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# Air Quality and Climate Change: Integrating Policy Within Local Authorities

## About Environmental Protection UK

Environmental Protection UK is a national charity that provides expert policy analysis and advice on air quality, land quality, waste and noise and their effects on people and communities in terms of a wide range of issues including public health, planning, transport, energy and climate.

We offer clear and critical analysis of UK government and European Union policy proposals through a range of high-quality publications and expert-led events, as well as up-to-date regulatory information through our comprehensive guide to UK and EU environment legislation.

We bring together policy-makers, business, local authorities and academics to enable and foster successful partnerships for environmental action and provide networking opportunities to support the careers of environmental professionals and allow them to share best practice.

Our structure enables us to take a progressive and pragmatic approach to the issues which concern us and, on behalf of our wide and extensive cross-sector membership, to promote integrated and effective policy-making which supports sensible and workable solutions to pressing environmental challenges.

Environmental Protection UK works with and for UK national and devolved governments, local authorities, business, academics and the general public, and with relevant EU institutions and NGOs.

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This guidance was commissioned by the City of London, with funding provided by Defra under the Air Quality Grants programme.

## Credits

The document was edited principally by Ed Dearnley at Environmental Protection UK.

Environmental Protection UK gratefully acknowledges the assistance provided by organisations who commented on earlier drafts; these included:

- AEA Technology
- Campaign for Clean Air in London
- City of London
- The Environment Agency
- Local Government Regulation (formerly LACORS)
- SLH Environmental Ltd
- University of the West of England, Bristol



Carbon Action Network  
reducing carbon emissions & fuel poverty



## Foreword – Air Quality and Climate Change: Integrating Policy in Local Authorities

Climate change presents one of the most significant environmental challenges facing humanity, and the UK is committed to making significant cuts in emissions of greenhouse gases. Poor air quality in our towns and cities is a major cause of premature death and serious illness for the people who live and work there. Both issues cannot be dealt with by national and international measures alone, and local authorities have a key role in coordinating effective action at the local level.

An integrated approach to tackling air quality and climate change makes sound sense. The emissions that pollute our air and those that warm the planet have common sources: vehicles, buildings, power generation and industry. Defra's recent 'Air Pollution: Action in a Changing Climate' document set out how policies could be aligned at a national level; however, integrating policy at a local level is also strongly desirable.

Environmental Protection UK and the Carbon Action Network both have a long history of supporting local authorities with their environmental duties. We provide training and networking opportunities for our members, and disseminate best practice through our publications, workshops and regional networks. With local authorities currently experiencing extreme financial pressures, we hope that this new guidance will help them take forward a strategic approach to addressing air quality and climate change through joint actions, using resources efficiently to generate 'win/ win' outcomes.

This guidance includes several case studies. Many local authorities are now developing best practice in this area, taking forward innovative actions that tackle both sets of emissions. By working together, and learning from each other, we can ensure that the air is fit for us to breathe now, and that the climate is protected for generations to come.

A handwritten signature in black ink that reads 'Caroline Jackson'.

**Caroline Jackson (President, environmental Protection UK)**

A handwritten signature in black ink that reads 'Andy Stephenson'.

**Andy Stephenson (Chair, Carbon Action Network)**

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## EXECUTIVE SUMMARY

Poor air quality and climate change have a direct impact on the health and well-being of both humans and the natural environment. In the UK over 35,000 annual premature deaths are thought to be attributable to air pollution, whilst climate change threatens to pose significant health and environmental challenges in the years to come. Local authorities have a pivotal role in managing both air quality and the causes and effects of climate change, and it is a well recognised fact that the UK will not be able to manage either problem without a significant input at the local level. The UK has a legislative framework to manage both emissions of greenhouse gases and air quality, and under this local authorities have a range of binding responsibilities covering both areas.

Air quality and climate change are fundamentally interrelated. Many common air pollutants are 'climate active', and reducing emissions will lessen the warming effect on our climate. A warming climate also threatens to make air quality worse, with the prevalence of harmful photochemical smogs likely to increase throughout longer, hotter summers. The processes of managing emissions of air pollutants and greenhouse gases are also interconnected. Both sets of emissions largely arise from the same combustion processes – vehicle engines, power generation, homes and industry. If impacts of both sets of emissions are not considered in policy decisions the results can be unintentional trade-offs, with one set of emissions falling at the expense of an increase in emissions of the other.

The benefits of an integrated approach are significant. Foremost amongst them is that integrated policy is cheaper to implement – measures can be prioritised to ensure that they benefit both areas, rather than two sets of measures being implemented separately. Integrated measures also help to spread benefits over a long timescale. The benefits of reducing greenhouse gas emissions will be felt several decades in the future, whilst air quality benefits are felt 'here and now' in the form of improved public health and environmental improvement. If policy is not integrated unintentional increases in emissions of air pollutants or greenhouse gases can occur, requiring costly remedial measures to mitigate the impacts.

Local authorities benefit greatly from an integrated approach to climate change and air quality – greater benefits still can be achieved if this approach were to be extended to include other local environmental issues such as noise. The foundation of an integrated approach is a close working relationship between staff and elected members working on the issues, which with staff often working in different departments can be challenging to achieve. Climate change and air quality strategies cannot on their own implement the full range of actions they may propose – to do this they need to influence other plans and strategies that guide a local authority's services. Key functions include planning, transportation and housing. Ideally this should be done via a top down approach, with policy 'hooks' in documents such as the Sustainable Community Strategy and the Local Development Framework.

This document, developed by Environmental Protection UK, sets out why local authorities need to tackle air quality and climate change (sections 1 to 4), and outlines the benefits of an integrated approach (section 5). It also examines how local authorities can successfully implement integrated policy, and introduce integrated policy into the relevant plans and strategies that guide a local authority's functions (section 6). Finally it examines some common measures that local authorities can promote to reduce emissions of local air pollutants and greenhouse gases, and whether these measures benefit both sets of emissions, or whether cuts in one set of emissions will be at the expense of a rise in the other (section 7).

This guidance can be applied throughout the UK, however in the devolved administrations alternative legislation and practice may need to be taken into account.

# 1. Why Do We Care About Air Pollution?

## Key Points

- Better air quality protects human health and sensitive ecosystems.
- Currently at least 35,000 premature deaths a year in the UK can be attributed to air pollution, around 6% of all deaths. Some research suggests this figure may be as high as 50,000.
- The main pollutants of concern in the UK are particulate matter (PM<sub>2.5</sub> and PM<sub>10</sub>)<sup>1</sup>, nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), sulphur dioxide (SO<sub>2</sub>) and ammonia (NH<sub>3</sub>).
- The European Union (EU) has set legally binding Limit Values for concentrations of these and other pollutants in outdoor (ambient) air.
- Air quality is an issue for local authorities, who have statutory duties under the Local Air Quality Management regime, in addition to responsibilities around implementation of the Clean Air Act and, in England, Wales and Northern Ireland, regulation of certain industrial activities.

