure (2.52%) will be achieved by national measures, leaving less than one-fifth (0.5%) to be achieved by national measures influenced by local authority activity and by measures applied locally.

- Total emissions for Derbyshire (excluding Derby City) are 6.6 million tonnes of carbon dioxide (6.649mtC)

- Land use and Land Use Change totals are not shown on the figures here but constitute very small overall carbon dioxide emissions of around 16,000 tonnes for Derbyshire.

- Average per capita carbon emissions for Derbyshire are 8.9 tonnes per person. Comparison of this total with the average for the East Midlands and the UK shows a higher per capita emission figure than both the region and the UK as a whole.

- An explanation of the possible reasons for some of the variations between districts for different sectors is offered in the text on pp 17 -23

- For a detailed sector breakdown of the data presented here a 'Detailed Sector Split' table is available on the Derbyshire County Council website: www.derbyshire.gov.uk/climatechangestrategy. This shows the elements of data included within the CO_2 estimates. Elements of this data, such as the domestic gas and electricity estimates and the estimates for road transport, are of reasonable certainty, as they are based on local readings, sales data and traffic counts. Other components of the estimates, including solid and liquid fuels combustion and land use estimates, are of less certainty as they are based on less well defined spatial data, including population, satellite images and fuel surveys, and incorporate many assumptions.

  According to DEFRA the estimates presented here stretch the bounds of what is reasonable to assume in an attempt to provide a number for each local authority and sector and should be considered *indicative.*

- Population data are obtained from: England and Wales: The Office for National Statistics: http://www.statistics.gov.uk/downloads/census2001/KS_LA_E&W_part1.pdf

- The DEFRA classification of Local Authority Districts and Unitary Authorities in England is available from: www.defra.gov.uk/rural.ruralstats/rural-definition.htm

- For detailed information on data quality and methodology of these estimates of carbon emissions please read the accompanying report. www.defra.gov.uk/environment/statistics/globatmos/galocalghg.htm. This spreadsheet accompanies the report produced by Netcen, September 2005 (AEAT/ENV/R/2036)

Appendix Two. The Policy Framework for Climate Change

This list of drivers demonstrates the need, in all organisations, for a corporate approach to tackling climate change, as the issues involve, amongst others: assets and facilities, travel and transport, procurement, water and waste resources management, health and welfare, local planning, emergency planning housing, landscape and habitats management and crime.

The Home Energy Conservation Act 1995 aims to improve the energy efficiency of domestic housing by requiring all local authorities to publish an energy conservation report annually. A review is currently underway to assess the effectiveness of HECA reporting.
http://www.defra.gov.uk/environment/climatechange/uk/publicsector/localauth/heca95/index.htm

Local Government White Paper: Strong and Prosperous Communities.
The White Paper establishes local authority's leadership role on climate change, leading by example as well as creating partnerships within the community to deliver carbon reductions.
http://www.communities.gov.uk/publications/localgovernment/strongprosperous

The Decent Homes Standard includes an obligation to achieve warm and weatherproof social housing by 2010.
http://www.decenthomesstandard.co.uk/

The Code for Sustainable Homes aims to create a market for sustainable new build homes and pave the way for zero-carbon homes within a decade.
http://www.planningportal.gov.uk/uploads/code_for_sust_homes.pdf

The Carbon Emissions Reduction Target (CERT) which replaces the **Energy Efficiency Commitment** (EEC) came into effect on 1 April 2008 and is an obligation on energy suppliers to achieve targets for promoting reductions in carbon emissions in the household sector, doubling the level of activity of EEC. Suppliers must direct at least 40% of carbon saving to a priority group of low-income and elderly consumers. This will ensure than a large number of fuel poor households, including the over 70s become eligible for support. Many local authorities will continue to develop schemes in partnership with energy suppliers to increase insulation rates or subsidise energy efficient boilers.
http://www.defra.gov.uk/environment/climatechange/uk/household/supplier/index.htm

The Climate Change and Sustainable Energy Act 2006 contains a duty on Government to produce an energy measures report by August 2007, a duty on local authorities to have regard in the discharge of their functions to the energy saving measures in the report and wide variety of other measures to encourage action to combat climate change. Parish and Community Councils are given powers to encourage and promote energy saving measures, including micro-generation. Actions and targets contained in the Government report will help to clarify the level of carbon emission reductions expected of each authority.
http://www.opsi.gov.uk/ACTS/acts2006/ukpga_20060019_en_1

The Building Regulations set legal minimum energy performance standards for new buildings. The standard established in 2006 requires a 20% reduction in carbon emissions over the previous standard. Local Authority and Registered Social Landlord buildings must be improved upon refurbishment.
http://www.communities.gov.uk/planningandbuilding/buildingregulations/

Planning Policy Statement No. 1(PPS1): Delivering Sustainable Development and its supplement: Planning and Climate Change sets out the Government's overarching planning policies on the delivery of sustainable development through the planning system. The proposed supplement seeks to make climate change more explicit in the planning system.
http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps1/

