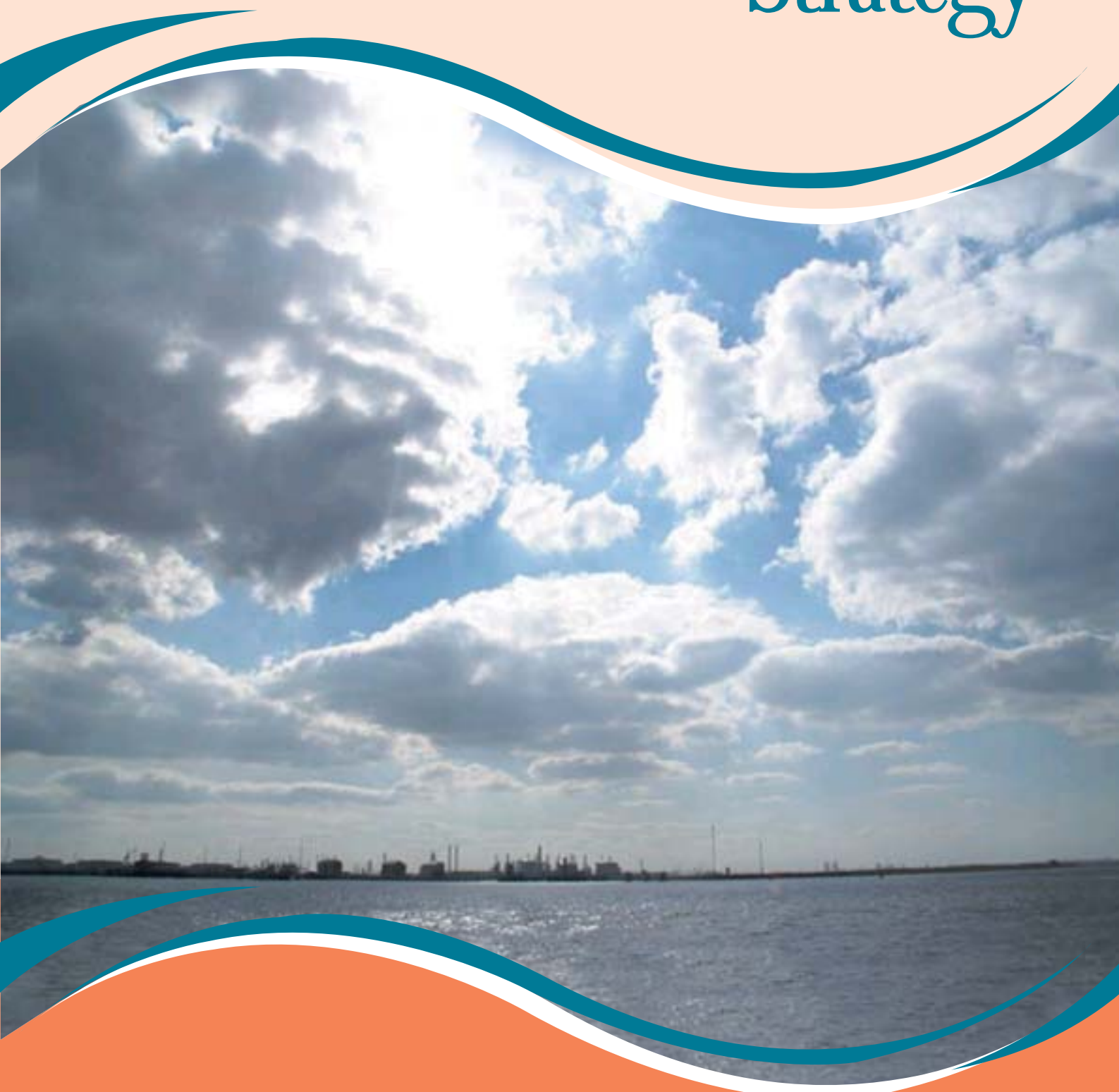




# The Tees Valley Climate Change Strategy



Reporting Period  
2006 - 2012



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**Published 2007**

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## Foreword

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“Climate change is probably the greatest long-term challenge facing the human race. That is why the Tees Valley Climate Change Partnership has made it a top priority for the sub-region and will lead the way to a low carbon future.

There is no longer any data contradicting the predictions of global warming models<sup>1</sup>, every week new evidence emerges demonstrating climate change is the biggest threat facing humanity. Not only is climate change impacting on our lives now, we have also committed future generations to these impacts for at least the next 100 years.

Global temperatures have risen by 0.6°C since 1850, and at the same time levels of carbon dioxide (CO<sub>2</sub>) in the atmosphere have increased to a concentration that is higher now than at any time in the last 650,000 years. The ten warmest years globally since instrumental records began in 1861 have all occurred since 1994. 1998 was the warmest year and 2005 was almost as warm.

Should we do nothing, global average temperatures could increase by as much as 5.8°C before the end of the century. This would have a devastating impact on our economy and natural environment in the Tees Valley, the UK and above all the most vulnerable developing countries.

The vastness of the challenge that the human race has before it can only be met by working together. Our aim is to facilitate corporation of all individuals and public and private bodies together, to safeguard the future of the Tees Valley.

Whilst our task has only just begun, for the first time, all parts of society in the Tees Valley will have a point of reference through our work.”

**Bob Pailor MBE**  
Chair of the Tees Valley Climate Change Partnership





## Statements of Support

“This is a powerful and comprehensive Strategy and is an invaluable ‘call to action’ for the Tees Valley. The challenge now is for us all to translate strategy into delivery. Agreed targets for reductions in greenhouse gas emissions and robust monitoring systems are essential, as are the provision of good quality information and simple routes to action for all sections of the community. This Strategy provides an excellent platform for the Tees Valley and here at the Energy Saving Trust Advice Centre we look forward to playing our part in this vital work”

**Steve Hunter**

**Energy Saving Trust Advice Centre - Director**



“Hartlepool on its own cannot influence the world's climate, but the world's climate does affect Hartlepool. As such, we are keen to tackle climate change on a local level, and working in partnership with other Local Authority areas in the Tees Valley ensures a consistent and coordinated approach to the problem. This Strategy is a clear statement that we are committed to combating climate change, and here in Hartlepool we will strive to continue our good work in this area and achieve further progress.”

**Mayor Stuart Drummond**

**Hartlepool Partnership - Vice Chair**



“Redcar and Cleveland Borough Council acknowledges both the threat posed by climate change and the response that needs to be taken by the Council, its partners and citizens of the borough. As a coastal borough, we take the threat seriously and have publicly declared to reduce our emissions and adapt to the changes that will take place. We have fully supported the development of this innovative, collaborative Tees Valley Climate Change Strategy and wholeheartedly endorse its aims. We are committed to working with our partners across the sub-region to ensure its delivery.”

**Councillor Eric Empson**

**Chair of the Cabinet,**

**Redcar and Cleveland Borough Council**



## Statements of Support

“As signatories of the Nottingham Declaration on Climate Change Stockton Borough Council is committed to reducing emissions from our own activities as well as working with the community to secure action on a local level to tackle this important issue. We recognise that reducing emissions of greenhouse gases, developing new approaches to cut our reliance on fossil fuels, and adapting to the inevitable impacts of climate change can be achieved most effectively through joint working across the Tees Valley. I commend this strategy and ask that the community as a whole work with us in achieving our targets.”

**Steve Nelson**

**Stockton Borough Council - Cabinet Member for the Environment**



“Global warming is no longer a subject which inhabits text books; it is happening now. The Tees Valley Climate Change Strategy provides an important framework to secure a safe and sustainable environment in the decades to come. The future is in our hands. Reducing carbon dioxide emissions is one of my 20 key priority reduction targets and I fully support the aims and objectives in the strategy.”

**Ray Mallon**

**Mayor of Middlesbrough**



“Darlington Borough Council recognises that climate change is occurring and is committed to securing local action in tackling this important issue, by signing the Nottingham (Darlington) Declaration on Climate Change. Working in partnership with other key organizations within the Tees Valley will ensure a co-ordinated and effective approach to both mitigating and adapting to the effects of climate change. This strategy represents an innovative approach to joint working across the Tees Valley and is a clear statement of the commitment to combating climate change.”

**Councillor Harker**

**Cabinet Member for Consumer and Environmental Services**







## *Executive Summary*

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“I think in terms of the long term future there is no issue that is more important than climate change...it would be deeply irresponsible not to take action.”

*Tony Blair; New Zealand Climate Change Speech, March 2006*

“There is still time to avoid the worst impacts of climate change...the benefits of strong and early action far outweigh the economic costs of not acting.”

*Stern Review: The Economics of Climate Change, October 2006*

The Tees Valley Climate Change Partnership has been established to ensure that a coordinated approach is taken to tackling climate change across the sub-region, and to maximise results through the sharing of resources.

This Strategy has been produced by the 5 Tees Valley Boroughs of Darlington, Hartlepool, Middlesbrough, Redcar and Cleveland and Stockton, and other key partners (as listed in Chapter 1.3). The Tees Valley Climate Change Partnership is engaging with Government Office for the North East and the North East Assembly to ensure effective coordination with the North East Regional Action Plan. Short-term targets will be subject to annual review.

The Tees Valley Climate Change Strategy is a sub-regional, partnership document encompassing the whole of the Tees Valley. Although each Local Authority will be documenting and implementing its own local action plan with their Local Strategic Partnerships, responsibility for co-ordinating action rests with the entire Climate Change Partnership. Reaching the overall short-term and long-term emission reduction targets for the Tees Valley is therefore more significant, and a better indicator of success, than annual reductions in each area. A consensus by all partners to adopt the approach, principles and targets in this Strategy is essential for success.

### **The Tees Valley Climate Change Strategy:**

- Provides a background to the current situation in the Tees Valley, in terms of energy use, waste and transport.
- Sets targets of 8.75% (minimum) and 14% (aspirational) for reducing CO<sub>2</sub>e from 2000 levels for the period 2006-2012.
- Introduces the Tees Valley Emissions Reporting Protocol as a methodology for monitoring emissions throughout the sub-region. Data includes gas, electricity, and other fuel (solid and oil) consumption, waste tonnages, road transport fuel consumption and emission estimates for aviation and rail.
- Outlines year 2000 baseline data for each Local Authority area, against which all measures to reduce CO<sub>2</sub>e will be assessed.
- Outlines broad actions that will be taken to achieve emission reductions, adapt to existing climate change and raise awareness amongst the community.
- Provides a timescale and plan for delivery and review, including identification of partners responsible for implementation. Progress update reports will be published annually, based on carbon savings from projects implemented. Published emission levels for the Tees Valley as a whole will be released in conjunction with the availability of data from the Department of Trade and Industry (DTI).



# Chapter 1

## Introduction

There is strong scientific consensus now that the rise in temperature cannot be explained solely by the natural variability in our climate system, but is due to the recent activities of humans.

### 1.1 What is Climate Change?

Huge volumes of carbon dioxide (CO<sub>2</sub>) have been released into the Earth's atmosphere since 1850 due to the burning of fossil fuels (coal, oil and natural gas). The level of CO<sub>2</sub> in the atmosphere is higher now than at any time in the last 650,000 years<sup>2</sup>.