## Human Health – Air Pollution Causes Premature Death and Serious Illness

Human exposure to air pollution is associated with premature death and serious illness from cardiovascular (heart) and cardiopulmonary (lung) disease. In addition, existing health conditions, such as asthma, can be exacerbated by air pollution. Of the common air pollutants, particulate matter is thought to be the most harmful in terms of health, and efforts to quantify the health impacts of air pollution have therefore centred on this pollutant. The most common ways of expressing the health impacts of air pollution are through numbers of premature deaths in a particular area, average months of life lost across a population (e.g. UK or a city region) and the estimated economic cost of poor health caused by air pollution.

Premature deaths are perhaps the most graphic way of quantifying the scale and nature of the air quality issue. In 2010 the House of Common’s Environmental Audit Committee<sup>2</sup> concluded that, at present, 35,000 people in the UK die prematurely due to poor air quality every year – nearly 6% of all annual deaths in the UK – with some evidence suggesting that this figure could be as high as 50,000.

Average number of life years, or months, lost is also often used for quantifying the health impacts of air pollution. The UK Air Quality Strategy<sup>3</sup> estimates that air pollution reduces

### Box 1 – The Main Air Pollutants of Concern

The three air pollutants of greatest concern and their impacts on our health are:

- **Nitrogen dioxide (NO<sub>2</sub>)** – This pollutant gas is released through combustion processes, for example vehicle engines and domestic boilers. It is a respiratory irritant, and also helps to form ground level ozone.
- **Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>)** – Particulate matter is released through certain combustion processes, for example diesel engines and domestic solid fuel burning, as well as through processes such as tyre and brake wear on road vehicles. Long-term exposure to particulate matter is associated with premature death, especially from heart and lung conditions. Recent studies have also suggested that high levels of PM<sub>2.5</sub> in childhood can permanently impair lung function.
- **Ozone (O<sub>3</sub>)** – Ground level ozone is formed through the reaction of other pollutant gases like NO<sub>2</sub>, carbon monoxide (CO) and volatile organic compounds (VOCs) in strong sunlight. Unlike ozone high up in the atmosphere (stratospheric ozone which blocks ultra violet radiation) ground-level ozone is damaging, causing inflammation and narrowing of the airways after only relatively short exposure.

The term ‘smog’ is often used to describe pollution episodes. This is a combination of the words ‘smoke’ and ‘fog’, although modern smogs are normally of the photochemical variety with pollutant gases reacting in sunlight to form ozone and other harmful gases.

average life expectancy across the UK by 7-8 months. This, however, disguises the fact that the problem is concentrated in town and city centres, and that the health impact for those living and working in these locations is much greater. It is useful to compare this figure with the impacts of other factors that negatively affect public health to act as yardsticks – Table 1 shows work commissioned by the Department of Health from the Institute of Occupational Medicine, comparing the benefits of removing all anthropogenic (human made) PM<sub>2.5</sub> with the elimination of road accidents and passive smoking.

The health impacts of air pollution can also be monetised to estimate the cost to society at large. The UK Air Quality Strategy estimates that PM2.5 pollution alone imposes an annual cost to the UK economy of between £9 and £20 billion. A recent comparison of the wider costs of transport in urban areas of England suggests that poor air quality is responsible for up to one quarter of the ‘external’ impacts of urban transport, as shown in Figure 1 on page 5 (note that recent research by the Committee on the Medical Effects of Air Pollutants (COMEAP) suggests that air pollution costs will lie towards the high end of the range shown)<sup>5</sup>.

**Table 1: Comparison of the benefits of reducing PM<sub>2.5</sub> by 10 µg/m<sup>3</sup> (equivalent to eliminating man-made PM<sub>2.5</sub> in 2005), the elimination of motor vehicle traffic accidents and the elimination of exposure to passive smoking<sup>4</sup>**

	Reduction in PM <sub>2.5</sub>	Elimination of road traffic accidents	Elimination of passive smoking
Expected gain in life expectancy	7-8 months	1-3 months	2-3 months
Estimated equivalent gain in life years in England and Wales from 2005-2110 for the whole population (including people born during that time)	39,058,000	8,126,000	13,194,000

<sup>1</sup> The number after the PM denotes the appropriate size of the particles in micrometers, e.g. PM2.5 represents all particles in the air under 2.5 micrometers in diameter

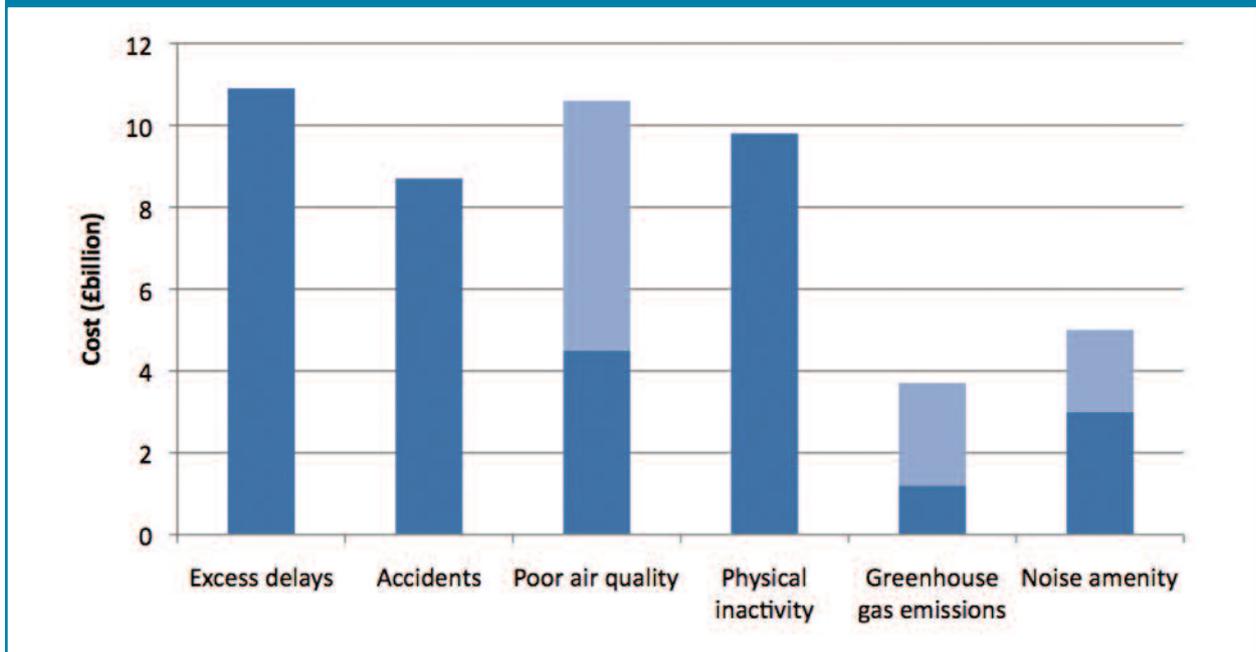
<sup>2</sup> <http://www.publications.parliament.uk/pa/cm200910/cmselect/cmenvaud/229/229i.pdf>