Planning Policy Statement No. 22 (PPS22) encourages local authorities to develop targets for renewable energy within their area and to take account of these targets in local development documents and when taking planning decisions.
http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps22/

Planning Policy Statement No 25 (PPS 25) aims to ensure that flood risk is taken into account at all stages in the planning process to avoid inappropriate development in areas at risk of flooding, and to direct development away from areas of highest risk. Where new development is, exceptionally, necessary in such areas, policy aims to make it safe, without increasing flood risk elsewhere, and, where possible, reducing flood risk overall.
http://www.communities.gov.uk/planningandbuilding/planning/planningpolicyguidance/planningpolicystatements/planningpolicystatements/pps25/

The Energy Performance of Buildings Directive has prompted the UK Government to introduce the Energy Performance of Buildings (Certificates and Inspections) (England and Wales) Regulations 2007, to comply with the relevant articles of the Directive. From 2008 all public organisations are required to display energy certificates in their public buildings of over 1000 m^2 based upon an operational rating (including schools).
http://www.communities.gov.uk/planningandbuilding/theenvironment/energyperformance/

The European Landfill Directive requires EU member states to set up waste reduction strategies and implement specific measures to comply with this Directive. The UK regulations currently in force set national targets for the amount of biodegradable waste going to landfill for each local authority in order to reduce methane emissions (a greenhouse gas).
http://www.defra.gov.uk/environment/waste/topics/landfill-dir/

The Natural Environment and Rural Communities Act 2006 states that every public authority must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity. This issue is becoming more and more challenging as climate change takes place.
http://www.defra.gov.uk/rural/ruraldelivery/bill/

The Planning Bill proposes a new single regime for handling nationally significant infrastructure projects such as power stations, reservoirs, airports, railways, wind farms, waste projects etc., most of which are considered important in the national climate change agenda. The Bill includes provisions for such key developments to be determined by a new body called the Infrastructure Planning Commission (IPC). The provision to put a duty on local authorities to include policies to mitigate or adapt to climate change in their Local Development Frameworks has recently been removed from the Bill, which remains contentious both for this reason and the proposed removal of decision-making on major infrastructure projects from planning authorities to the IPC.
http://www.planningportal.gov.uk/england/professionals/en/1115315410774.html

Appendix Three: The Climate Change Bill section of the Queen's Speech, 6 November 2007.

"My Government is committed to protecting the environment and to tackling climate change, both at home and abroad. A Bill will be brought forward to make the United Kingdom the first country in the world to introduce a legally binding framework to reduce carbon dioxide emissions."

Climate Change is one of the greatest challenges facing the world today – but the Government believes that there are strong grounds to be optimistic that it can be tackled. The science is clear. Climate change is happening and it is caused by human activity. The question is no longer whether to act, but how much to do and how quickly.

The Government has shown consistent leadership by setting bold targets and pursuing ambitious policies at home and abroad. There has already been progress in reducing greenhouse gas emissions, and we have broken the link between growth in the economy and growth in emissions. The UK is set to almost double our Kyoto target for reducing emissions.

The **purpose of the Bill** is to create a long-term legal framework to reduce the UK's CO_2 emissions to 2050.

The main **benefits of the Bill** are to:

- enable the UK to meet its commitment to reduce CO_2 emissions by at least 60% by 2050;
- increase confidence and certainty for business planning and the investment in technology needed to move towards a low carbon economy;
- create a new approach to managing and responding to climate change in the UK through setting ambitious targets, taking powers to help achieve them, strengthening the institutional framework, and establishing clear and regular accountability to Parliament;
- demonstrate the UK's international leadership to help make progress towards a post-2012 global agreement;
- enhance the operation of the Renewable Transport Fuels Obligation (RTFO), which is expected to deliver significant carbon savings from the road transport sector by increasing the use of bio fuels;
- provide a power to pilot local authority incentives for household waste minimisation and recycling;
- implement the Carbon Reduction Commitment (a mandatory cap-and-trade scheme covering energy use emissions from approximately 4,000-5,000 large, non-energy-intensive organisations that will save 1.1 mtC per year by 2020); and
- provide a strong, sustainable framework for adapting to the impacts of climate change in the UK.

The main elements of the Bill will:

- Make the Government's 2050 target of at least 60% reduction in CO_2 emissions legally-binding, with real progress by 2020;

- Introduce a new system of 5-year carbon budgets;

- Establish a new independent Committee on Climate Change to advise the Government on the optimum trajectory to the 2050 target; and

- Require the Government to assess the risks from climate change in the UK and set out a sustainable programme of adaptation.

Related documents:

- Draft Climate Change Bill (published 13 March 2007), Consultation Document and Partial Regulatory Impact Assessment: http://www.defra.gov.uk/corporate/consult/climatechange-bill/index.htm

- Command Paper (published on 29 October 2007) set out the Government's response to pre-legislative scrutiny by three Parliamentary Committees and the public consultation: http://www.official-documents.gov.uk/document/cm72/7225/7225.asp

Devolution:

- Much of the Bill applies to the whole of the UK. The Government is working closely with the Devolved Administrations on the responsibilities they have in this area.