The **greenhouse effect** is a natural process by which gases in the atmosphere (including carbon dioxide, methane, nitrous oxide and water vapour) trap some of the sun's energy, warming the Earth enough to support life. Human activity is enhancing this effect by increasing the levels of these gases present in the atmosphere.

**Global warming** is the publicly recognised term for the current concern over changes to the Earth's climate. Global warming refers to the average warming of the whole Earth.

**Climate change** refers to the effect of the warming on weather conditions (such as increases in hurricane intensity and heat waves) and unpredictable variations in temperature.

Figure 1

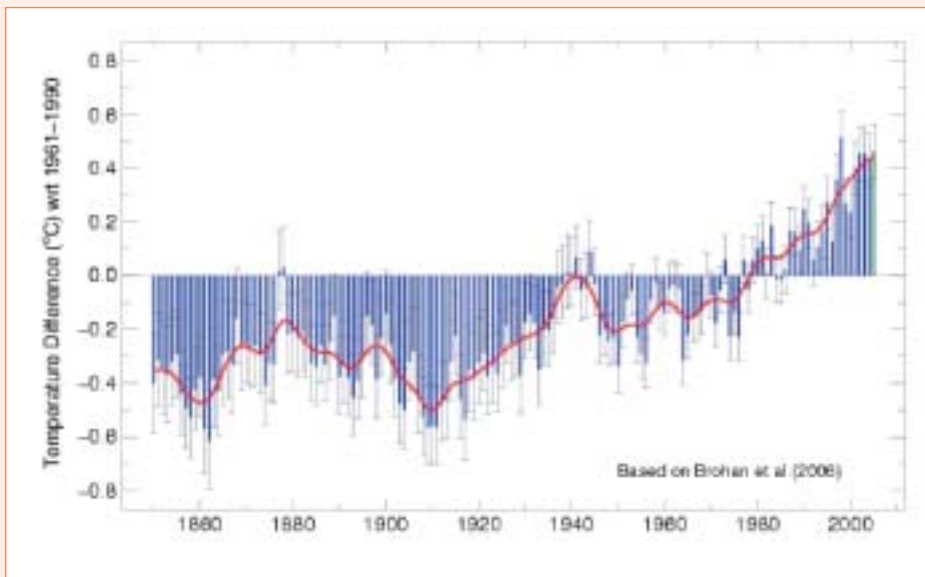


Figure 1 shows the global average temperature change from 1850-2005 with respect to a 1961-1990 average<sup>3</sup>, collated by Philip Brohan and colleagues from the UK Meteorological Office. This information is based on regular measurements of air temperature at land stations and of sea-surface temperature measured from ships and buoys.

<sup>2</sup> Siegenthaler et. al., 2005, Science, 310, 1313-1317

<sup>3</sup> Brohan et al., 2006, Journal of Geophysical Research, in press

## Chapter 1

### Introduction

Climate change is a global issue, and as such there have been attempts to reach international agreement on setting targets for reducing emissions. The Rio de Janeiro Conference in June 1992 highlighted the issue of climate change, and this was then bolstered in 1997 through the Kyoto Protocol, an agreement made under the United Nations Framework Convention on Climate Change, which assigned mandatory targets for the reduction of greenhouse gases to signatory nations. Countries around the world are, therefore, working together to cut emissions and help to reduce the causes and effects of climate change.

The implementation and success of such agreements, however, depends on local action. The Tees Valley is taking a lead in establishing an effective sub-regional strategy for tackling climate change, and in raising awareness at a local level.

### 1.2 What is the Tees Valley?

The Tees Valley is a distinct and unique economic and cultural area in the North East of England, consisting of the 5 unitary boroughs of Hartlepool, Darlington, Stockton-on-Tees, Middlesbrough and Redcar & Cleveland (see Figure 2). This dynamic region combines miles of spectacular coastline and countryside with vibrant urban centres and a thriving, innovative industrial base.

Figure 2 Map of the Tees Valley



Source: Tees Valley Tourism



### 1.3 The Tees Valley Climate Change Partnership Initiative

The Tees Valley Climate Change Partnership was established in 2005 in response to the threat of climate change to the Tees Valley sub-region. The Partnership consists of both funding partners and supporting/strategic partners (as listed in the *Supporting Document*<sup>4</sup> to this Strategy). The 9 funding partners are:

- Environment Agency
- Darlington Borough Council (DBC)
- Hartlepool Borough Council (HBC)
- Middlesbrough Council (MBC)
- Redcar & Cleveland Borough Council (RCBC)
- Stockton-on-Tees Borough Council (SBC)
- Tees and Durham Energy Advice (TADEA)
- Renew Tees Valley
- Scottish Power

A total of £110,000 of funding has been allocated for the joint initiative, used in part to support a full time Climate Change Coordinator who will deliver on the key aims of the project for a period of 3 years from October 2005.

The aim of the Partnership is to be an influential voice providing direction and articulating views on climate change to policymakers and the wider community. The Partnership will lead and drive programmes to raise the profile of the climate change agenda, and build confidence for all affected by climate change. Working closely together will enable us to succeed in reducing greenhouse gas emissions, and in effectively adapting to existing and future climate change.

#### *The Strategic Aims of the Tees Valley Climate Change Partnership are:*

- To establish a Tees Valley Climate Change Strategy that will support and compliment the development of local and sub-regional carbon reduction and climate adaptation delivery plans.
- To set challenging but achievable emission reduction targets for a 25-year period.
- To develop an effective emissions reporting protocol and methodology that will help to analyse the Tees Valley's role in contributing to climate change.
- To build upon the work of Middlesbrough Council in relation to their Climate Change Community Action Plan, through the development and implementation of similar action plans across the other Local Authority areas in the sub-region.
- To raise awareness of climate change amongst the population of the Tees Valley and to highlight the economic, societal and environmental benefits of adopting a low carbon economy.

<sup>4</sup> The Supporting Document is designed to be read in conjunction with this Strategy, and goes into further detail on areas of particular interest. This document is available from the Tees Valley Climate Change Partnership (see Chapter 8.3 for contact details).



## Chapter 2

# Impacts of Climate Change

Scientists warn that the gradual warming of the atmosphere as a result of human activity will have serious environmental consequences. The climate will change, resulting in more storms, floods, droughts and other extreme weather events.

### 2.1 Global Impacts of Climate Change

The current scientific consensus is that climate change will affect communities in the developing world more than it will more affluent countries. Living in a prosperous society, we have the technological and financial capacity to adapt rapidly to the potential changes a warmer atmosphere might bring.

Those less fortunate can expect to experience increased flooding affecting the viability of communities, drought affecting their agriculture, an increase in disease, wars over water, and famines on a large scale. The World Health Organisation estimates that climate change is already causing 150,000 premature deaths per year. Many prevalent human diseases are strongly linked to climate change. Cardiovascular, respiratory and infectious diseases are all exacerbated by malnutrition and heat stress, and thus are expected to become more prevalent with expected future changes to the climate<sup>5</sup>.

Potentially vulnerable regions include the temperate latitudes, with regions around the Pacific and Indian oceans projected to warm disproportionately, as well as sub-Saharan Africa and sprawling cities where the urban heat island effect could increase the intensity of extreme climatic events.

The effects of climate change on developed countries such as the UK, although possibly less damaging than those experienced in developing countries, are still potentially serious. As such it is imperative, both for the health and success of our own region, and for the lives of those in the developing world, to act now to reduce emissions. As the main contributors of historic greenhouse gas emissions, industrialised countries have the responsibility to lead the way to a low carbon future.

### 2.2 Predicted Changes to the North East Climate

General projections for the UK based on data from the UK Climate Impacts Programme (UKCIP), include drier, warmer summers and milder, wetter winters. There will also be an increase in both the number and extent of extreme events (such as floods, storms, droughts and heat waves).

- Average annual temperatures in the North East may rise by between 0.5 and 1°C from 2000 levels by the 2020s.
- High summer temperatures will become more frequent and very cold winters will become increasingly rare.
- A very hot summer, as experienced in 2003 with the average August temperature 3.5°C above normal, may occur as often as 1 year in five by the 2050s.

<sup>5</sup> Patz et al., 2005, Nature, **438**,310-317



## Chapter 2

# Impacts of Climate Change

- The sea level along the Tees Valley coastline could rise by up to 20cm by 2020.
- Winds are expected to increase in frequency and strength throughout the UK. An increase in wind speed of just 10% results in a rise in storm damage insurance claims of 150%.
- Winters are expected to become wetter by around 4-6%, and summers drier by perhaps 7 to 10% across the North East by the 2020s.
- Extreme winter precipitation will become more frequent.
- Depending on emissions scenario, winter snowfall is predicted to decrease by between 40-100% by the 2080s.

### 2.3 Expected Impacts of Climate Change on the Tees Valley

The Impacts of climate change on the Tees Valley can be split up in to eight themes. The following sections are based on information from the 2002 report 'And the weather today is...'<sup>6</sup>, supplemented by reviewed journal articles and more up to date information from UKCIP.

#### ➤ *Business and Tourism*

The Tees Valley is likely to benefit significantly from the business opportunities brought about by climate change. Negative impacts on business include rising insurance and energy costs. This is likely to drive more stringent planning regulations and will encourage increased resource efficiency.

- There will be opportunities to develop new products and services, such as micro-renewables, that will help individuals reduce fuel and water consumption.
- Tees Valley is set to become the centre of the biofuels industry, already hosting the largest biofuels refinery in Europe, with the development of a rapeseed crusher eventually set to produce locally sourced biodiesel. Several other plans are underway for a second biodiesel refinery and its first bio-ethanol plant, as well as a wood-fuel facility.
- Warmer, drier summers are likely to encourage people to take holidays within the UK rather than travel abroad.

#### ➤ *Health*

A national assessment suggests that the main impacts of climate change on health in the UK will be through increased frequency of extreme weather events such as heat waves and floods, through changing patterns of infectious disease, and via increased exposure to ultra-violet (UV) radiation.



<sup>6</sup> And the weather today... (2002), commissioned by the North East Assembly on behalf of Sustainability North East (SustainE) with support from the UK Climate Impacts Programme (UKCIP)

## Chapter 2

# Impacts of Climate Change

Key findings of the Department of Health, 'Health Effects of Climate Change in the UK (2001)' were:

- Cold-related deaths, and deaths from bronchiolitis and pneumonia are likely to decline substantially, by perhaps 20,000 cases a year<sup>7</sup>.
- Heat-related deaths are likely to increase, by about 2,000 cases per year. The precautions necessary to cope with the expected frequency of heat waves are outlined in the document 'Heat wave plan for England' published in July 2004.
- Cases of food poisoning are likely to increase significantly, by perhaps 10,000 cases a year.
- It is likely that victims of the impacts of climate change (e.g. flooding) will suffer from increased levels of stress and mental illness.

### ➤ *Agriculture*

The impact of climate change on agricultural and horticultural practices includes changes in the location of agricultural activities, earlier development and growth, changed yields and quality.