<sup>3</sup> See - [www.defra.gov.uk/environment/quality/air/airquality/strategy](http://www.defra.gov.uk/environment/quality/air/airquality/strategy)

<sup>4</sup> Institute of Occupational Medicine, Comparing estimated risks for air pollution with risks for other health effects, March 2006

<sup>5</sup> ‘Long-term exposure to air pollution: effect on mortality’, the Committee on the Medical Effects of Air Pollutants (COMEAP) - [www.dh.gov.uk/ab/COMEAP/DH\\_108151](http://www.dh.gov.uk/ab/COMEAP/DH_108151)

Figure 1 - Comparison of the wider cost of transport in English urban areas (£billion per annum, 2009 prices and values). Light blue bars represent the possible range of values<sup>6</sup>



In addition to its effects on mortality, poor air quality also contributes to poor health and exacerbates existing respiratory conditions. These chronic impacts are difficult to quantify, but nevertheless need to be borne in mind when considering the full impact of poor air quality.

**Box 2 – Air Quality in Cost/ Benefit Analysis**

Quantifying the health and environmental impacts of air pollutants is crucial in order to argue the case for measures to improve air quality. Efforts to date have focused on quantifying the impacts of PM<sub>10</sub> and PM<sub>2.5</sub> on premature death, with the Department for Health’s Committee on the Medical Effects of Air Pollutants producing authoritative statements on the strong links between particle exposure and premature death<sup>7</sup>. However, the impacts of NO<sub>2</sub> on health have proved much more difficult to quantify and there is currently no commonly accepted damage costs associated with NO<sub>2</sub> exposure to use in cost/ benefit analysis. In a step to rectify this situation the Government’s Interdepartmental Group on Costs and Benefits has developed a new methodology<sup>8</sup> for cost/ benefit analysis that can apply when a policy may result in NO<sub>2</sub> Limit Values being breached. This methodology assumes that air quality Limit Values have to be met; therefore if a policy causes a breach of NO<sub>2</sub> Limit Values the methodology assumes that other measures will be needed to reduce concentrations, and costs the policy accordingly.

**The Environment – Air Pollution Damages Sensitive Ecosystems**

The effect of air pollution on sensitive ecosystems is an important secondary driver of action to improve air quality. The issue first came to prominence in the 1970s due to ‘acid rain’ – here emissions from Europe’s large industrial nations caused acidification of the rain falling in Scandinavia and resulted in severe degradation of ecosystems. Damage to ecosystems

may still occur when acid deposition exceeds ‘critical loads’, which was the case in 58% of terrestrial habitats in the UK assessed between 2004-2006<sup>9</sup>.

Another potential consequence of pollutant deposition is eutrophication, which is an increase in the concentration of chemical nutrients in an ecosystem. This can cause biodiversity loss because of changes to plant communities and soil functions. Eutrophication of land habitats is caused by deposition of oxides of nitrogen and ammonia; currently critical loads are exceeded in 60% of UK habitats sensitive to eutrophication from nitrogen deposition.

**Regulation – Air Quality is the Subject of Legally Binding European Standards**

Legally binding air quality Limit Values have been set by the European Union, most of which are now consolidated into a single Ambient Air Quality Directive<sup>10</sup>. The UK is currently failing to meet standards for PM<sub>10</sub> in parts of London, and also failing to meet NO<sub>2</sub> standards across large parts of the country. The Ambient Air Quality Directive gave EU member states the ability to apply for a time extension for meeting PM<sub>10</sub> (to 2011) and NO<sub>2</sub> (to 2015) Limit Values; the UK has recently re-applied for a PM<sub>10</sub> time extension (after a previous application was rejected for the London ‘zone’) and will apply for an NO<sub>2</sub> extension during 2011.

The Ambient Air Quality Directive also introduced a control framework for PM<sub>2.5</sub>. This sets an overall Limit Value and an ‘exposure reduction’ target for urban areas of the UK. PM<sub>2.5</sub> is a ‘no safe threshold’ pollutant; a reduction in the concentration of PM<sub>2.5</sub> in the air will always have a beneficial health impact, and there is no level below which it can be judged ‘safe’. This means that greater health benefits can be obtained by reducing concentrations across

6 Source - The wider costs of transport in English urban areas in 2009, Cabinet Office November 2009  
 7 See - www.dh.gov.uk/ab/COMEAP/DH\_108448  
 8 See - www.defra.gov.uk/environment/quality/air/airquality/panels/igcb/documents/100303-aq-valuing-env-limits.pdf  
 9 Source, DEFRA - www.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-pollution.PDF  
 10 See - http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32008L0050:EN:NOT

large urban areas, rather than targeting hot spot areas where concentrations are above set levels. Both the Limit Value and exposure reduction target need to be achieved by 2020.

The consequence of not meeting European Limit Values for ambient air quality is legal action by the European Commission, and ultimately large fines imposed on the UK. These could reportedly reach £300 million per pollutant per year if the Limit Values are not achieved<sup>11</sup>.

### Air Quality is an Issue for Local Authorities – Local Air Quality Management

The Environment Act (1995) established the Local Air Quality Management (LAQM) framework for local authorities (in Northern Ireland LAQM was established by the Environment (Northern Ireland) Order 2002). LAQM requires individual local authorities to periodically assess air quality, and identify locations where the national air quality objectives may not be met by their target dates. Where any such exceedances are predicted, and where there is relevant public exposure, local authorities have a duty to declare Air Quality Management Areas (AQMAs) following a process of consultation. Such designations are a statutory requirement, with local authorities in all parts of the UK having a duty to 'work towards' achieving the national air quality objectives for seven key pollutants<sup>12</sup>.

Following the designation of AQMAs, local authorities are required to develop Air Quality Action Plans (AQAPs) to identify and implement actions to improve air quality locally. Such plans require effective collaboration between local authority departments, external agencies and stakeholders (such as environmental regulators, the Highways Agency and industry). Land-use planning and transport planning also underpin the development of effective air quality action plans, and close liaison between air quality and planning officers is therefore critical to improving air quality.

At the time of writing, 234 local authorities across the UK had declared AQMAs, with the number rising over time rather than falling. In 2010 Defra and the devolved administrations released a review of the LAQM regime<sup>13</sup>, highlighting that LAQM had been very good at identifying areas of poor air quality, but less successful on taking action to improve these. The review recommended that Defra and the devolved administrations should be more prescriptive regarding what they wanted local authorities to achieve if they wanted LAQM to take more of a

role in improving air quality. During a conference in 2009, the then Defra Minister for Air Quality Jim Fitzpatrick hinted that any fines imposed by the European Commission for failing to meet air quality Limit Values may be shared with local authorities, although he did not identify a mechanism for doing this.