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Appendix Four – Indicators from the National Indicator Set for Local Authorities and Local Authority Partnerships which are related to climate change.

NI 167	Congestion – average journey time per mile during the morning peak
NI 175	Access to services and facilities by public transport, walking and cycling
NI 176	Working age people with access to employment by public transport (and other specified modes)
NI 177	Local bus passenger journeys originating in the authority area
NI 185	CO_2 reduction from Local Authority operations
NI 186	Per capita reduction in CO_2 emission in the LA area
NI 187	Tackling fuel poverty – people receiving income based benefits living in homes with a low energy efficiency rating
NI 188	Planning to adapt to climate change
NI 189	Flood risk and coastal erosion risk management
NI 191	Residual household waste per head
NI 192	Household waste recycled and composted
NI 193	Municipal waste landfilled
NI 194	Level of air quality – reduction in NO_X and primary PM_{10} emissions through local authority estate and operations
NI 197	Improved local biodiversity – active management of local sites
NI 198	Children travelling to school – mode of travel usually used

Detail of these indicators and formulae for calculations relating to targets set for any of the above can be found at:
http://www.communities.gov.uk/documents/localgovernment/pdf/542437

Appendix Five

Factor Four, Doubling Wealth, Halving Resource Use
by Ernst von Weizsacker, Amory B. Lovins and L. Hunter Lovins, Earthscan, London, 1997.
(See footnote 58.)

This review of Factor Four is included here because it is a succinct illustration of how the resource efficiency agenda, which is crucial in mitigating climate change impact and important for adapting the way we live and deliver services, can be achieved within the scope of current technologies.

This review is written by Paul Harrison, author of “Inside the Third World and the Third Revolution”, published by Penguin, and is a contributing editor of People & the Planet[117].

This book is one of the Club of Rome’s most important publications. It deals with the central challenge we face over the next half century: how to accommodate population growth and economic growth, while at the same time not just stabilizing the burden of consumption and waste currently threatening the planet, but reducing it below its present unsustainable level.

[117]
http://www.peopleandplanet.net/doc.php?id=1207

The maths of this challenge is daunting. By 2050, if economic growth continues at its recent rate, and population growth reaches the UN medium projection of 9.4 billion, we would need to cut our resource use for each unit of consumption by two thirds. In other words, we would need to increase resource productivity by a factor of three. To reduce environmental burdens to sustainable levels, we would need at least a factor four increase in resource productivity - hence the book's title.

In the long run we will need a lot more than factor four. If population stabilizes at below ten billion and the world reaches per capita incomes equal to today's high-income countries, we will need a Factor Ten revolution, as the Factor Ten club founded by Friedrich Schmidt Bleek recommends[118].

But *Factor Four* should be our immediate goal, and the beauty of this book is that it shows how feasible that might be on the basis of models that are working right now. Fifty documented examples show dramatic improvements in resource efficiency in energy, materials use and transport – super-windows that let light through but not heat; passive solar buildings in the Rocky Mountains that grow bananas in winter with no conventional energy input; refrigerators that use one tenth of the normal energy; systems to quadruple the number of trains that can use the same track, and so on.

Factor Four is not simplistic. It fully recognises the obstacles that have held back the revolution in resource efficiency. Economists have fixed ideas - against the evidence - that saving energy and reducing pollution will always involve net costs. Discriminatory regulations often penalize resource saving over resource wasting. Architects are paid more, the more their building costs. Utility companies earn more, the more energy consumers waste.

So it is incisive in its recommendations. Incentives should be reversed: architects, utility companies and so on should be paid more the more they reduce costs and resource use. The regulatory playing field should be levelled between green approaches and old-style wasteful ways of doing things. Tax systems should be changed to penalize bads, not goods.

Another of the book's virtues is that it shows how the new technologies and approaches can save money, make money, and offer profit opportunities for business folk ready to exploit them. It offers win-win solutions that make life better for people and the planet at the same time.

Factor Four is well-documented, punchy and clearly written, often brilliantly incisive, full of information and original proposals. It is a must for the desks of all policy-makers, businessmen, architects, planners and government ministers throughout the world.

[118] http://www.factor10-institute.org/

Glossary

Anaerobic Digestion

The refers to a process where biodegradable material, usually organic matter is broken down by bacteria in the absence of oxygen (air) in an enclosed vessel. It produces methane, a biogas which can be used in furnaces, gas engines, turbines (to generate electricity) or gas-powered vehicles; and solids/liquors known as digestate, which can be used as fertiliser and compost.

online.gateshead.gov.uk/udp/local_plan/written/cpt28.htm
www.planningportal.gov.uk/england/professionals/en/1115310681665.html

Biodiversity

This describes the number and variety of different organisms in the ecological complexes in which they naturally occur. Organisms are organised at many levels, ranging from complete ecosystems, to the biochemical structures that are the molecular basis of heredity; therefore the term includes genetic diversity, species diversity and ecosystem diversity.