- Crops we would normally see growing in the south of the country will be able to be grown further north. The United Nations (UN) believes there will be a shift northwards of between 200 and 300 kilometres for every degree of warming.
- Arable farming may become viable in some previously uncultivated areas.
- Times of planting and harvesting may change as the growing season lengthens.
- Increased dryness in the summer could affect the quality and yields of crops.
- Increased irrigation/drainage may be required to deal with water shortages and water-logged land.
- Soil erosion may increase.
- Migration of different pest species and crop/livestock diseases may occur.
- Increased summer temperatures may exert heat stress on livestock.

### ➤ *Forestry*

In 2002, the Forestry Commission published the report 'Climate change: Impacts on UK forests<sup>8</sup>'. The key conclusions of this report were:

- Rising CO<sub>2</sub> levels and a longer growing season are likely to increase forest productivity across large areas of the UK, where growth is not limited by water or nutrient supply.

<sup>7</sup> Donaldson, G. C. (2006) Climate change and the end of the respiratory syncytial virus season. *Clinical Infectious Diseases*, 42: 677-679

<sup>8</sup> Broadmeadow, M. (2002) Climate Change: Impacts on UK forests, Bulletin 125

## Chapter 2

# Impacts of Climate Change

- Commercial species suitability will change, as well as the character and structure of native woodland ecosystems.
- There will be an increased risk of forest fires.
- It is likely that social and economic factors will play a larger part than climate change in determining the composition of plantation forests.

### ➤ *Transport and Highways*

There are a large number of important impacts for the transport industry presented in the document ‘The changing climate: its impact on the Department for Transport<sup>9</sup>.’

The following issues are the most critical:

- Highways, airport runways and rail infrastructure will all suffer from the same physical impacts of the changing climate. Possible problems include subsidence, flooding and drainage issues.
- The age of the rail network means that there are already problems with landslips and collapses during times of heavy rain. These affect old embankments, tunnels and areas where there are old mine workings. Problems can be expected to increase.
- Rail and road closures may result from storms and flooding, cutting off communities from ground based emergency care.
- Difficult driving conditions due to snow and ice would reduce.

### ➤ *Buildings*

- Increases in rainfall will place additional strain on the water drainage and flood defences of buildings and urban areas within the Tees Valley. Heavy intense events and the likelihood that these will become more frequent means that existing flood defence and water runoff systems would be operating outside their design criteria.
- Foundations can be significantly affected by the ground shrinking as a result of drying and swelling when it has to absorb water again. This can damage buildings and cause walls to crack, requiring structural intervention such as underpinning.
- Wind action on buildings causes pressures that can lead to structural failure. This can range from individual roof tiles being removed through uplift, to flat walls and gable ends being sucked out. Very severe damage is also possible when chimney stacks or adjacent trees collapse on to a house.

<sup>9</sup> The changing climate: its impact on the Department for Transport, DfT, 2002



## Chapter 2

### *Impacts of Climate Change*

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- Exposure to increased levels of driving rain will lead to more rapid weathering of buildings and thus higher maintenance requirements in order to ensure that buildings remain weather-tight throughout their expected lives.
- People will be more uncomfortable during the summer due to warmer external temperatures. This will increase the demand for air-conditioning in buildings, potentially offsetting reductions in energy consumption brought about through energy efficiency and conservation measures.

#### ➤ *Energy Resources*

- Extreme weather events already cause significant disruption to supply, but an increased rate of climate change could exacerbate this and also lead to shifts in the demand for energy.
- Renewable sources of energy are likely to play an increasing role in energy supply, but will themselves be affected by the changing climate. For example, wind turbines rely on a relatively stable wind and will fail to function effectively in very low or high wind conditions.

#### ➤ *Water Resources*

- Given that the Tees Valley has above average levels of rainfall it is unlikely that the sub-region will suffer from water shortages. Other problems, however, may still be experienced.
- Reduced water levels can have a detrimental effect on water quality, as there is less water to dilute discharges.
- Flooding increases pollutant concentration from water by drawing in pesticides and other toxins from the surrounding area.
- Drought affects the colour of water - the lower the water levels, the higher the discolouration due to sediment levels.



## Chapter 3

# The Tees Valley Climate Change Strategy

A climate change strategy is a valuable tool to raise the profile of climate security throughout the Tees Valley, signal our commitment to the wider community and plan actions in a coherent manner.

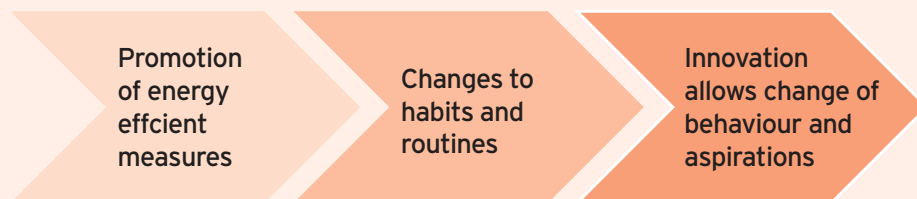
### 3.1 The Tees Valley Approach to Reducing Emissions

Over the lifetime of this Strategy (2006-2012) the Tees Valley Climate Change Partnership will achieve a minimum 8.75% reduction in CO<sub>2</sub>e<sup>10</sup> below 2000 levels. This equates to an average 1.25% annual reduction target for this period. For 2012-2030 the minimum target will be 27% (an average annual target of 1.5%). These emission reductions will be achieved by progressively moving through the Tees Valley's Climate Change Spectrum (Figure 3) towards a future low carbon economy. This will result in increased resource efficiency, leading to competitive and innovative businesses, low fuel bills, and to communities that are pleasant and healthy places in which to live, learn and work.

#### ➤ Promotion of energy efficiency measures

Measures in the first part of this spectrum require less intervention. Promotion of energy efficiency measures such as cavity wall insulation, energy saving light bulbs, or a micro wind turbine, can have significant positive environmental impacts, but require little active change at the individual level. Hartlepool Borough Council has already made significant progress in promoting these types of measures (see Box 1).

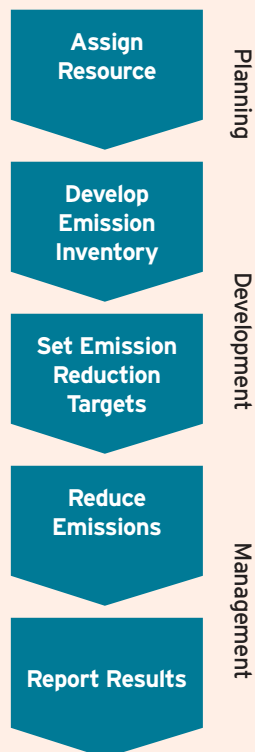
Figure 3 The Climate Change Spectrum



#### ➤ Changes to habits and routines

In the centre of the spectrum are more deep-seated changes in behaviour, such as turning off lights, opting to walk or cycle rather than using a car, buying locally produced foods, minimising consumption and increasing recycling.

STEP-BY-STEP SUMMARY OF THE TVCCP CLIMATE CHANGE STRATEGY



<sup>10</sup> CO<sub>2</sub>e is an abbreviation of 'carbon dioxide equivalent' and is an internationally recognised measure of greenhouse gas emissions.



## Chapter 3

# The Tees Valley Climate Change Strategy

### ➤ *Innovation allows change of aspirations*

At the far end of the spectrum are innovations and measures that encourage people to change their aspirations, bringing more fundamental changes in behaviour, for example, around air transport. The Tees Valley Climate Change Partnership is directly addressing the issue of rapidly increasing flight volumes by supporting Durham Tees Valley Airport's 'Last Call!' carbon offset scheme in partnership with Tees Forest (see Chapter 6.3).

## 3.2 *Application of the Framework*

The Partnership has already worked through the Planning and Development stages of the Strategy and will now be focusing on Management (reducing emissions and reporting results), as covered in Chapters 5, 7 and 8. Chapter 7 outlines the steps we will take to facilitate progression through Figure 3, with actions focusing on all three elements of the spectrum, and an ultimate aim of changing the aspirations of residents in the Tees Valley.

### **Box 1 - Corporate energy savings in Hartlepool**

Since signing the Nottingham (Hartlepool) Declaration on Climate Change and Tees Valley Climate Change Charter, a variety of projects and schemes have been utilised to help HBC reduce their CO<sub>2</sub>e emissions. The 4th November 2006 was a Climate Change 'Day of Action'. This preceded a week long corporate energy savings campaign in conjunction with the Energy Saving Trust (EST). This initiative involved a number of volunteer EST-trained 'Energy Champions' educating their colleagues about improving energy efficiency, by promoting measures such as turning equipment off standby and unplugging mobile phone chargers when not in use. Prizes for staff participating included free loft or cavity wall insulation, an energy efficient microwave and a solar powered radio. In addition to this, all staff were provided with home energy surveys, for completion of which they received an energy saving goodie-bag.

In recognition of this type of initiative HBC has recently been accredited under the Carbon Trust's Energy Efficiency Scheme.

## Chapter 4

# Emission Reduction Targets

Setting achievable targets to reduce emissions is essential for any strategy aiming to tackle climate change by the introduction of measures to mitigate as well as to adapt.

The following section outlines both short-term (2006-2012 inclusive) and long-term (2012-2030) emission reduction targets. Both targets will help the Tees Valley contribute to the long-term delivery of the national CO<sub>2</sub> reduction target of 60% below 1990 levels by 2050.

### 4.1 Short-Term Aims

#### 2006-2012

- An average annual 1.25% reduction from 2000 levels each year  
(total minimum net reduction of 8.75%)
- An aspirational annual 2% reduction from 2000 levels each year  
(total net reduction of 14%)

### 4.2 Long-Term Aims

#### 2012-2030

- An average annual 1.5% reduction from 2000 levels each year  
(cumulative net reduction of 35.75% below 2000 levels from 2006-2030)
- An aspirational annual 2% reduction from 2000 levels each year  
(cumulative net reduction of 50% below 2000 levels from 2006-2030)

Whilst much research has been carried out into forecasting the future using a number of different scenarios and advanced modelling techniques, there is no convergence of ideas of what is achievable within this time frame. We have therefore set ourselves what we believe to be realistic aspirational targets, with minimum targets acting as a buffer against uncertainty. These targets will be reviewed on an annual basis (see Chapter 8) and are quantified in Table 1. The average annual reduction target for each Local Authority area is 11,813 tonnes of CO<sub>2e</sub>.

However, given that some Local Authority areas have a higher baseline than others, this is an average target and actual reductions are anticipated to vary depending on area. As a sub-regional Partnership we believe that this strategy should focus on reducing emissions across the entire sub-region. Emission targets for each Local Authority area are therefore less significant than overall cumulative emission levels and required reductions.

Major industry will be subject to the same reduction targets as the domestic and Small and Medium Enterprise (SME) sectors. The Environment Agency will lead for the delivery of major industry reductions through the Emission Trading Schemes, Climate Change Levy and PPC Regulations (see the *Supporting Document* for more information on these schemes).

The Partnership has not set targets beyond 2030 as it is likely that the 'safe' level of CO<sub>2</sub> concentration in the atmosphere estimated by the Royal Commission on Environmental Pollution (RCEP) will be reduced in the near future, based on increased understanding of the sensitivity of the climate to increasing levels of greenhouse gases.