Local authorities have duties under the Clean Air Act, ensuring that solid fuel appliances meet legal standards and that emissions of smoke from domestic and industrial premises are well controlled. In England and Wales local authorities are also involved in environmental permitting for smaller industrial operations under the Local Authority Pollution Prevention and Control regime; these duties include setting and enforcing permit conditions on emissions of pollutants to the air.

In 2008, a new framework for local authority performance indicators was introduced in England and Wales, reducing the number of indicators to 198. Local authorities are required to monitor all of the indicators; however, they are only required to set improvement targets for up to 35 indicators as part of multi agency Local Area Agreements. For air quality the relevant indicator is NI 194 (Air quality - % reduction in NO<sub>x</sub> and primary PM<sub>10</sub> emissions through a local authority's estate and operations). NI 194 is mirrored by the climate change indicator NI 185, with the same data used to calculate both indicators.

#### Box 3 – Air Quality in Sussex

With its rural interior and coastal breezes, Sussex is not an area that most people would associate with air pollution. However, heavy traffic flows in the county's urban areas have led to air pollution breaching Air Quality Standards. Local authorities in Chichester, Adur, Brighton & Hove, Hastings and Lewes have all declared Air Quality Management Areas for nitrogen dioxide. The air quality problems in the county town of Lewes illustrate how poor air quality can affect even small towns. Lewes's narrow, hilly streets are frequently congested with traffic, and tall buildings by the roadside lead to a 'street canyon' effect that stops pollution from dispersing. The result is poor air quality in parts of the town centre. The local authorities of Sussex have responded by co-operating closely to monitor, and take action on, air quality under the 'Sussex Air' initiative ([www.sussex-air.net](http://www.sussex-air.net)). Sussex also runs the free airAlert service, which informs vulnerable individuals, schools and the media when air pollution is forecasted to increase. The service has now been taken up in Southampton, Hertfordshire and Bedfordshire ([www.airalert.info](http://www.airalert.info)).

11 Source – Environmental Audit Committee ([www.publications.parliament.uk/pa/cm200910/cmselect/cmenvaud/229/229i.pdf](http://www.publications.parliament.uk/pa/cm200910/cmselect/cmenvaud/229/229i.pdf))

12 These include a tougher standard for PM10 set by the Scottish Government, that applies to Scotland only

13 See [www.defra.gov.uk/environment/quality/air/airquality/local/documents/laqm-report.pdf](http://www.defra.gov.uk/environment/quality/air/airquality/local/documents/laqm-report.pdf)

## 2. Why Do We Care About Climate Change?

### Key Points

- The concentration of greenhouse gases in our atmosphere has been increasing since pre-industrial times due to emissions from human activities. The climate is warming as a result, and is likely to continue to do so over forthcoming years (even with emissions reductions). The consequences of this include more frequent extreme weather events and sea level rises.
- The pre-eminent legislative driver for reducing UK greenhouse gas emissions is now the Climate Change Act (2008) and in Scotland, the Climate Change (Scotland) Act (2009); these both set a legally binding target of an 80% reduction in emissions from 1990 levels by 2050. The 'steps' to this target are 5 year carbon budgets set by the Government (in Scotland these are annual budgets set by the Scottish Government).
- Local authorities have a key role to play in both reducing greenhouse gas emissions and adapting communities to climate change. An evolving framework of mandatory and voluntary commitments is driving local authorities to act in this area.

### Greenhouse Gases are Changing the Global Climate

The process of climate change relates to levels of 'greenhouse gases' in the Earth's atmosphere. For many years it has been known that gases such as carbon dioxide and methane have a warming effect; they let heat from the sun in, but trap re-radiated heat from the Earth within the atmosphere. Without this natural greenhouse effect, the Earth would be too cold for complex life to exist. However, the increasing levels of atmospheric greenhouse gases that have been measured over recent decades are cause for concern.

The most significant greenhouse gas, due to the quantity released, is carbon dioxide (CO<sub>2</sub>). Since the pre-industrial era the concentration of CO<sub>2</sub> in the atmosphere has increased from about 280 parts per million to 380 parts per million, largely due to emissions from the combustion of fossil fuels and human induced land use changes. Observations have shown that the world is now warming as a result, and modelling predicts that if we continue to

emit CO<sub>2</sub> and other greenhouse gases at present rates there will be a significant change in the climate over coming decades.

The consequences of unabated climate change would be significant, with increased temperatures, sea level rises and a greater frequency of extreme weather events having serious effects on the natural environment, as well as on human health and well-being. Projections for the UK climate under a number of different scenarios have been provided by Defra under the 'UK Climate Projections' programme<sup>14</sup>.

### The UK Has Legal Obligations to Reduce Greenhouse Gas Emissions

The UK is legally bound by a number of international and national agreements to reduce its emissions of greenhouse gases. The first and most well known of these is the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, which binds the UK to reduce emissions of greenhouse gases by 12.5% from 1990 levels by 2020. Further agreements have been set at EU level – under the Greenhouse Gas (GHG) Effort Sharing Decision the UK is obliged to reduce emissions from non-emissions traded sectors (i.e. excludes large scale industry and power generation) equivalent to 16% below 2005 levels, by 2020.

In 2008 the Climate Change Act was passed, which is now (with the exception of Scotland) the UK's primary climate change framework legislation. The Act commits the UK Government to achieving an 80% cut in CO<sub>2</sub> emissions (from 1990 levels) by 2050. Under the Act, the Government sets a series of 5-year carbon 'budgets', with three successive budgets always in legislation. The first three budgets were set alongside the (financial) Budget in 2009, committing to cuts (from 1990 levels) of 22% by 2012, 28% by 2017 and 34% by 2022. The official Government advisory body for setting targets and budgets under the Act is the Committee on Climate Change. In Scotland, the Scottish Government set an 80% reduction in emissions by 2050 in the Climate Change (Scotland) Act 2009. The Scottish Act differs from the UK Act with a tougher (42% cut vs. 34%) interim 2020 target, and annual carbon targets set by Scottish Ministers rather than 5 year 'budgets'.

In 2008, UK emissions of greenhouse gases were 22% below 1990 levels. Much of this decrease is due to growth in the use of natural gas for electricity generation that took place in the 1990s. Preliminary figures for 2009<sup>15</sup> suggest that a large decrease in greenhouse gas emissions took place between 2008-2009, which is at least partly due to the economic recession during this time.