www.nsc.org/EHC/glossary.htm
www.csbsju.edu/environmentalstudies/curriculum/greenbuildingplan/Green%20Building%20Plan%20p12.htm

Biodegradable Municipal Waste (BMW)

This is the fraction of Municipal Solid Waste that will break down under the action of micro-organisms, either in the presence of oxygen in air (known as aerobic conditions) or in the absence of oxygen such as that within a landfill or digestion plant (known as anaerobic conditions). The types of material that comprise BMW include food or kitchen wastes, garden wastes, paper, card, wood and some textiles. In 2001 this constituted around 56% of household waste.

http://www.defra.gov.uk/environment/waste/wip/newtech/pdf/introductory-guide-2007.pdf

Carbon Cycle

This is the global scale exchange of carbon and its forms, including CO_2, between the earth's reservoirs, namely the atmosphere, oceans, vegetation, soils and geological deposits and minerals (including oil, coal and gas). The process involves photosynthesis, respiration and decomposition. Photosynthesis in plants, which produces sugars and starches increasing a plant's biomass, could be released back into the atmosphere when the plant dies, decays or burns. Over very long periods of time (millions of years) biomass can be buried under sediment and placed under extreme pressure which allows it to form coal. This removes carbon from the active carbon cycle until the coal is extracted and burned releasing CO_2 back into the atmosphere.

http://www.climatechangenorth.ca/H1_Glossary.html
http://museum.gov.ns.ca/mnh/nature/nhns2/glossary.htm
www.climatechange.ca.gov/glossary/letter_c.html

Carbon Dioxide (CO_2)

Carbon dioxide is a heavy, colourless, odourless, non-poisonous gas which makes up around 0.03% of the atmosphere. Carbon dioxide circulates amongst the earth's reservoirs

(see the Carbon Cycle) and is vented by volcanoes. It is also released by burning fossil fuels and is considered a major greenhouse gas contributing to the greenhouse effect by trapping terrestrial radiation, and contributing to the potential for global warming.
http://www.natsource.com/markets/index.asp?s=104
www.ajc.com/news/content/shared/weather/weather_glossary.html

Carbon Dioxide equivalent CO_2e

This is the universal unit of measurement used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). The global warming potential of a greenhouse gas is given in units of CO_2 equivalent, whereby one unit equals one tonne of carbon dioxide. The reference in the text means that by 2050 the expected levels of carbon dioxide and other greenhouse gases in the atmosphere will be approximately 550 ppm. See also **Global Warming Potential**.

www.cincs.com/glossary.html
www.natsource.com/markets/index.asp
www.climatechange.be/jicdmtender/article.php3

Carbon Footprint

A carbon footprint is the total amount of carbon dioxide attributable to the actions of an individual (mainly through their energy use) over a period of one year. This definition underlies 'personal carbon calculators'. The term owes its origins to the idea that a footprint is what has been left behind as a result of the individual's activities. Carbon footprints can either consider only direct emissions (typically from energy used in the home and in transport, including travel by cars, aeroplanes, rail and other public transport) or can also include indirect emissions (including CO_2 emissions as a result of goods and services consumed). Bottom-up calculations sum attributable CO_2 emissions from individual actions; top-down calculations take total emissions from a country (or other high-level entity) and divide these emissions among the residents (or other participants in that entity). The average UK carbon footprint is 8.53 tonnes per capita, 7.6 if calculated using the methodology in the NI 186 guidance and used as the basis of calculations for per capital emissions in Derbyshire. Other calculations, taking into account products and services consumed, give a much higher total of 10.92 tonnes per capita.

A carbon footprint can also be attributable to the actions of an organisation and is a measure of the amount of greenhouse gases produced, measured in units of CO_2. It is an aide to conceptualising organisational behaviour and its contribution to global warming.

http://en.wikipedia.org/wiki/Carbon_footprint
http://www.direct.gov.uk/en/environmentandgreenerliving/actonco2/DG_067197?cids=Google_PPC&cre=CO2Cal
http://www.carbonuk.co.uk/glossary.htm

Carbon-neutral

This occurs when the net greenhouse gas emissions associated with an organisational unit, product, service or process, are zero, through a combination of direct (internal) emission reducing actions and indirect (external) offsetting actions.

Information from the Carbon Neutral Protocol, p 8, The Carbon Neutral Company, November 2007.
http://www.carbonneutral.com/uploadedfiles/CNP_2007_v1%202.pdf

Carbon Offsetting

A process whereby global warming emissions from an organisation have been measured, reductions identified and recommended, and remaining emissions fully offset through carbon credits purchased from renewable energy, energy efficiency and/or forestry projects around the world in accordance with The Carbon Neutral Company's Carbon Neutral Protocol. This incorporates established international guidelines and is verified annually by an independent auditor. The projects suggested, have prevented or removed an equivalent amount of carbon dioxide elsewhere.