## Chapter 4

### *Emission Reduction Targets*

Table 1: Tees Valley short-term emission reduction targets (tonnes of CO<sub>2</sub>e, based on 1.25% annual decrease)

	LAs/LSPs	EA (major industry)	TV Total*
2000 baseline	4,725,442	15,702,000	20,544,112
Average annual reduction 2006-2012 (1.25%)	59,068	196,275	256,801
Total reduction required 2006-2012 (8.75%)	413,476	1,373,925	1,797,610

\* Includes emissions from aviation and rail



## Chapter 5

# Emissions Reporting Protocol

Carbon provides a common currency for assessing the value of our actions in the context of mitigating climate change.

A vital part of any climate change strategy is to have an accurate inventory for a baseline year. This enables the identification of the main energy using sectors, and allows the Tees Valley Climate Change Partnership to set reduction targets and benchmark to allow for meaningful comparisons of emissions over time.

The aim of the Tees Valley Emissions Inventory (TVEI) is, therefore, to provide a guide to a well-targeted climate change strategy for each Local Authority, and the sub-region as a whole, but not to provide a detailed ecological footprint.

The formation of the TVEI was facilitated through the development of a unique end-user based Tees Valley Emissions Reporting Protocol (ERP) in partnership with Middlesbrough Council, the Environment Agency, the South East Climate Change Partnership (SECCP), DTI and DEFRA. The purpose of having an ERP is to assist Local Authorities to report emissions, and to present information on the connection between fossil fuels, electricity consumption and greenhouse gas emissions in a quantifiable way.

More information on the ERP and TVEI can be found in the *Supporting Document* to this Strategy.

### 5.1 The Baseline

In 2000, the Tees Valley's emissions were around 20.5 million tonnes of CO<sub>2</sub>e from all sectors. In CO<sub>2</sub>e we include carbon dioxide, methane and nitrogen oxides, expressed as an equivalent amount of carbon dioxide. These are the greenhouse gases which we will be targeting for reduction (see Chapter 8 for more information on the delivery process).

Table 2 displays Tees Valley emission levels for the year 2000. This shows that over 80% of emissions came from energy consumption and around 15% from transport. Most emissions in the Tees Valley come from major industry. This sector represents a key economic driver in the sub-region and is subject to the same emission reduction targets as the other sectors (see Chapter 4). The Environment Agency will lead in meeting these reductions and will be submitting annual progress reports to the Tees Valley Climate Change Partnership.

Working in partnership with the Environment Agency, we have disaggregated emissions from major industry from the DTI and Defra data in order to provide a representation for each Local Authority area. This is to ensure that their targets are realistic and represent emissions that are related to individual and commercial consumption and lie within the control of the Local Authorities/Local Strategic Partnerships.

## Chapter 5

# Emissions Reporting Protocol

### Data for Middlesbrough

The Tees Valley Climate Change Partnership has worked in close Partnership with Middlesbrough Council, which established its own methodology in 2004 with the release of its Community Action Plan, trying to ensure data comparability and establish a similar Emissions Reporting Protocol. However, due to the gradually evolving and experimental nature of data sources, the baseline data according to the Tees Valley Emissions Reporting Protocol is slightly different to Middlesbrough's own baseline data, as published in their Community Action Plan and subsequent work programs. At Middlesbrough's request the Tees Valley Climate Change Partnership has included Middlesbrough's own data in Table 2.

The Tees Valley Climate Change Partnership does not consider this to be a significant barrier to implementation and monitoring as close coordination with Middlesbrough and transparent reporting processes will continue. Both methodologies are likely to be subject to regular review, as the availability and reliability of data improves. The Tees Valley Climate Change Partnership will be working closely with Middlesbrough in the future to ensure methodology convergence. Further information on the differences between the Tees Valley and Middlesbrough data can be found in the *Supporting Document*.

### Emissions from Aviation

Emissions from domestic aviation are covered by the Kyoto Protocol, but international aviation emissions are excluded. This is due to the difficulties associated with attaching responsibility for trans-boundary emissions. However, to ignore international emissions from aviation risks invalidating the UK Government's pledge to cut carbon dioxide emissions by 60% below 1990 levels by 2050. For this reason, although not explicitly included in the final Local Authority baseline figure, we do include emissions from personal international travel at the Tees Valley level. This figure is based on a regionally specific value of 0.17 tonnes/capita taken from the Ecological Budget UK<sup>11</sup>.

Aviation emissions will be controlled in the future through the EU Emissions Trading Scheme (EU ETS)<sup>12</sup>, but the Partnership believes that the Tees Valley should lead the way and consider the impact of air travel, at least for experimental purposes.

<sup>11</sup> WWF, SEI, cure and Biffa, 2006, Ecological Budget UK - Counting Consumption

<sup>12</sup> For more information on EU and UK ETS please consult the Supporting Document to the TVCC Strategy

## Chapter 5 Emissions Reporting Protocol

Table 2 CO<sub>2</sub>e emissions (kTonnes) by sector for baseline year 2000

			TV Total
<b>Energy</b>			3,590
Gas	Domestic	915.5	
	Industrial & commercial	766.4	
Electricity	Domestic	481.4	
	Industrial & commercial	1,140.8	
Other fuels (solid fuels <sup>13</sup> & fuel oils)		285.6	
<b>Municipal Waste</b>			96
<b>Road Transport</b>			1,039
Other transport	Aviation	108.66	116.67
	Rail	8.01	
<b>Total*</b>			4,842
<b>Major Industry sub-total</b>			15,702
<b>Total (all sectors)</b>			20,544

\* Excluding emissions from major industry

<sup>13</sup> Solid fuels includes both coal, and solid manufactured fuels such as coke, Benzole, tars, coke oven gas and blast furnace gas.

## Chapter 6

### Current Situation in the Tees Valley

An assessment of the current state of play in terms of emissions from different sectors across the sub-region is a useful precursor to producing a list of carbon-saving actions.

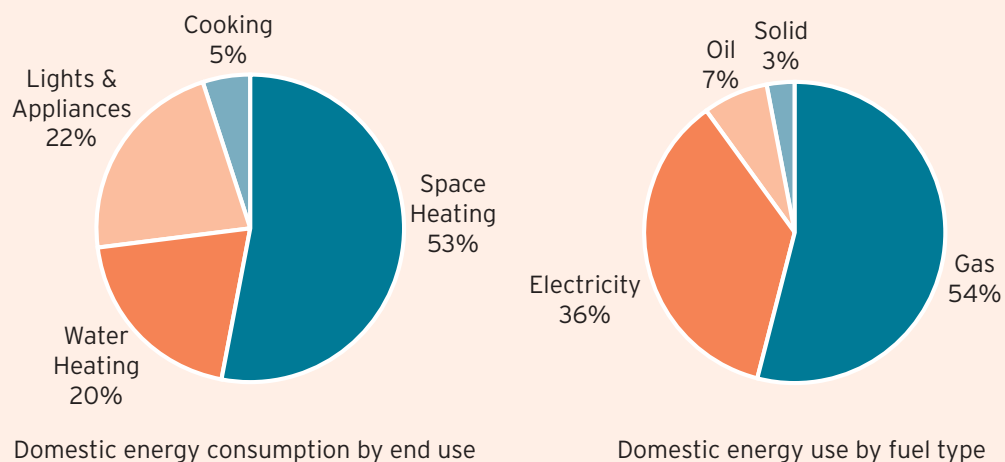
#### 6.1 Use of Energy (electricity, gas, solid fuels and fuel oils)

##### ➤ Domestic and Small to Medium-size Enterprises (SMEs) Users

The domestic sector accounts for almost one third of the UK's total energy consumption, and around half of the reduction necessary to meet the Tees Valley emissions targets is anticipated to come from the domestic sector. In many cases the energy services we demand are provided using equipment that is less efficient than the latest technology due to age, technology or design.

Figure 4

Domestic sector energy profile (2003)



(Source: Defra)

Figure 4 shows the domestic sector energy profile for the UK, with domestic energy consumption by end use on the left and domestic energy use by fuel type on the right. A large proportion of energy is used for space heating (around 53%). Home energy use is therefore central to efforts to reduce greenhouse gas emissions. Within the Tees Valley, Stockton-on-Tees Borough Council has shown some success in achieving reductions in household energy consumption (see Box 2).



## Chapter 6

### Current Situation in the Tees Valley

#### Box 2 – Home energy consumption in Stockton-on-Tees

In the Government's recently published "league table" of Local Authorities that have made the most progress in saving energy in the home, Stockton was 14th in the whole country and 4th in the region. The energy saving of domestic properties in the Borough was over 25% compared with an average in the region of 18%. This equates to a reduction of over 135,000 tonnes of carbon dioxide (CO<sub>2</sub>) being released into the atmosphere from our homes.

Stockton rose to the challenge of increasing energy efficiency as far back as 1996, through the development of an affordable warmth strategy in conjunction with "National Energy Action" in 2001. Partnership work has also enabled the delivery of initiatives such as the Stockton Warm Zone where over 15,000 homes were insulated. Significant private sector investment of around £11.5 million (from British Gas and Transco) and Government grants have also contributed to this success.

The sources of inefficient energy use at the household level can be classed into three broad categories:

- The thermal and insulation quality of the house and heating system
- The number and energy rating of appliances
- The behaviour of individuals using the house and appliances.

All three can be targeted for improvement, and will make a strong contribution to the UK and Tees Valley emission reduction targets. In addition, concerns for disadvantaged residents who are classed as Fuel Poor (needing to spend more than 10% of their income on fuel to maintain an adequate standard of warmth), means that there are a raft of policies that impact on all aspects of the domestic energy sector. These are identified in the *Supporting Document* to this Strategy.

In addition to emissions from the home, this section also includes energy use from SMEs, which the Carbon Trust estimates contribute to around 6.6% of total UK emissions. The Partnership plans to achieve emission reductions within this sector through the Tees Valley Climate Change Charter (see *Supporting Document*) - a call to action for all businesses within the Tees Valley to commit to at least two measures, which will count toward emissions savings.

Each Local Authority in the Tees Valley is also a signatory to the Tees Valley Climate Change Charter. The role that Local Authority operations can play in achieving emission reductions is illustrated by the example of Hartlepool (see Box 1). This will be covered in more detail in individual action plans, which will be formulated by each Local Authority or Local Strategic Partnership in conjunction with this Strategy.

## Chapter 6

### Current Situation in the Tees Valley

#### ➤ Large Commercial and Industrial Users

Emissions from large commercial and industrial users (also including Local Authority operations) account for around two thirds of the UK's energy consumption and around 44% of all emissions from the UK.

Greenhouse gas emissions from industry are becoming increasingly regulated through the European Union and UK Emissions Trading Schemes (EU ETS and UK ETS respectively).

In Phase 1 of the EU ETS, approximately 1200 installations in the UK were included, covering approximately 46% of CO<sub>2</sub> emissions. These include industries involved in power generation, ferrous metals manufacture, mineral extraction and treatment and the manufacture of paper and board. In addition, any installation that has a combustion plant with a thermal input of greater than 20MW is also included, thus affecting food, chemicals and aerospace sectors as well as large hospitals and universities.