### Climate Change is a Local Issue

It is well recognised that national action alone cannot deliver the targets set in the Climate Change Act, and that local authorities and their partners have a key role in both reducing emissions of greenhouse gases and adapting communities to the effects of a changing climate. A system of voluntary commitments, performance indicators and targets has evolved to encourage local authorities to take action.

#### Box 4 – The Impact of Climate Change in Yorkshire and the Humber

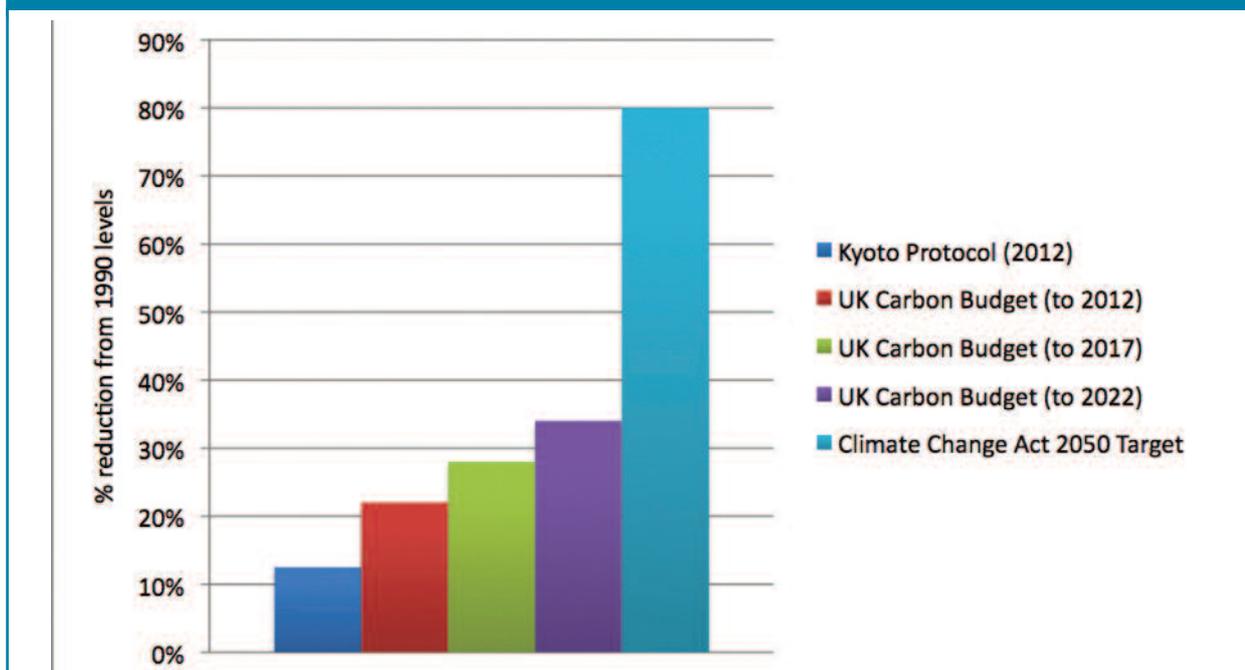
Key agencies, including local authorities, in the Yorkshire and the Humber area have come together to form a Climate Change Partnership for the region. As part of their work the partnership has carried out an adaptation study to assess the projected climate changes that the region will face by 2050, and how these climate changes will impact on the region's society, infrastructure, businesses and services. The study also explored what organisations in the region need to do now to adapt to these predicted impacts. Potential climate impacts on the region identified by the study included:

- Annual average daily temperatures rising, by almost 2°C
- Extreme hot temperatures will increase, with summer temperatures more regularly reaching 34°C
- Greater seasonality of rainfall, with increases in winter combined with significant reductions in summer
- In northern and upland areas, an increase in the number of extreme rainfall events

<sup>14</sup> <http://ukclimateprojections.defra.gov.uk/>

<sup>15</sup> See [www.decc.gov.uk/en/content/cms/statistics/climate\\_change/gg\\_emissions/uk\\_emissions/uk\\_emissions.aspx](http://www.decc.gov.uk/en/content/cms/statistics/climate_change/gg_emissions/uk_emissions/uk_emissions.aspx)

Figure 2 – The main legally binding greenhouse gas reduction targets for the UK



**Box 5 – The Beacon Councils’ Scheme**

The Beacon Councils’ scheme aimed to spotlight local authorities with best practice in particular areas and help them to disseminate this to other local authorities. In 2008, five local authorities were awarded Beacon status under the ‘tackling climate change’ theme – these were the London Borough of Barking and Dagenham, City of London, Eastleigh Borough Council, Middlesbrough Council, Woking Borough Council and Worcestershire County Council. Details of the Beacon authorities and their work can be found on the programme’s website<sup>16</sup>.

More than 300 English local authorities have now signed the Nottingham Declaration, which was launched in October 2000. The Nottingham Declaration recognises the central role of local authorities in leading society’s response to the challenge of climate change. By signing the Declaration, councils pledge to systematically address the causes of climate change and to prepare their community for its impacts. All Scottish and Welsh local authorities have also signed their own versions of the Declaration (Scotland’s Climate Change Declaration and the Welsh Commitment to Address Climate Change).

As with air quality, climate change is included in the national performance framework for local authorities in England and Wales. Relevant indicators for mitigation of climate change are:

- NI 185 CO<sub>2</sub> reduction from local authority operations (mirrored by NI 194 level of air quality)
- NI 186 per capita CO<sub>2</sub> emissions in the LA area

Many larger local authorities are now covered by the CRC Energy Efficiency Scheme in respect of emissions from their own estates. This is an emissions trading scheme for medium to large energy users. Organisations are required to monitor their energy use in buildings, and purchase allowances to cover their carbon emissions. League tables will be published to show how the organisations covered are performing.

In January 2010, the UK Government announced that nine local authorities would be piloting ‘Local Carbon Frameworks’<sup>17</sup>. The frameworks aim to help implement the targets in the Climate Change Act locally. However, in keeping with the current focus on reducing targets imposed by central Government the frameworks involve local authorities developing their own targets and approaches to reducing emissions. They will involve a local authority:

- Setting out a clear set of targets for action and a route for progress, with appropriate milestones.
- Developing a clear strategy for how carbon reductions can be achieved. Robust and strongly evidence based, this strategy will need to articulate how the council will secure community buy in and involvement.
- Producing a delivery plan involving all its partners, including those outside the formal strategic partnership.

Plans might set out what action is needed on issues spanning recycling, energy efficiency, renewables, transport and more.

**The Impact of Greenhouse Gas Emissions Can Be Monetised**

The impacts of a policy decision that reduces or increases greenhouse gas emissions are extremely complex, and at a local or even national level it is very difficult to quantify the exact climate impacts of a small (on a global scale) change in greenhouse gas emissions. To help value greenhouse gas impacts in policy decisions, the UK Government has developed a methodology for valuing the change in greenhouse gas emissions associated with a particular policy decision, based on the climate impact of the emission change (known as the Social Cost of Carbon) and also the impact on meeting the targets set under the Climate Change Act. This methodology is available from the DECC website<sup>18</sup>.