It is acknowledged that carbon offsetting is not a cure for climate change but it can help raise awareness and reduce the impact of our actions. The most appropriate action to take is to reduce emissions. Offsetting is a useful element of what we can all do to address climate change for several reasons:

- Providing the means to work out the emissions from our own activities helps raise awareness of our impact on climate change. Combined with reducing our emissions, offsetting can be used to address this impact.
- When done in a robust and responsible way, offsetting leads to a reduction in carbon dioxide emissions in the area local to the offsetting project, often in developing countries.
- Offsetting projects, such as those approved by the United Nations, provide a mechanism for investment in clean technology in the areas which lack it the most. Such investment can lead to the spread of low-carbon development across entire regions, further reducing climate change impact.

http://www.carbonneutral.com/uploadedfiles/CarbonNeutral%20Protocol%202007%20(v1.2-14Dec07).pdf
http://www.defra.gov.uk/environment/climatechange/uk/carbonoffset/index.htm

Carbon Reduction Commitment (CRC)

The Carbon Reduction Commitment (CRC) is a new scheme, announced in the Energy White Paper 2007, which will apply mandatory emissions trading to cut carbon emissions from large commercial and public sector organisations (including supermarkets, hotel chains, government departments, a large local authority's buildings) by 1.1 mtC / year by 2020. The CRC is the new name for the Energy Performance Commitment proposal on which the Government consulted in 2006.

The Government's response to a consultation on this issue and analysis of responses was published in March 2008.

The CRC will target emissions from energy use by large organisations whose annual mandatory half-hourly metered electricity use is above 6,000MWh – focusing on those emissions outside Climate Change Agreements (CCAs) and outside the direct emissions covered by the EU Emissions Trading Scheme (EU ETS). In addition, firms with more than 25% of their energy use emissions in Climate Change Agreements would be completely exempt.

http://www.defra.gov.uk/environment/climatechange/uk/business/crc/index.htm
http://www.defra.gov.uk/environment/climatechange/uk/business/crc/pdf/crc-implement-govresponse-0803.pdf

Carbon Sink

Forests, soils, oceans and the atmosphere all store carbon, which moves among those different carbon pools over time; these four different carbon stores form the active carbon pool. If one of these pools absorbs more carbon than it gives off, it is called a 'sink' in the climate jargon, while a ‘source’ emits more than it absorbs.

Destroying forests - turning them from a sink into a source - will shift the balance within the active carbon pool towards higher concentrations in the atmosphere and lower levels of carbon stored in the world's forests. Another important carbon store is the world's fossil fuel deposits. But this particular carbon store, buried deep inside the earth, is naturally separated from the carbon cycling in the atmosphere, unless humans decide to release it into the atmosphere when we burn fossil fuels like coal, oil or natural gas. Any releases from this pool of carbon will increase the amount of carbon available to the active carbon pool.

http://www.sinkswatch.org/carbX.html

Carbon Trading Schemes

Carbon emissions trading is emerging as a key instrument in the drive to reduce greenhouse gas emissions. The rationale behind emission trading is to ensure that the emission reductions take place where the cost of the reduction is lowest thus lowering the overall costs of combating climate change.

Carbon trading is particularly suited to the emissions of greenhouse gases, the gases responsible for global warming, which have the same effect wherever they are emitted. This allows the Government to regulate the amount of emissions produced in aggregate by setting the overall cap for the scheme but gives companies the flexibility of determining how and where the emissions reductions will be achieved. By allowing participants the flexibility to trade allowances the overall emissions reductions are achieved in the most cost-effective way possible.

Participating companies are allocated allowances, each allowance representing a tonne of the relevant emission, in this case carbon dioxide equivalent. Emissions trading allows companies to emit in excess of their allocation of allowances by purchasing allowances from the market . Similarly, a company that emits less than its allocation of allowances can sell its surplus allowances. In contrast to regulation which imposes emission limit values on particular facilities, emissions trading gives companies the flexibility to meet emission reduction targets according to their own strategy; for example by reducing emissions on site or by buying allowances from other companies who have excess allowances. The environmental outcome is not affected because the amount of allowances allocated is fixed.

One of the largest schemes and the first of its kind in the world is the European Union Emissions Trading Scheme (EU ETS) which came into existence in January 2005.

http://www.defra.gov.uk/ENVIRONMENT/climatechange/trading/
http://www.defra.gov.uk/ENVIRONMENT/climatechange/trading/eu/index.htm

Climate proofing

Climate proofing involves assessing the organisational risks of climate change and taking steps to build institutional resilience to the threats posed. In the UK potential threats include higher temperatures, heatwaves, increased flooding, droughts and more intense rainfall events. Areas of vulnerability include buildings, operational procedures and the delivery of services, particularly to those less able to care for themselves. Uncertainty about the nature of a changed climate should not prevent planning and action being taken to embed climate-risk management into decision-making including strategies, policies, programmes and plans. Risks need to be assessed and managed to build institutional resilience and identify opportunities which present themselves.

www.cdproject.net/download.asp?file=CDP4_FTSE350_Adaptation_Report.pdf
http://www.devon.gov.uk/cc-section3.pdf