In late June 2006, the Government announced the proposal for the next phase of the EU ETS (Phase 2). The scheme is now expected to deliver additional savings of 8 million tonnes of carbon each year, beyond 2007. This is roughly equivalent to the emissions of 4.5 million households.

Given the strong industrial base of the economy in Tees Valley, it is no surprise that a number of industries have been affected by the EU ETS and UK ETS schemes. Some examples of the industries committed to emission caps under the EU ETS within the Tees Valley include:

- James Cook University Hospital, Middlesbrough
- Teesside Integrated Iron & Steel Works
- SembCorp Utilities Teesside Limited Power Station
- Combined Heat and Power Plant, Boulby Mine

Through partnership with the Environment Agency, the Tees Valley Climate Change Partnership supports policies that regulate emissions from the large commercial and industrial sector and acknowledge the greenhouse gas emissions reductions already achieved (see Box 3).

#### **Box 3 – Industry best practice: Dupont/Invista**

Adipic acid is manufactured at the Wilton complex as part of the process to make Nylon. This process generates significant quantities of nitrous oxide (N<sub>2</sub>O), an extremely potent greenhouse gas (310 times more effective than CO<sub>2</sub> at trapping the sun's heat). The annual plant releases were equivalent to about 20 million tonnes of carbon dioxide.

Although the plant is now owned by Invista, in 1998 it was operated by Du Pont, who made a commitment to construct a Combined Off Gas Abatement (COGA) plant to remove the nitrous oxide from the production process. In the COGA, N<sub>2</sub>O reacts with methane at high temperatures to form nitrogen, carbon dioxide and water. The heat from the reactions is harnessed to produce steam that is used elsewhere in the nylon manufacturing process. In the first full year of its operation (1999), the COGA unit destroyed 42,300 tonnes of N<sub>2</sub>O, equivalent to nearly 2% of total UK greenhouse gas emissions in 1990.

An additional benefit from the COGA is the destruction of ammonia and volatile organic compounds from other processes on the site.

#### 6.2 Emissions from Waste

This Strategy encompasses only municipal waste, and not most of the waste produced by commercial and industrial users. The reason for this is that comprehensive and accurate data are not yet publicly available for disposal of wastes from commercial and industrial processes. Most emissions associated with waste from these sectors lie outside the control of this Partnership. This strategy therefore focuses on emissions from municipal waste.

A Joint Waste Management Strategy covering Hartlepool, Middlesbrough, Redcar & Cleveland and Stockton-on-Tees Borough Councils means that most residual waste from these authorities is sent to the EfW (Energy from Waste) Plant at Haverton Hill, Billingham. A small proportion of this waste is currently landfilled, mainly at times when the EfW Plant is unavailable.

Darlington is not currently part of this contractual arrangement as it inherited a landfill-based contract when it became a unitary authority in 1997. Consequently it has focused on increasing recycling levels and is currently working on a new waste disposal contract that will include diversion from landfill as a priority.

Greenhouse gas savings are made partly from reductions in landfill emissions of methane (CH<sub>4</sub>), which has a much stronger warming effect than CO<sub>2</sub> (21 times more effective) and partly from increasing recycling. All landfill sites that accept biodegradable municipal waste have landfill gas control, which is flared to generate CO<sub>2</sub> rather than CH<sub>4</sub>. This gas is not currently used as a green fuel to generate electricity, but the Partnership will seek to promote this whenever it becomes viable. Waste recycling also significantly reduces greenhouse gas emissions because secondary materials (recycled from waste) use far less energy in production than primary raw materials (up to 95% less in the case of aluminium).

Current targets for Local Authorities in the Tees Valley area (excluding Darlington), set by the Joint Waste Strategy include:

- Raising civic amenity site recycling to 50% by 2010
- Encouraging waste minimisation in order to stabilise tonnages and achieve zero growth after 2010
- Increasing home composting rates to 20% by 2020
- Reducing municipal waste sent to landfill by 5% by 2010

The Tees Valley Climate Change Partnership supports these targets and will work towards both meeting and exceeding these standards wherever possible.

The Partnership also promotes the Waste Hierarchy, whereby waste reduction is considered to be better than re-use, then recycling, then energy recovery through incineration, then, lastly, landfill.



## Chapter 6

### Current Situation in the Tees Valley

Some critics argue that recycling sometimes has little benefit for the environment, but the recent publication of the largest and most comprehensive international review of life-cycle analyses (LCAs)<sup>14</sup> of waste management systems reports that higher rates of recycling do lead to reductions in overall carbon emissions. The document produced by WRAP<sup>15</sup> (Waste & Resources Action Programme) established that current levels of paper, cardboard, glass, plastics, aluminium and steel recycling save around 10-15 millions tonnes of CO<sub>2</sub>e per year compared with the current mix of landfill and incineration with energy recovery to the same materials.

By diverting large proportions of the waste stream to be recycled, therefore, significant emission reductions can be achieved. This is illustrated by Redcar & Cleveland's recycling scheme (see Box 4). By increasing their percentage recycling/composting to 36% in 2005/06 a total of 6,000 tonnes of CO<sub>2</sub>e has been saved (this does not include further offsets made by reducing the need for virgin materials - see Table 3). This is equivalent to taking around 3,000 cars of the road.

**Table 3 CO<sub>2</sub> emissions associated with recycling ERM (2006)<sup>16</sup>**

As Table 3 shows, key elements to recycling are: non-ferrous metals (mostly aluminium), textiles, and plastics. Given that paper and glass are consumed in such large quantities, they are also very effective at reducing emissions.

Composting shows one of the lowest emissions savings. Given that organic waste, however, is particularly heavy and that 3.75 litres of diesel are used for each tonne of waste transported it is further recommended that the percentage of household domestic composting be increased. In areas where households have little or no outside space, wormeries and community composting schemes may be employed.

To achieve emission reductions of 8.75% below 2000 levels, it is recommended that each Local Authority should aim to achieve a recycling rate of around 40% by 2010, 45% by 2015 and 50% by 2020, in line with proposed central government targets.

Research into greening communities shows that households who recycle also tend to show a higher level of environmental awareness, and tend to develop their lifestyles around this awareness.

Material	Emissions Factor (tonnes of CO <sub>2</sub> e/tonne of material)
Non-ferrous metals	11.634
Textiles	7.869
Plastic (dense)	2.324
Plastic (film)	1.586
Glass	0.762
Paper and card	0.496
Ferrous metals	0.434
Compost	0.0162

<sup>14</sup> An LCA is a calculation of the environmental burden of a material, product or service during its lifetime

<sup>15</sup> Environmental Benefits of Recycling, WRAP, 2006

<sup>16</sup> ERM (2006), Impact of Energy on Waste and Recycling Policy on UK Greenhouse Gas Emissions, Final Report for Defra, January 2006



#### Box 4 - Recycling in Redcar and Cleveland

Redcar & Cleveland Borough Council (RCBC) has been awarded Beacon Status in Waste and Recycling 2006-2007 and is leading the way on best practice through increased efficiency and new working arrangements. These include new working patterns agreed with the Unions and a four day working week, use of vehicles for bulky waste collections on weekends and bank holidays, improved kerbside collections of source separated materials (with mixed waste only collected fortnightly), and new investment in Household Waste Recycling Centres (HWRCs). These actions have boosted public participation in recycling to nearly 90%.

Innovations include the use of a dedicated Community Waste Liaison officer who conducts home visits and carries out waste audits. This has helped a number of customers understand the importance of recycling and increased their participation in the schemes. The waste audits have also helped to identify low take up rates across the borough which will allow officers to target individual homes, streets or whole communities for education and promotion of the service.

### 6.3 Emissions from Transport

The transport sector is responsible for around one quarter of total UK emissions. Emissions from the transport sector are growing at a rate of around 1% per year, and this is the only sector where emissions are expected to be higher in 2020 than in 1990<sup>17</sup>. This contrasts with other sectors, such as domestic and manufacturing, where energy intensity and consumption show a declining trend.

The Tees Valley Emissions Inventory shows that the largest contributor to greenhouse gas emissions from transport in the Tees Valley is the use of petrol cars, despite car ownership being significantly lower than the national average at the present time. The Department for Transport's (DfT's) TEMPRO<sup>18</sup> database indicates that in 2005, 34% of households had no access to a car, compared to 28% nationally.

This gap is forecast to close significantly by 2021, when 27% of Tees Valley households are likely to not have access to a car, compared to a forecast national figure of 23%. This increase in car ownership is likely to have a significant impact on emissions from transport. The Tees Valley Climate Change Partnership will be looking to curb the increase in emissions from this sector by developing an integrated, sustainable sub-regional transport system. This will aim to incorporate ideas from Darlington's 'Local Motion' scheme (see Box 5).

<sup>17</sup> Bristow et al. (2004) How can we reduce carbon emissions from transport?, Tyndall Centre Technical Report, No. 15.

<sup>18</sup> Trip End Model Presentation Program

## Chapter 6

### Current Situation in the Tees Valley

#### Box 5 – Darlington's 'Local Motion' Scheme

In April 2004 Darlington Borough Council (DBC) won £3.24 million from the Department for Transport to become a showcase Sustainable Transport Town. More recently £1.5 million has been awarded to Darlington from Cycling England.

This money has been spent on developing an understanding of how and why residents chose to travel. Using this knowledge a programme has been established to provide high quality travel information, education and training and a marketing strategy inspiring citizens to change the way they travel. The infrastructure for pedestrians, cyclists and public transport users has also been improved significantly.

So far success has been seen in schools, where 50% now have an 'active travel' plan. A recent survey has shown that since 2004 there has been a 27% reduction in single-family car trips and 300% increase in cycling levels on the journey to school.

Residents are also being engaged through an ambitious programme of individualised travel marketing (ITM), resulting in an increase of 14% in bus journeys and reductions of 3% in car use and 6% in car mileage across the borough. In areas specifically targeted by the team, recent surveys have shown that there has been a 24% increase in people making journeys by foot, and a 79% increase in cycling trips.

#### ➤ Transport, economic growth and prosperity

The key reason for the growth in emissions from transport relates to economic growth and associated increase in prosperity. As individuals become more prosperous, they also tend to choose to travel in a way that uses more carbon. Instead of walking (zero carbon), they are more likely to take the bus (low carbon). Figure 5 shows a comparison of CO<sub>2</sub> emissions from different transport modes. Short haul air travel is ranked the highest emitter of CO<sub>2</sub> per passenger kilometre, with passenger rail the lowest. Walking and cycling are both counted as zero carbon.

Transport is both a contributor to prosperity, providing opportunities to participate in international trade; and a consequence of prosperity, allowing people more choice of recreation and leisure activities and access to a wider range of goods and services.

The challenge for transport is to improve accessibility and facilitate economic growth whilst at the same time reducing emissions. This requires a long-term, sustained effort across many policy fields, such as spatial planning, industrial development and agriculture, which must all integrate the aim of reducing the need to travel as a policy driver.