<sup>16</sup> See - [www.localinnovation.idea.gov.uk/idk/core/page.do?pagelid=1](http://www.localinnovation.idea.gov.uk/idk/core/page.do?pagelid=1)  
<sup>17</sup> See- [www.communities.gov.uk/news/planningandbuilding/1449087](http://www.communities.gov.uk/news/planningandbuilding/1449087)  
<sup>18</sup> See - [www.decc.gov.uk/en/content/cms/what\\_we\\_do/lc\\_uk/valuation/valuation.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/lc_uk/valuation/valuation.aspx)

### 3. Trends in Greenhouse Gas and Air Pollutant Emissions and Concentrations

#### Key Points

- Concentrations of common air pollutants in many urban areas of the UK remain high, despite UK wide emissions of most air pollutants falling significantly. This is due to the localised nature of air pollution – UK average figures hide a complex local picture.
- UK emissions of CO<sub>2</sub> (and other greenhouse gases) have fallen over recent years but, as global emissions are still increasing, the concentration of CO<sub>2</sub> in the atmosphere is continuing to rise.
- Transport (particularly road transport) is a ‘problem sector’ for both sets of emissions, and reductions in emissions from individual vehicles are being offset by the rising number of vehicles on the roads.

#### Emissions Are Falling, but Concentrations Are Not Following Suit

UK emissions of the main greenhouse gas (CO<sub>2</sub>) and most other major air pollutants have been falling over recent years. However, the local concentrations of these pollutants in the air have not simply followed this overall decline. CO<sub>2</sub> concentrations are rising rapidly, mainly due to increasing emissions from outside of the UK. Meanwhile UK wide average figures for air quality hide a complex local picture, with concentrations of pollutants in many urban areas static or even increasing. This situation is summarised in Table 2 below.

Note that several common air pollutants are ‘climate active’ and have a warming effect on the climate. These include ozone and black carbon (black carbon, or soot, forms part of what we refer to as particulate matter). The concentration of these pollutants in the air therefore has an impact on climate, as well as air quality. These factors are considered in more depth on page 13.

#### The Damage Caused by Air Pollutant Emissions Depends Upon Where They Are Emitted

Local air pollutants have a direct impact on human health and ecosystems, and the location where they are emitted is therefore of great importance. Emissions from a vehicle in a highly populated urban area, for example, will have a much greater impact on human health than those emitted by the same vehicle in a sparsely populated rural area. By contrast CO<sub>2</sub> in

the air is non-toxic at the concentrations we normally experience, and even around major power stations and queuing traffic, CO<sub>2</sub> presents no direct danger to human health. It therefore doesn’t really matter where on the Earth’s surface carbon dioxide is emitted – a kilogram of CO<sub>2</sub> emitted in the middle of London will have much the same impact as a kilogram of CO<sub>2</sub> emitted in the middle of the Atlantic Ocean.

In addition to the actual emissions, the concentration of air pollutants that people are exposed to depends on a number of other factors, which are summarised in Box 6 below. Carbon dioxide has a relatively long life in the atmosphere and is fairly evenly mixed in with other atmospheric gases. Background concentrations of CO<sub>2</sub> in the atmosphere therefore tend to be similar all over the globe. CO<sub>2</sub> exists in a ‘carbon cycle’ – CO<sub>2</sub> is emitted from burning fossil fuels as well as through natural processes, and is then absorbed by growing vegetation or dissolved into the oceans. Emissions from human activities are unbalancing this cycle, with more CO<sub>2</sub> being emitted than can be absorbed. As a result, the concentration in the atmosphere is rising.

#### UK Emissions of Greenhouse Gases Are Falling, but Global Atmospheric Concentrations Are Still Rising

UK emissions of greenhouse gases fell from 735 to 628 million tonnes of CO<sub>2</sub> equivalent between 1990 and 2008. The first half of this period saw a large reduction in emissions from power generation. Decreases in emissions since 2000 have been more broad-based, with falling emissions in many sectors. Some sectors, most notably transport, have bucked the falling trend and have seen steady increases in emissions since the 1990 baseline. See Figure 4, page 10.

#### Box 6 – Factors Affecting the Concentration of Air Pollutants in a Particular Geographical Area

- Background levels of pollutants (e.g. pollution blowing in from outside of the area or the UK)
- Local emissions (e.g. from vehicles, domestic combustion, etc)
- Site dispersion characteristics (e.g. tall buildings by the side of busy roads can trap air pollutants, stopping them from dispersing into the air)
- Weather conditions (e.g. rain may remove pollutants, whilst still, dry conditions may lead to pollutants building up in the air)
- Chemical reactions in the air (may remove pollutants, or lead to their formation)

Table 2 – Trends in UK emissions and concentrations of air pollutants and CO<sub>2</sub>

Pollutant	Trend in UK emissions		Trend in local concentrations	
Carbon dioxide (CO <sub>2</sub> )	Decreasing		Increasing (due to worldwide increase in emissions)	
Nitrogen dioxide (NO <sub>2</sub> )	Decreasing		Steady or even increasing in some urban areas, falling in rural areas	
Particulate Matter (PM <sub>10</sub> )	Decreasing		Falling in rural areas, falling (but far more slowly) in urban areas	
Ozone (O <sub>3</sub> )	Does not apply (ozone is a product of pollutant gases reacting in sunlight)	n/a	Increasing, especially in urban areas	

Figure 4 – UK emissions of greenhouse gases by sector, 1990 to 2008 (Source DECC<sup>19</sup>)