Corporate Facilities Management

"Facilities management is the integration of processes within an organisation to maintain and develop the agreed services which support and improve the effectiveness of its primary activities". Facilities management encompasses multi-disciplinary activities within the built environment and the management of their impact upon people and the workplace. Effective facilities management, combining resources and activities, is vital to the success of any organisation. At a corporate level, it contributes to the delivery of strategic and operational objectives. On a day-to day level, effective facilities management provides a safe and efficient working environment, which is essential to the performance of any business – whatever its size and scope.

http://www.bifm.org.uk/bifm/about/facilities

Energy Performance Certificates

Energy Performance Certificates (EPCs) are used to show a home's energy efficiency and carbon emissions on a scale of A to G. EPCs also show current average costs for heating, hot water and lighting in the home to be sold, as well as how to cut costs with energy efficiency measures, such as thicker loft insulation and even advise on retrofit renewable applications such as solar hot water heating.

The energy ratings are included in Home Condition Reports (HRCs) which set out independent information on the condition of the property as part of the Home Information Pack. The average property in the UK is rated D to E for both energy efficiency and carbon dioxide emissions. EPCs are to be introduced across the EU from 2009.

http://www.homeinformationpacks.gov.uk/consumer/17_Energy_Performance_Certificate.html
http://www.communities.gov.uk/news/corporate/governmentlaunchescompulsory

EU ETS – See Carbon Trading Schemes.

Global Warming Potential

The IPCC (see below) defines a quantity called Global Warming Potential which compares the warming effect of a greenhouse gas over a given time period (usually 100 years) with that of CO_2, which is given a value of 1. Most gases are more potent than CO_2 (see table below) but because human-made CO_2 emissions are much greater that any other gas, its

warming effect is greater, despite its low GWP. Roughly two-thirds of the human-made warming effect over the next 100 years is projected to be due to CO_2 emissions.

The GWP provides a mechanism for converting emissions of various gases into a common measure, which allows climate analysts to aggregate the infrared absorbing capability of a gas, its density and its lifetime in the atmosphere into a uniform measure denominated in carbon or carbon dioxide equivalents. For the basket of 6 greenhouse gases defined by the Kyoto Protocol, the GWPs are shown in the table below:

Greenhouse gas	Warming potential	% UK emissions now (global in 100yrs)	Source of gas
Carbon dioxide	1	86% (63%)	Volcanic eruptions, respiration, evaporation of the oceans, deforestation and burning fossil fuels eg. coal, oil, gas
Methane	21	6% (24%)	Anaerobic chemical and biological reactions e.g. animal digestion, agriculture and fuel leaks
Nitrous Oxide	310	6% (10%)	Biological processes in the soil and oceans, industrial combustion, vehicle exhausts, chemical fertilizers
Perfluorocarbons Hydrofluorocarbons Sulphur hexafluoride	9,200 11,700 23,900	In total:2% (3%)	Aerosol propellants, refrigerator coolants and air conditioners

Information from: http://www.aeat.co.uk/netcen/airqual/naei/annreport/annrep98/chap2_1.html
http://www.climatecare.org/business/jargon-buster/
http://www.defra.gov.uk/environment/statistics/globatmos/gagccukem.htm
For emissions from industrial processes see:
http://www.defra.gov.uk/environment/business/envrp/pdf/envrpgas-annexes.pdf

See also **Water Vapour**

Greenhouse Effect

This is the effect of gases in the atmosphere such as carbon dioxide, methane, nitrous oxides which are known as Greenhouse Gases. Light energy from the sun passes through the transparent atmosphere and is absorbed by the Earth's surface. It is re-radiated back to space as infrared heat energy, but becomes 'trapped' by greenhouse gases, similar to the effect in a garden greenhouse. The process is naturally occurring and keeps the Earth's temperature high enough to sustain life. Increasing greenhouse gas concentrations generated by human activity now appear to be disturbing this natural balance and contributing to global warming

http://www.coalitionforcleanair.org/air-pollution-glossary.html

Greenhouse Gases

There are a number of greenhouse gases but a 'basket' of six are specifically listed in Annex A of the Kyoto Protocol – carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O),

hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6). Water vapour is also a naturally occurring greenhouse gas. Another greenhouse gas, ozone (O_3) is effective at subsonic aeroplane cruising levels.