#### ➤ Private vehicle use

Private vehicle use is increasing and now accounts for over 86% of miles travelled in the UK, compared with just 27% in 1952. Energy consumption in this sector has increased by around 1% per year since 1973<sup>19</sup>. These rates are currently unlikely to decline in the future due to the continued increase in national fleets of motor vehicles and increased mobility.

## Chapter 6

### Current Situation in the Tees Valley

From a climate change perspective, growth in personal transportation is a major concern, whilst data on public behaviour and opinions regarding modal shifts to more sustainable transport measures is even more disturbing.

- A significant number of people who do not have cars aspire to have one. Suggestions that individuals should change their lifestyles, in particular to reduce car journeys and flights, sparks considerable hostility, even amongst those who express a high level of concern about climate change and other environmental issues.
- Behavioural research on car dependency by researchers on behalf of the FIA Foundation shows that the majority of the population are determined to retain car usage in the face of virtually any barrier, such as excessive cost, tighter legislation and the banning of vehicles from urban areas.
- Environmental performance ranks at the bottom of most people's concerns when buying a car. There are few substitutes for petroleum-based liquid fuels, and those that do exist are not readily available.

**Figure 5**

**Comparison of Carbon Dioxide (CO<sub>2</sub>) Emissions from Different Transport Modes\***  
(grams per passenger kilometre)

Short Haul	180
HGV's	180
Cars	109
Buses	76
Passenger Rail	49

\*Source: AEA Technology Environment for SRANAEI

Whilst there are a number of behavioural factors that have driven the increase in emissions from the personal transportation sector, transport users have become locked into production and consumption patterns that are not easily changed in the short-term. For example, companies are located in certain places and need supplies, people need to go to work, and children need to go to school. In the Tees Valley, emissions from private vehicle use (petrol and diesel cars) account for almost 60% of the total emissions from the transport sector, including aviation and rail emissions.

A significant contribution to emissions from the transport sector comes from personal car journeys to and from work. The Tees Valley sees a daily inflow of traffic from surrounding areas, including County Durham, Tyne & Wear and North Yorkshire, in addition to a large outflow to these regions. There is also no dominant centre of commercial activity as would be the case for a single large city of similar population; personal journeys are regularly trans-borough boundary. Because of this, it makes it extremely difficult to attach responsibility for CO<sub>2</sub>e emissions to any one particular Local Authority in the Tees Valley. For this reason it is best to address transport at the sub-regional level.

The sub-regional Transport Strategy proposes further investigation into a number of measures that would help to reduce the demand for private vehicle use. This is important for both reducing emissions from this source and also facilitating the regeneration of the sub-region, without which development would eventually be stifled by congestion. Measures under consideration include parking charges, increasing awareness and use of more sustainable modes of transport.







## Chapter 6

### Current Situation in the Tees Valley

#### ➤ Public Transport

Whilst the bus remains the principal mode of public transport in the Tees Valley, with over 39 million journeys recorded in 2005/06<sup>20</sup>, bus patronage continues to decline at an accelerating rate. Decreases of up to 8% have been recorded across the Tees Valley. At the same time, bus operators have faced increased costs of around 8.5% per annum, which are reflected in the continued rise in fares.

Despite the lack of substantial investment in the local rail system in Tees Valley, the number of people travelling by train has continued to increase at virtually all stations. Between the base years of 1999/00 and 2005/06 the average increase in station footfall for the Tees Valley was 37%. The Tees Valley Joint Strategy Unit reports that this growth shows every sign of continuing.

The Tees Valley City Region Development Programme, published in May 2005 (in response to the Northern Way Growth Strategy) proposes a new, high quality, public transport system consisting of Tees Valley Bus Network improvements and Tees Valley Heavy Rail improvements (including a Tees Valley Metro). These are central to the long-term transport strategy of the City Region, which aims to improve connectivity within the Tees Valley and enhance the sub-region's economic performance, facilitating the regeneration programme for the next 20 years.

From a climate change perspective the growth and development of rail travel is a positive mitigating measure, encouraging a modal shift from car journeys to a more efficient transport mode (in terms of CO<sub>2</sub>e per passenger kilometre). A shift from HGV to rail travel for the transportation of freight also has the potential to save further CO<sub>2</sub> per kilometre travelled.

#### ➤ Aviation

Rapid growth in aviation has ensured that it remains a significant and growing contributor to climate change, despite technological advancements that continue to improve efficiency and reduce emissions as new aircraft are introduced. Greenhouse gas emissions from aviation have increased by more than 50% over the past decade.

Air traffic is estimated to contribute to about 3.5% of the total share of human activities held responsible for climate change. This share is expected to grow to 5% by 2050 and threatens to undermine global warming mitigation efforts made in other sectors.

##### • Durham Tees Valley Airport

Within the Tees Valley, Durham Tees Valley Airport is used by around 898,000 passengers a year and deals with around 363 tonnes of cargo. The airport is currently home to 30 businesses and employs around 750 people. The expansion of Durham Tees Valley Airport is supported by a number of national, regional and sub-regional documents. These include The Future of Air Transport White Paper, the Northern Way, the Statutory Planning Framework, the Regional Spatial Strategy and the Regional Economic Strategy. Development of the airport is viewed as a key economic driver for the sub-region.

Proposals for the expansion of the airport are aimed at increasing capacity and in improving operational efficiency. The proposals would increase the airport from its current potential of 1.2 million passengers per year to around 3 million, and the current rate of throughput (cargo) of just over 1000 tonnes to around 26,000 tonnes.



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### Current Situation in the Tees Valley

The Tees Valley Climate Change Partnership recognises the importance of the Durham Tees Valley Airport to the economy of the sub-region. The Airport's White Paper estimates that for every 1 million passengers leaving from Durham Tees Valley Airport a further 500 jobs at the airport will be created.

Therefore, rather than opposing this development the Partnership chose to work in conjunction with the Airport by offering general support and a financial contribution of £2000 towards the 'Last Call' carbon offset scheme. This helps to fund tree planting in the Tees forest and increases public awareness of the connection between air travel and global warming.

#### ➤ Shipping

In 2000 EU-flagged ships emitted almost 200 million tonnes of CO<sub>2</sub>. This is significantly more than emissions from EU aviation<sup>21</sup>.

The Tees Valley hosts Teesport; the second largest port in the UK, handling around 10% of all the UK's shipping traffic. It is the only deep-sea port on the East coast capable of taking vessels up to 150,000 tonnes and has the potential to become a major deep-sea container port catering for the growing Far East trade, creating around 5,000 new jobs.

As for aviation, however, the allocation of emissions from shipping activities is not straightforward due to the cross-boundary nature of such travel, and associated difficulties in attaching responsibility for emissions to any one country or region. As such, emissions from shipping are usually excluded from national and international emissions inventories.

As such, although the Tees Valley Climate Change Partnership acknowledge the contribution of shipping towards sub-regional CO<sub>2</sub>e emissions, in the absence of any clear emissions allocation method, we are unable to quantify this contribution and therefore emissions from shipping are excluded from the overall Tees Valley Emissions Inventory at present.

<sup>21</sup> Source: Ship Emissions Report, p.160 (2005)



## Chapter 7

### Actions

A strategy aiming to combat climate change should consider mitigation and adaptation. This chapter therefore considers what actions can be taken to both reduce existing CO<sub>2</sub>e emissions and to prepare ourselves for existing and future changes to the climate.

The act of reducing greenhouse gas emissions is termed mitigation. Because of the lag times in the global climate system, no mitigation effort, no matter how rigorous or relentless, is going to prevent climate change from happening in the next few decades. In fact, the first impacts of climate change have already been observed in natural systems. Adaptation is therefore essential. Reliance on adaptation alone, however, will lead to a greater magnitude of climate change, to which effective adaptation is only possible at very high social and economic costs. It is therefore no longer a question of mitigation or adaptation; these measures need to be developed in concert with one another.

For ease of use the Partnership has chosen to display actions in tabular form, indicating responsibility and potential carbon savings. Each action is colour coded to denote a stage of the Climate Change Spectrum (see Chapter 3), with light orange representing actions requiring less intervention and change, and the darker oranges for progressively more deep-seated changes.

This table is designed to provide a broad overview of the scope of potential actions, rather than a comprehensive list, and will work in conjunction with more detailed Local Area Action Plans to deliver significant cross-sectoral CO<sub>2</sub>e savings. For more information on specific local actions, please contact your local climate change representative (see Chapter 8.3).

#### Box 6 – Renewable Energy in Middlesbrough

'New Energy' is one of four main areas of focus within Middlesbrough's Action Plan to reduce greenhouse gas emissions. Middlesbrough currently has eight installations that demonstrate the success of clean, renewable energy technologies. Some examples of these are given below:

- Nature's World has solar panels, wind turbines, geo-thermal energy, and passive solar design to demonstrate how renewable energy can reduce a site's energy bills, and provide a valuable educational resource.
- The Hydrogen Fuel Cell at Acklam Cemetery Chapel of Remembrance was launched in June 2005 and represents part of the solution to moving to low-carbon energy systems.
- More recently, Beechwood Youth and Community Centre successfully installed a 1.5kW building mounted wind turbine.

These sorts of new energy have great potential to complement initiatives to reduce energy consumption by providing cleaner localised energy generation, which benefits the local society and economy as well as the environment.

## 7.1 Table of Actions

Factor	Action	Responsibility/ Proposed key partners	Potential carbon emission savings per annum (expressed as kg of CO <sub>2</sub> e)
Energy Use	Improve the energy efficiency of the sub-region's buildings, including both homes and business premises	All Local Authorities (LAs)/Local Strategic Partnerships (LSPs), Tees and Durham Energy Advice (TADEA), Energy Saving Trust (EST), Carbon Trust	<ul style="list-style-type: none"> <li>- Cavity wall insulation: 202/house</li> <li>- Boiler upgrades: 44/house</li> <li>- External wall insulation: 336/house</li> <li>- Draught proofing: 28/house</li> </ul>
	Encourage and advise on improving standards of energy efficiency and sustainable construction techniques in new developments e.g. wider use of Combined Heat and Power, use of eco-building design	Developers, Planners, Renew Tees Valley, Tees Valley Joint Strategy Unit (JSU)	<ul style="list-style-type: none"> <li>- Installing room thermostat: 70/house</li> <li>- Switching fuel to gas: 622/house</li> </ul>
	Research innovative ways to meet the sub-region's energy requirements through renewable sources of power and heat (Middlesbrough Council have already made progress in this area - see Box 6)	Renew Tees Valley, Nature's World, New and Renewable Energy Centre (NaREC), EST (Best Practice Programme)	<ul style="list-style-type: none"> <li>- Ground source heat pumps: 434/house</li> <li>- Solar water heating: 103/house</li> <li>- Solar Photovoltaics (PV): 176/house</li> </ul>
	Work within the Regional Spatial Strategy framework towards the integration of renewable energy into the major new developments in the Tees Valley (Middlehaven, Central Park, Victoria Harbour, North Shore)	Tees Valley Regeneration, all LAs/LSPs, One North East	Preparing for considerable CO <sub>2</sub> reductions post-2012
	Increase take-up of appropriate micro-renewables amongst householders and businesses	EST, Renew Tees Valley, Planners	Variable, depending on power and placement of turbine.
	Promote the procurement of 100% renewable energy to households and businesses	EST	
Transport	Promote eco-driving and the purchase of low-carbon vehicles	EST, local garages	<ul style="list-style-type: none"> <li>- Cleaner vehicles: 68/new purchase</li> <li>- Eco-driving: 22/driver</li> </ul>