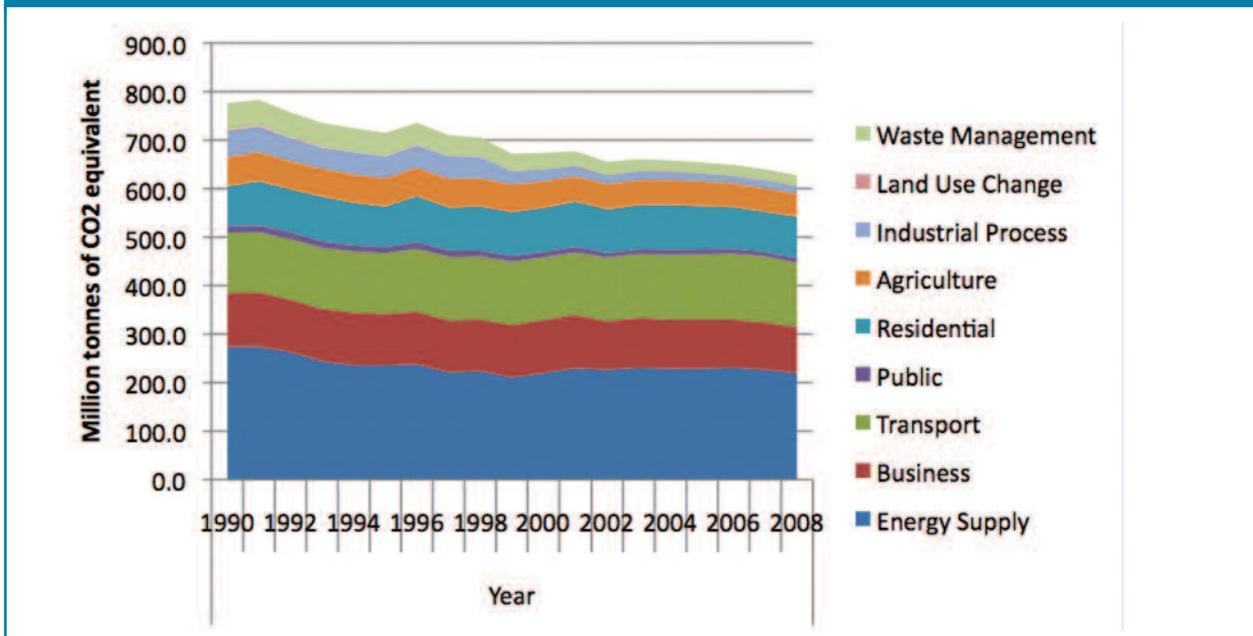
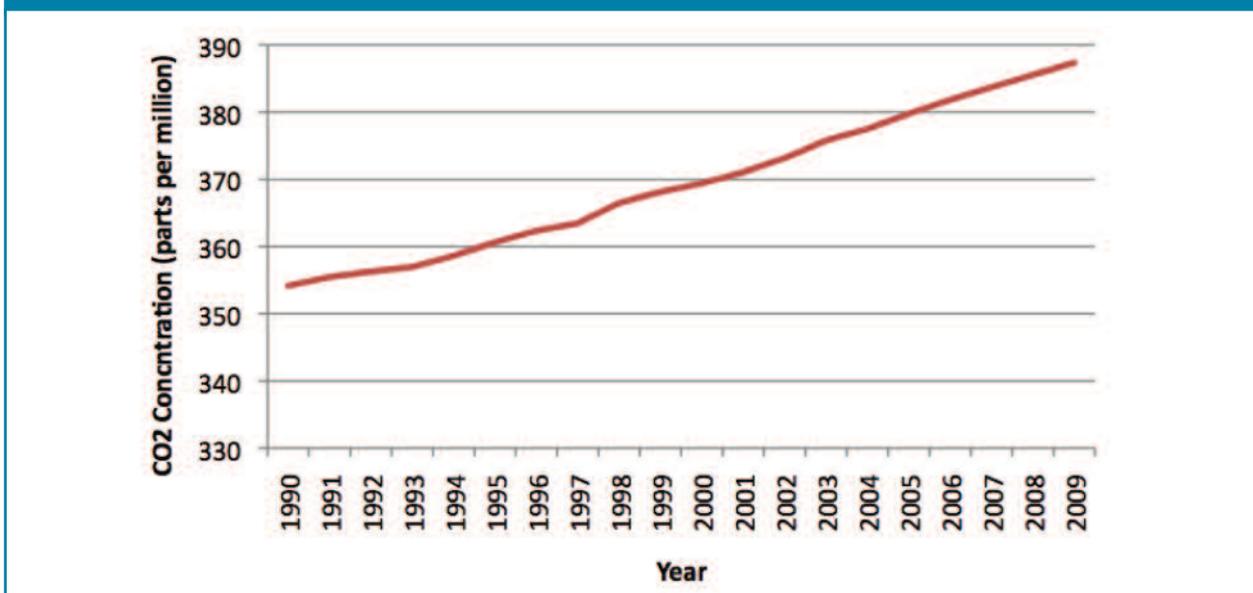


Figure 5 – Atmospheric CO<sub>2</sub> concentrations (Source US National Oceanic & Atmospheric Administration<sup>20</sup>)



Global concentrations of CO<sub>2</sub> have been increasing for decades. This is mainly due to increases in global CO<sub>2</sub> emissions – although emissions have been falling in the UK, our emissions make up only a small part of the global total (approximately 2%) and emissions from many other nations have been rising significantly (See Figure 5 above).

**UK Emissions of Air Pollutants Are Falling, but Poor Air Quality is Still a Problem in Many Parts of the Country**

In the UK, emissions of most air pollutants have also been declining over the past two decades due to tougher emission standards for industry, power generation and road vehicles

(See Figure 6, page 11). This national picture, however, hides a complex local picture – emissions in some urban areas of the UK are static or even rising.

Due to the complex local picture for emissions, the trend in concentrations too is somewhat mixed. Average concentrations (pollutants measured across all sites) have fallen significantly. However, at some of the most polluted roadside sites concentrations of NO<sub>2</sub> and PM<sub>10</sub> are static or actually rising. Meanwhile, average concentrations of ozone have shown a rising trend in recent years, which is particularly marked in urban areas<sup>21</sup>.

<sup>19</sup> www.decc.gov.uk/en/content/cms/statistics/climate\_change/gg\_emissions/uk\_emissions/uk\_emissions.aspx  
<sup>20</sup> As measured at Mauna Loa, Hawaii - see www.esrl.noaa.gov/gmd/ccgg/trends/  
<sup>21</sup> UK wide monitoring data can be found at www.airquality.co.uk/networks\_home.php, London data can be found at www.londonair.org.uk

Figure 6 – UK Emissions of NO<sub>2</sub> and PM<sub>10</sub> (Source – National Atmospheric Emissions Inventory<sup>22</sup>)