Carbon dioxide is not the most potent greenhouse gas but by volume it is the greatest component of greenhouse gas emissions globally at around 60%. In the UK CO_2 currently represents 86% of greenhouse gas emissions but by 2100 it is expected to represent 63%, as methane is expected to increase from 6% to 24%.

http://www.defra.gov.uk/environment/statistics/globatmos/gagccukem.htm

HFCs (Hydrofluorocarbons)

These chemicals are composed of two carbon atoms and varying numbers of hydrogen and fluorine atoms. They are used as solvents and cleaners in the semiconductor industry and were introduced as alternatives to ozone-depleting substances, namely the Chlorofluorocarbons (CFCs) under the terms of the Montreal Protocol. The lack of chlorine in these compounds eliminates their potential to destroy stratospheric ozone but they are estimated to have a global warming potential thousands of times greater than CO_2. See also **Global Warming Potential**.

www.eia.doe.gov/oiaf/1605/95report/glossary.html
www.nrdc.org/reference/glossary/h.asp
www.climatechange.ca.gov/glossary/letter_h.html

IPCC – Intergovernmental Panel on Climate Change

This is a scientific body set up by the United Nations Environment Programme (UNEP) and the World Meteorological Organisation (WMO) in 1988 to evaluate the risk of climate change. The IPCC does not carry out research but it does publish special reports such as the Fourth Assessment Report (see footnote 29) using peer reviewed and published scientific literature. IPCC reports are widely cited in almost any debate related to climate change and the Panel is generally regarded as authoritative.

http://en.wikipedia.org/wiki/Intergovernmental_Panel_on_Climate_Change
http://www.ipcc-data.org/ddc_ar4pubs.html

Methane – See **Greenhouse Gases** and **Global Warming Potential**

Municipal Solid Waste (MSW)

MSW is waste collected by or on behalf of waste collection authorities (WCAs), (usually districts, boroughs and unitary authorities) or their agents. It consists mainly of household waste and may include municipal parks and garden waste, beach cleansing waste, commercial or industrial waste and waste resulting from the clearance of fly-tipped materials. Waste disposal authorities (WDAs) (usually county councils and unitaries) manage and dispose of the waste collected by WCAs

http://www.defra.gov.uk/environment/waste/wip/newtech/pdf/introductory-guide-2007.pdf

Nitrous Oxide – See **Greenhouse Gases** and **Global Warming Potential**

One Planet Living

One Planet Living is a concept devised to show how globally, we are consuming resources and polluting 30% more than the planet can sustain. Our increasing consumption means we leave less and less space for other species to flourish, and we are losing biodiversity at an alarming rate.

Different countries are consuming and polluting at different rates. If everyone in the world lived as Americans do, we'd need 5 planets to support us. And if everyone lived the way Europeans do, we'd need 3 planets. Large segments of the populations of major countries such as India, China and Brazil consume natural resources at similarly high rates. *One Planet Living* is said to be the challenge of our times.

http://www.bioregional.com/programme_projects/opl_prog/opl_programme.htm

Perfluorocarbons

These non-toxic compounds are a group of human-made chemicals composed of carbon and fluorine only. They have no commercial uses and are emitted as a by-product of aluminium smelting. See also **Global Warming Potential**.

www.natsource.com/markets/index.asp
www.eia.doe.gov/oiaf/1605/95report/glossary.html
en.wikipedia.org/wiki/Perfluorocarbons

Phenology (Phenological)

Phenology is the study of the times of recurring natural phenomena such as migration of birds, bud bursting or flowering of plants, especially in relation to the prevailing climate. Because many such phenomena are very sensitive to small variations in climate, phenology is useful in the study of climate change.

http://en.wikipedia.org/wiki/Phenology

Polluter Pays Principle

The Polluter Pays Principle is a principle in international environmental law where the polluting party pays for the damage done to the natural environment. It is regarded as a regional custom because of the strong support it has received in most Organisation for Economic Co-operation and Development (OECD) and European Community (EC) countries. International environmental law itself mentions little about the principle. Application of the principle is usually in the form of a tax.

http://en.wikipedia.org/wiki/Polluter_pays_principle
www.wiley.com/college/geog/cutter018104/resources/glossary.htm

Precautionary Principle

The precautionary principle is a moral and political principle which states that if an action or policy might cause severe or irreversible harm to the public, in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who would advocate taking the action. In the case of new products or processes it is suggested that the principle should prohibit or restrict use until it is known to be safe. It is difficult to apply the precautionary principle to climate change because very few now doubt that the planet is getting warmer and the burning of fossil fuels is the chief cause.

http://en.wikipedia.org/wiki/Precautionary_principle
www-personal.umich.edu/~alandear/glossary/p.html
http://www.i-sis.org.uk/sapp.php

Renewable Energy

This term is used to describe energy sources that are replenished by natural processes on a sufficiently rapid time-scale so that they can be used by humans more or less indefinitely, provided the quantity taken per unit of time is not too great. Such energy sources include those that are driven directly or indirectly by the sun: water, wind and wave power, biomass, active and passive solar heating; those driven by gravity such as tidal power and those which harness the earth's internal heat source such as geothermal energy. The potential of solar is enormous, with scientists estimating that every year a square kilometre of desert receives solar energy equivalent to 1.5 million barrels of oil.

www.science.org.au/nova/005/005glo.htm
http://www.jri.org.uk/resource/climatechangeoverview.htm
http://www.worldofrenewables.com/index.php?do=viewarticle&artid=1494&title=africa-will-country-lead-the-solar-energy-revolution

Section 106 Agreements

Section 106 Agreements are legally binding obligations made under Section 106 of the Town and Country Planning Act 1990, to secure elements of development that cannot be controlled by planning conditions.