## Chapter 7

### Actions

Factor	Action	Responsibility/ Proposed key partners	Potential carbon emission savings per annum (expressed as kg of CO <sub>2</sub> e)
	Actively promote and work towards the implementation of an effective, efficient and user-friendly inter-modal transport system, incorporating the development of bus and cycle networks and a possible Tees Metro/light railway system	JSU, Renew Tees Valley, Local Transport Planners	<ul style="list-style-type: none"> <li>- Modal shift in transport: 37/person.</li> <li>- Double journeys by bike by 2012: likely to instigate general change in attitudes and behaviour and promote further carbon savings</li> </ul>
	Improve and promote a safe and convenient walking and cycling network in the sub-region	All LAs/LSPs, Tees Valley Climate Change Coordinator (TVCCC), Sustrans, Tees Forest, EST	As above
	Ensure that new developments are located and designed to encourage the use of public transport, walking and cycling	Planners, developers, all LAs/LSPs.	<ul style="list-style-type: none"> <li>- Reducing car use by a quarter: 750/vehicle</li> </ul>
	Reduce CO <sub>2</sub> emissions by supporting the growing biofuels industry in the Tees Valley through promotion of the use of biofuels in private vehicles and LA and public transport fleets	All LAs/LSPs, Renew Tees Valley, EST Advice Centre North East	<ul style="list-style-type: none"> <li>- Conversion to 100% green biodiesel: 3500/vehicle</li> </ul>
	Promote the use of electric and hybrid vehicles, and the development of hydrogen fuel cell technologies, in preparation for hydrogen-based transport	Renew Tees Valley, All LAs/LSPs	<ul style="list-style-type: none"> <li>- Hybrid vehicle allowing regenerative braking (20% reduction in fuel consumption): 700/vehicle.</li> <li>- If hydrogen produced using renewable energy, process is carbon neutral: 3500/vehicle</li> </ul>
<b>Waste</b>	Minimise the amount of waste produced in the Tees Valley	LAs/LSPs, householders, businesses	Stabilise growth in waste: no further increase in emissions
	Promote the recycling and re-use of waste in accordance with local targets	LAs/LSPs, CLEMANCE	Diverting waste from landfill to recycling: 435/person (if all waste recycled)
	Avoid the unnecessary transportation of waste	LAs/LSPs, Waste Contractors	Transportation of heavy organic waste: 10/tonne
	Promote the use of recycled materials	CLEMANCE, local recycling companies, Renew Tees Valley, procurement teams, North East Centre for Excellence (Procurement Programme)	Encouraging environmentally aware attitudes and severing the connection between consumption and prosperity leading to long-term future reductions in CO <sub>2</sub>



Factor	Action	Responsibility/ Proposed key partners	Potential carbon emission savings per annum (expressed as kg of CO <sub>2</sub> e)
Procurement	Increase the procurement of green energy for LA buildings and promote it amongst business and the wider community	LAs/LSPs, North East Centre for Excellence (Procurement Programme)	Potential to reduce emissions associated with electricity down to 0 for energy purchased on a renewable tariff (reductions of 5,244,000 - 9,704,00 per IA)
	Encourage procurement of the most energy efficient office equipment and more locally supplied products.	LAs/LSPs, suppliers, North East Centre for Excellence (Procurement Programme)	Leading to reduction in overall electricity consumption and CO <sub>2</sub> savings from reduced mileage travelled.
Carbon Sequestration	Support the increase in tree and vegetation cover within the Tees Valley	Tees Forest, LAs/LSPs	Tree planting: between 7.5 and 13/tree
	Support the development of a carbon capture and storage coal-fired power station in the Tees Valley	Renew Tees Valley	Paving the way for significant savings post-2012
Awareness raising	Raise awareness of climate change (CC) in the business, commercial and industrial sectors through use of the Tees Valley Climate Change Charter	TVCCC, Groundwork Trust, North East Chamber of Commerce	Changing attitudes and behaviours to develop gradual but deep-rooted change and carbon savings
	Promote the importance of energy efficiency and awareness of climate change amongst householders	EST Advice Centre North East	<ul style="list-style-type: none"> <li>- Turning heating down 1°C: 75/household</li> <li>- Switching off lights: 8/household</li> <li>- Efficient use of washing machine and kettle: 4/household each</li> </ul>
	Engage with schools and universities in the region to promote awareness and understanding of CC and the work of the Partnership	Durham University (Stockton Campus), University of Teesside, LEAs, Ecoschools Programme, Carbon Trust, One North East	Engaging with young people (e.g. though CC materials in Eco-schools packs) will help them make the connection between sustainability, green consumerism and CC and thereby increase awareness amongst the next generation and drive long-term reductions in CO <sub>2</sub> emissions.
	Engage with the Ecoschools Programme to investigate the possibility of including further Climate Change materials in the packs distributed to schools	TVCCC, Renew Tees Valley, Tees Valley Ecoschools Partnership	As above

## Chapter 7 Actions

Factor	Action	Responsibility/ Proposed key partners	Potential carbon emission savings per annum (expressed as kg of CO <sub>2</sub> e)
	Consider the benefits of developing a Tees Valley Climate Change Partnership website in order to promote our objectives to a wider audience	TVCCC, all Partners	Paving the way for significant future CO <sub>2</sub> e savings
<b>Adaptation</b>	Ensure that all businesses, public services and households are prepared to adapt to climate change, both physically and financially.	LAs/LSPs, Environment Agency, Emergency Services	
	Ensure new developments take due consideration of the risk of flooding	Planners, Developers, Environment Agency	
	Encourage the use of rainwater storage to reduce treated water consumption and to reduce flood risk	LAs/LSPs, Householders, Northumbrian Water	
	Ensure that the worst effects of climate change are integrated into Tees Valley emergency planning responses	LAs/LSPs, TVCCC, Tees Valley JSU, Emergency Planning Officers	
	Improve community preparedness in relation to future severe weather events through undertaking flooding scrutiny reviews and bi-annual emergency planning exercises	LAs/LSPs, Environment Agency, Emergency Services	

## 7.2 Carbon Emission Savings Sources

### Energy efficiency and awareness raising

- Coefficients have been obtained from the Energy Saving Trust ([www.est.org.uk](http://www.est.org.uk)).

### Transport

- Figures are based on an average annual mileage of 12,000 in a moderately efficient car, which would emit approximately 3.5 tonnes CO<sub>2</sub> per annum ([www.targetneutral.com](http://www.targetneutral.com)).

### Waste

- Defra estimates that the average person in the UK produces 500kg of waste/year ([www.defra.gov.uk](http://www.defra.gov.uk)).
- The GWP (Global Warming Potential) of methane is 21 ([www.environment-agency.gov.uk](http://www.environment-agency.gov.uk)). The National Atmospheric Emissions Inventory (NAEI) estimates that emissions of methane per tonne of waste disposed of to landfill are 8.5kg. This therefore corresponds to 178.5 tonnes CO<sub>2e</sub> per tonne, and thus 89.25 per person, based on the above assumption.
- Friends of the Earth estimate that 0.87 tonnes of carbon is saved per tonne of waste (mixed recyclables) diverted from landfill to recycling: ([www.foe.co.uk/resource/briefings/greenhouse\\_gases.pdf](http://www.foe.co.uk/resource/briefings/greenhouse_gases.pdf)).
- Transportation of waste figures based on an estimate of 3.75 litres of diesel per tonne of organic waste transported (emissions factor from Defra: <http://www.defra.gov.uk/environment/business/envrp/gas/envrpgas-annexes.pdf>).

### Carbon sequestration

- Carbon savings per tree planted are from [www.carbon-info.org](http://www.carbon-info.org).





## Chapter 8

### *Delivery, Monitoring and Review*

To ensure success, this Strategy will be coordinated and delivered by the Tees Valley Climate Change Coordinator in close conjunction with all five Local Authorities within the Tees Valley sub-region, as well as other key partners. The Partnership will continue to engage with the regional and national climate change agenda in order to maintain a consistent and coordinated approach.

#### **8.1** *Developing Area Action Plans*

- With the exception of Middlesbrough Council, who are already implementing an action plan, all remaining Local Authorities will use this document, together with the *Supporting Document* to this Strategy, to develop individual, targeted action plans specific to their area in order to meet the CO<sub>2</sub>e targets set out in this document.
- Each Local Authority is responsible for the development, management, delivery and review of its own action plan. Usually this is done through LSPs, engaging the local authority's partners as well. Because timetables for submissions and decisions by LSPs differ, it is not possible to give an agreed timetable for decision making. However, all of the partner Local Authorities are committed to ensuring that their action plans are based on robust consultation and gather high level and political support from within their boroughs.
- Local area action plans will also include a report highlighting the current situation with regards to borough activities. This will then be used to formulate a specific actions section on reducing carbon emissions, including emissions from Local Authority buildings and activities.

#### **8.2** *Delivery of the Strategic Aims and Monitoring Progress*

- Monthly meetings of the Tees Valley Climate Change Partnership Steering Group (consisting of key representatives from each funding partner and currently Chaired by the Environment Agency) will continue to be held, in order to facilitate discussion on the current situation and progress made, as well as to agree future policy direction.
- These meetings will be organised by the Tees Valley Climate Change Coordinator, who will act in an advisory capacity and ensure exchange of best practice between Partners.

## Chapter 8

### *Delivery, Monitoring and Review*

- CO<sub>2</sub>e emission levels will be updated on a yearly basis in conjunction with the release of data from the Department of Trade and Industry (DTI). This data will be inputted into the Tees Valley Emissions Inventory, from which tables for the Tees Valley will be published.
  - The DTI is not currently releasing data at regular intervals, and so exact dates for the publication of these results cannot be included in this Strategy. There is also currently a time lag of 2 years for the release of data. For these reasons the Partnership chooses to monitor progress in terms of carbon saved, rather than total emission levels (see below).
- Monitoring progress towards short-term targets will be done on a carbon-savings basis from actions taken and projects implemented. Progress will be reported on an annual basis and made available in electronic format to all Partners.
  - Information on carbon savings within each Local Authority area will be provided by the key contacts listed in Chapter 8.3.
  - Savings associated with sub-regional projects will be reported by the Tees Valley Climate Change Coordinator.
  - The Tees Valley Climate Change Partnership will plan to release the first such report in March - May 2008, with successive reports published during the same time period in 2009, 2010, 2011, 2012, 2013 and 2014 (to cover results for 2012).
- Prior to the release of these reports, the Partnership Steering Group will review the Strategy during annual workshops held in February. These will run every February from 2008 to 2013.
- Methodology and targets may be reviewed over the next two years in line with regional targets to be set soon for the North East by the Regional Climate Change Coordinator.

### **8.3 Responsibility for Reporting Progress**

Data will be provided to the Tees Valley Climate Change Partnership via the Tees Valley Climate Change Coordinator by the end of January each year from 2008-2013 by the people listed below. Information will include details of any schemes implemented, in relation to tonnes of carbon saved, as well as data on recycling rates. This will then be processed and made available for discussion at December's workshop, before being published in the annual report in March - May.

Darlington Borough Council	<b>Name:</b> Paula Jamieson <b>Title:</b> Sustainable Development Officer <b>Address:</b> Darlington Borough Council, Town Hall, Feethams, Darlington, DL1 5QT. <b>Tel:</b> 01325 388631 <b>Email:</b> paula.jamieson@darlington.gov.uk
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## Chapter 8

### Delivery, Monitoring and Review

Hartlepool Borough Council	<b>Name:</b> Sylvia Tempest <b>Title:</b> Environmental Standards Manager <b>Officers:</b> Public Protection and Housing Division, Hartlepool Borough Council, Civic Centre, Victoria Road, Hartlepool, TS24 8AY <b>Tel:</b> 01429 523316 <b>Email:</b> sylvia.tempest@hartlepool.gov.uk
Middlesbrough Council	<b>Name:</b> Shadia Rahman <b>Title:</b> Environmental Protection Officer <b>Address:</b> Middlesbrough Borough Council, Vancouver House, Gurney Street, Middlesbrough, TS1 1QP <b>Tel:</b> 01642 728265 <b>Email:</b> shadia_rahman@middlesbrough.gov.uk
Redcar & Cleveland Borough Council	<b>Name:</b> Paul Taylor <b>Title:</b> Environmental Management Officer <b>Address:</b> Redcar & Cleveland Borough Council, Strategic Performance and Planning, Chief Executives Directorate, Redcar and Cleveland House, Kirkleatham Street, Redcar, TS10 1RT <b>Tel:</b> 01642 444240 <b>Email:</b> Paul.Taylor@redcar-cleveland.gov.uk
Stockton Borough Council	<b>Name:</b> Kawun Williams <b>Title:</b> Environmental Project Officer <b>Address:</b> Stockton-on-Tees Borough Council, Gloucester House, 72 Church Road, Stockton-on-Tees, TS18 1TW <b>Tel:</b> 01642 526596 <b>Email:</b> kawun.williams@stockton.gov.uk
Sub-region	<b>Name:</b> Laura Owen <b>Title:</b> Climate Change Coordinator <b>Address:</b> 18b Manor Way, Belasis Hall Technology Park, Billingham, TS23 4HN <b>Tel:</b> 01642 373044 <b>Email:</b> laura.owen@tadea.com



### **8.4** *Timetable for Action*

<b>Details</b>	<b>Timescale</b>
Consultation period on this document	November 2006 - February 2007
Launch of TVCC Strategy	April 2007
Collation of data on carbon savings	December 2007 - February 2008
1st Strategy review Workshop	February 2008
Publication of 1st update report	March - May 2008
Successive reviews and update reports	February and March - May each year until March - May 2013

### **8.5** *2012 and Beyond*

In 2012 the Strategy will be reviewed and a new version covering 2012-2030 will be published to ensure effective progression through the later stages of the project.

From 2012-2030 the Partnership will work towards achieving the long-term CO<sub>2</sub>e targets as outlined in Chapter 4.

Aspirational targets will become increasingly viable as energy efficiency becomes an accepted norm and public awareness and behaviour changes accordingly (moving towards Stage 3 of the Climate Change Spectrum, as described in Chapter 3). The development of new, low carbon technologies and the increased use of renewable energy will further the potential to work towards higher carbon reduction targets.

## Chapter 9

### Glossary

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**Adaptation** - (in the context of climate change) refers to any adjustment that takes place in natural or human systems in response to the actual or expected impacts of climate change, aimed at moderating harm or exploiting beneficial opportunities.

**Adaptive Capacity** - the ability of a system to adjust to climate change through moderating potential damage, taking advantage of opportunities, and adapting to the consequences of change.

**Biofuel** - any fuel that is derived from biomass (recently living organisms or their byproducts, such as agricultural crops or manure from cows). It is a form of renewable energy produced from a sustainable source that reduces particulate matter produced from emissions.

**Carbon Dioxide (CO<sub>2</sub>)** – one of the most significant greenhouse gases, contributing around 77% to global greenhouse gas emissions.

**Carbon Dioxide Equivalent** - A metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). The CO<sub>2</sub>e for a gas is derived by multiplying the tonnage of gas by the associated GWP. The GWP for methane is 21 and for nitrous oxide 310. This means emissions of 1 million metric tonnes of methane and nitrous oxide are equivalent to emissions of 21 and 310 million metric tonnes of carbon dioxide respectively.

**Carbon Neutral** - see Carbon Offset.

**Carbon Offset** - a reduction in carbon dioxide emissions from the activities of a third party, aimed at canceling out (offsetting) the emissions arising from a particular action, such as driving a car or taking a flight. If all emissions are offset the activity is called Carbon Neutral. Offset activities include tree planting and investing in renewable energy projects.

**Carbon Sink** – the term given to the natural ability of trees, other plants and the soil to soak up carbon dioxide and temporarily store the carbon in wood, roots, leaves and the soil.

**Combined Heat and Power (CHP)** - a fuel-efficient energy technology that puts to use the by-product heat that is normally wasted to the environment. CHP can increase the overall efficiency of fuel use to more than 75%, compared with around 50% from conventional electricity generation.

**Eco-Building Design** – ensures structures are beneficial or non-harmful to the environment and resource efficient, using renewable and locally sourced materials. They require minimal energy to construct, and once complete, to inhabit.

**Eco-Driving** – driving in a way that maximises fuel efficiency. Techniques include driving at slower speeds, driving smoothly, using higher gears and ensuring the vehicle is serviced regularly.

**Ecological Footprint** - a representation of the amount of land and water a human population requires to produce the resources it consumes and to absorb its wastes. It is a way of determining relative consumption for the purpose of educating people about their resource use and encouraging lifestyle change in order to reduce consumption.

## Chapter 9

### Glossary

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**Eco-Schools Programme** – a government sponsored scheme that provides a simple framework to enable schools to analyse their operations and become more sustainable.

**Hybrid Vehicles** - combine a conventional petrol engine with an electric motor to deliver improved fuel economy and reduced carbon dioxide emissions. Most are able to run in electric-only (zero-emissions) mode at lower speeds.

**Global Warming Potential (GWP)** - a measure of how much a given mass of greenhouse gas is estimated to contribute to global warming. It is a relative scale that compares the gas in question to that of the same mass of carbon dioxide.

**Green Energy Tariff** – electricity arrives through the same cables and wires as usual, but for every unit of electricity you use your supplier will plough an equal amount of green energy into the National Grid.

**Greenhouse Gases** - gases that trap energy radiated by the Earth within the atmosphere and contribute to global warming. The Kyoto Protocol identifies 5 other greenhouse gases in addition to CO<sub>2</sub>. These are Methane, Nitrous Oxide, Hydrofluorocarbons, Perfluorocarbons, and Sulphur Hexafluoride. Because greenhouse gases vary in their ability to trap heat in the atmosphere, some are more harmful to the climate than others. See Global Warming Potential.

**Ground Source Heat Pumps** – transfer heat from the ground in to a building to provide space heating and occasionally to heat domestic water. For every unit of electricity used to pump the heat, 3-4 units of heat are produced.

**Mitigation** – refers to deliberate actions aimed at reducing emissions or enhancing the sinks of greenhouse gases.

**Renewable Energy Tariff** – see Green Energy Tariff.

**Vulnerability** - the degree to which a system is unable to cope with the adverse effects of climate change, including climate variability and extremes.



## Chapter 10

### Further Information

Further information on most of the areas covered by this Strategy can be found in the *Supporting Document*. Information on specific themes covered by this document can be accessed through the following links:

#### Climate Change

- Defra: <http://www.defra.gov.uk/environment/climatechange/index.htm>
- BBC: <http://www.bbc.co.uk/climate/>
- UNEP: <http://climatechange.unep.net/>
- European Commission: [http://ec.europa.eu/environment/climat/home\\_en.htm](http://ec.europa.eu/environment/climat/home_en.htm)
- Tyndall Centre: <http://www.tyndall.ac.uk/index.shtml>
- Met Office: <http://www.met-office.gov.uk/research/hadleycentre/>
- UK CIP: <http://www.ukcip.org.uk/>
- Environment Agency: <http://www.environment-agency.gov.uk/yourenv/639312/>
- Sustainable Development Commission: <http://www.sd-commission.org.uk/pages/climatechange.html>
- Intergovernmental Panel on Climate Change (IPCC): <http://www.ipcc.ch/>
- Ends Report: <http://www.endsreport.com/>

#### Impacts of Climate Change

- UK CIP: <http://www.ukcip.org.uk/>
- Environment Agency: [www.environment-agency.gov.uk/](http://www.environment-agency.gov.uk/)

#### Emissions Trading Scheme (ETS)

- DTI: <http://www.dti.gov.uk/energy/environment/euets/index.html>
- Defra: <http://www.defra.gov.uk/environment/climatechange/trading/index.htm>
- European Commission: <http://ec.europa.eu/environment/climat/emission.htm>

#### Waste

- European Commission: <http://ec.europa.eu/environment/waste/strategy.htm>
- Resource Recovery Forum: <http://www.resourcesnotwaste.org/>
- Renew Tees Valley:  
<http://www.renewteesvalley.co.uk/main.asp?Section=547&Admin=False&Article=0&User=jtpkrwnnhaozfmndmfhuhhceka>

## Chapter 10

### Further Information

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#### Transport

- DfT: <http://www.dft.gov.uk>
- Highways Agency (including research compendium): <http://www.highways.gov.uk/>
- European Commission: [http://ec.europa.eu/transport/index\\_en.html](http://ec.europa.eu/transport/index_en.html)

#### Energy

- DTI: <http://www.dti.gov.uk/energy/index.html>
- Defra: <http://www.defra.gov.uk/environment/energy/index.htm>
- Carbon Trust: <http://www.carbontrust.co.uk/energy>
- Energy Saving Trust: <http://www.est.org.uk/>
- Renew Tees Valley:  
<http://www.renewteesvalley.co.uk/main.asp?Section=546&Admin=False&Article=0&User=jtpkrwnnhaozfmfmdmfhuhhcekafi>

#### Sustainable Development

- Sustainable Development: <http://www.sustainable-development.gov.uk/>
- Defra: <http://www.defra.gov.uk/environment/sustainable/index.htm>
- Sustainable Development Commission: <http://www.sd-commission.org.uk/>
- Sustainable Development Research Network: <http://www.sd-research.org.uk/>
- Renew Tees Valley:  
<http://www.renewteesvalley.co.uk/main.asp?Section=1004&Admin=False&Article=0&User=jtpkrwnnhaozfmfmdmfhuhhcekafi>
- Tees Valley Regeneration: <http://www.teesvalleyregeneration.co.uk/>
- One North East: <http://www.onenortheast.co.uk/page/index.cfm>
- Sustaine: <http://www.sustaine.com/>

## Chapter 10

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- Photographs from [www.Free-foto.com](http://www.Free-foto.com) have also been used in this document.