www.cornwall.gov.uk/Environment/minwaste/report/gloss.htm
www.broxbourne.gov.uk/Internet/LocalPlanMap/glossary.html

Short Rotation Coppice (SRC)

SRC is made up of a variety of species, such as poplar, willow an eucalyptus, these trees are grown over a short period, for example 3 years, before being harvested for use as an energy crop either alone or in combinations with other fuels such as coal.

http://en.wikipedia.org/wiki/Short rotation coppice

Sulphur Hexafluoride

This is a colourless gas which has an atmospheric lifespan of 3,200 years and a GWP of 23,000. It is used widely in the electrical utility industry. See also Global Warming Potential.

www.wacklepedia.com/g/gr/greenhouse_gas.html
wordnet.princeton.edu/perl/webwn

Sustainable Energy

Sustainable Energy is produced from sources which are replenishable within a human lifetime and cause no long term damage to the environment. They therefore contribute to the sustainability of all species. See also **Renewable Energy**.

www.jsdnp.org.jm/glossary.html
en.wikipedia.org/wiki/Sustainable energy

Temperature annual anomalies

A temperature anomaly is the deviation from the long-term average value. Temperature anomalies are usually measured in a given region over a specified period of time. On page 16 anomalies are given for specific years over central England.

http://amsglossary.allenpress.com/glossary/search?id=anomaly1

Tipping Point

Tipping point is the term used to refer to a global scale, non-linear transition within an earth system, where a small change can make a big difference. It is the critical point at which such a transition is triggered. With reference to climate change it is argued that no tipping point has yet been reached. If it had, then the main response should be an adaptive one rather than one of mitigation.

It is suggested that climate change policy should be more concerned with tipping elements, a term used to describe the components of the Earth system that can be switched – under particular conditions – into a qualitatively different state by small perturbations (Lenton et al – see reference below) operating on a level at least sub-continental in scale (approx 1000 km^2) These tipping elements may be triggered by anthropogenic climate change or by natural variability. This definition includes 'abrupt climate change' occurring when the climate system is forced to cross some threshold, triggering a transition to a new state. The transition may be reversible or irreversible.

An example of a tipping element, although one not directly linked with climate change, would be the Antarctic ozone hole, brought about by the release of ozone depleting substances.

Climate warming may have caused the Arctic sea-ice to pass a tipping point. The area coverage of both summer and winter Arctic sea-ice is declining at present, summer sea-ice more markedly, and the ice has thinned significantly over a large area. The system may already be undergoing a non-linear transition towards a different state with less Arctic sea-ice (perhaps none in summer).

Source: http://researchpages.net/ESMG/people/tim-lenton/tipping-points/

Water Vapour

Water vapour is the most important greenhouse gas, although its concentration in the atmosphere is not directly influenced by human activity. However, any increase in global temperatures will increase concentrations, because, as air gets warmer it can hold more water vapour, in a positive feedback mechanism. Any enhanced greenhouse effect caused by other greenhouse gases will increase the global warming effect of water vapour.

http://www.ecocentre.org.uk/global-warming.html

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The Derbyshire Partnership Forum – List of Partners

The Derbyshire Partnership Forum comprises a number of public, private, voluntary and community sector organisations who have been working together to improve the quality of life of the people of Derbyshire.

Alliance Sub-regional Strategic Partnership
Amber Valley Borough Council
Amber Valley Council for Voluntary Service (CVS)
Amber Valley Local Strategic Partnership (LSP)
Big Lottery Fund
Bolsover LSP
CHART LSP
Chesterfield Borough Council
Church & Society Forum
Citizens Advice Bureau
Community and Voluntary Partners (Bolsover)
Cotmanhay Neighbourhood Management
Derby and Derbyshire Economic Partnership
Derby City Council
Derbyshire Association of Local Councils
Derbyshire Chamber & Business Link
Derbyshire Community Foundation
Derbyshire Connexions
Derbyshire Constabulary
Derbyshire County Council
Derbyshire County PCT
Derbyshire Dales CVS
Derbyshire Dales District Council
Derbyshire Dales and High Peak LSP
Derbyshire Fire and Rescue Service
Derbyshire Learning and Skills Council
Derbyshire Probation Service
Derbyshire Rural Community Council
Derbyshire Sport
Derbyshire Wildlife Trust
District of Bolsover
East Midlands Strategic Health Authority
Environment Agency (East Area, Midlands)
Erewash Borough Council
Erewash CVS
Erewash LSP
Government Office for the East Midlands
Groundwork Creswell, Ashfield & Mansfield
Groundwork Derby and Derbyshire
High Peak Borough Council
High Peak CVS
Highways Agency
Job Centre Plus
Links Chesterfield and NE Derbyshire CVS
Natural England
National Farmers Union
North East Derbyshire District Council
Peak District National Park Authority
Police Authority
South Derbyshire CVS
South Derbyshire District Council
South Derbyshire LSP
Sport England
Staveley Neighbourhood Management
Tameside and Glossop PCT
The University of Derby
Third Sector Support for Derbyshire (3D)