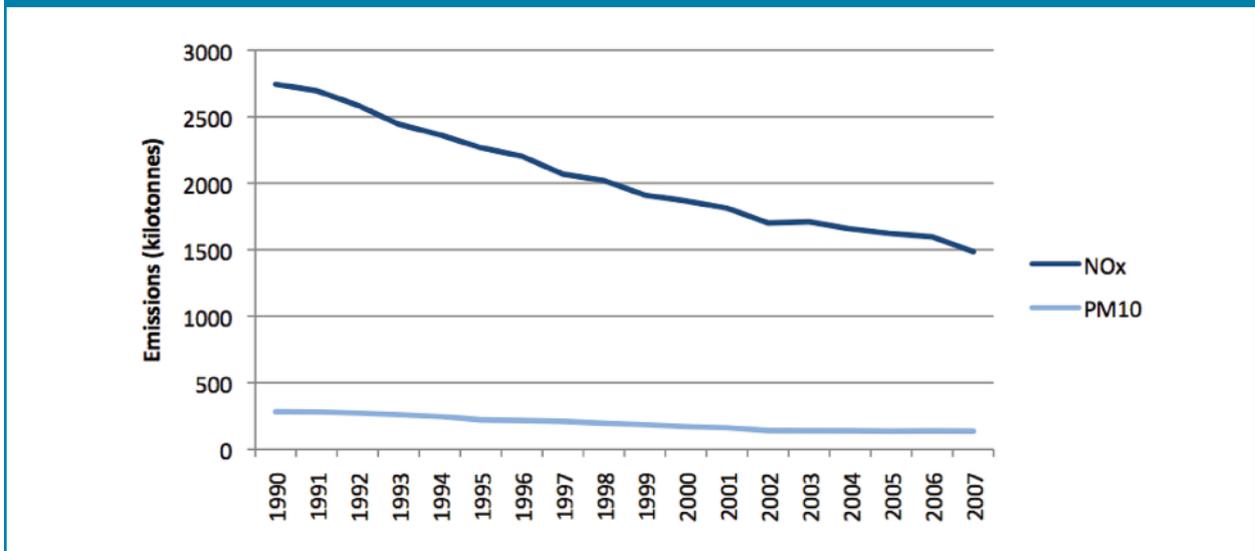
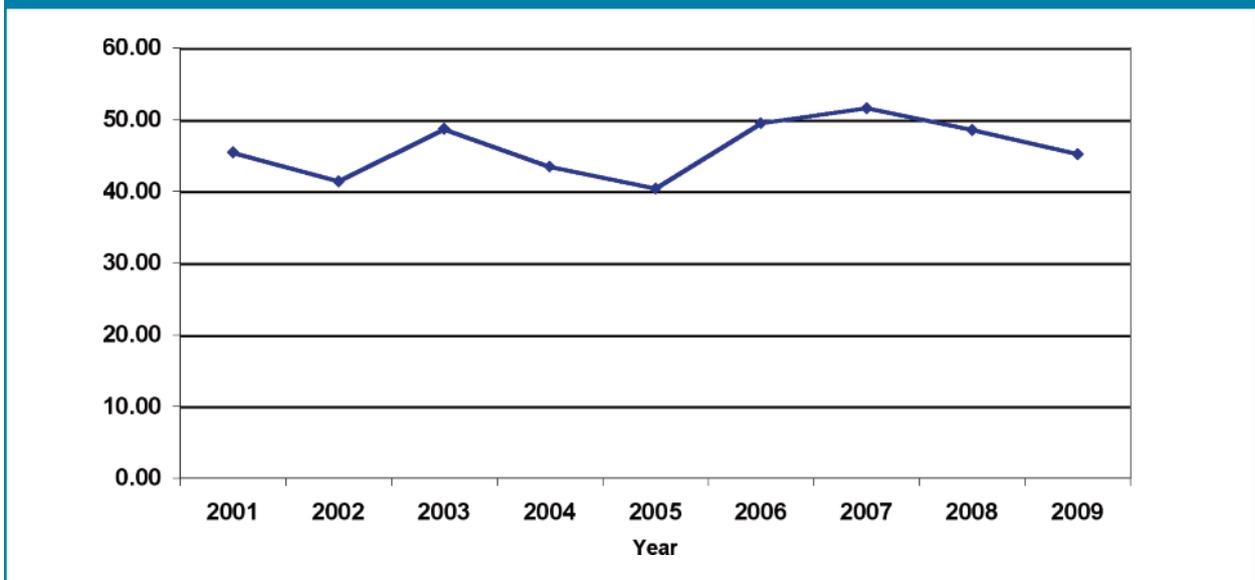


Figure 7 – Annual average nitrogen dioxide concentrations from the average of 59 measured roadside locations in Bristol (Source Bristol City Council)



**Box 7 – Air Quality in Bristol**

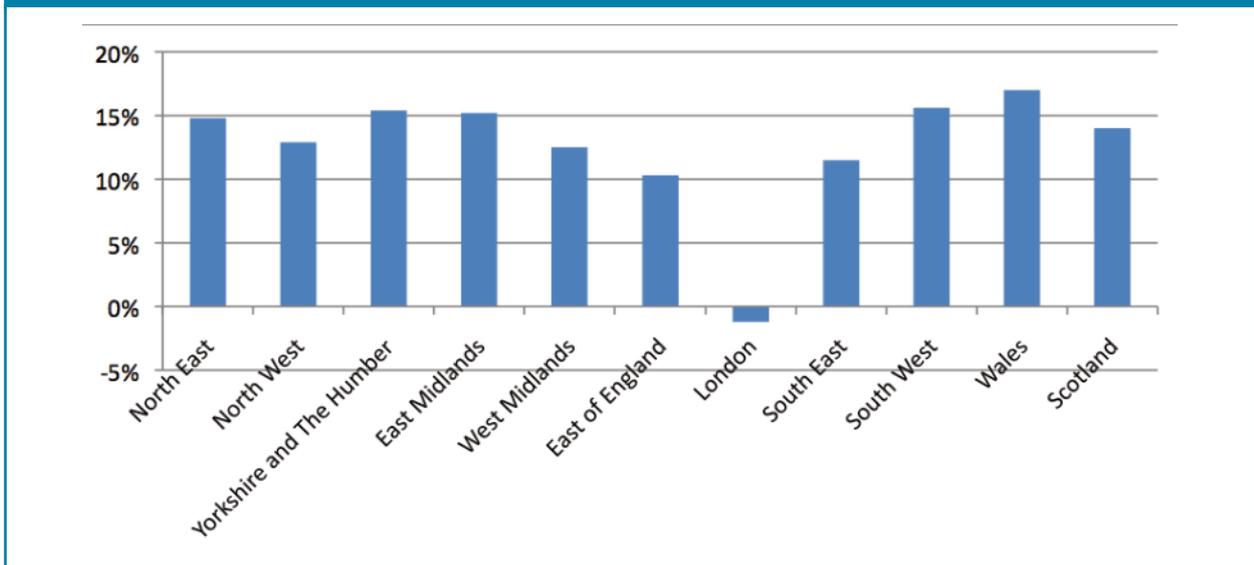
In common with many cities of its size, Bristol has problems with poor air quality. Traffic congestion on the city's roads is the principal source of pollution. Bristol has declared an Air Quality Management Area for NO<sub>2</sub> and PM<sub>10</sub> covering much of the city centre. Since the AQMA was declared concentrations of most pollutants have fallen; however, NO<sub>2</sub> concentrations still remain high at many city roadside locations, as shown in Figure 7 above (note that some variation can be due to change in the weather from year to year).

**Air Quality and Climate Change Share the Same 'Problem Sector'**

Efforts to clean the air and reduce UK CO<sub>2</sub> emissions share a common 'problem sector' – transport, and in particular road transport. Whilst emissions of both CO<sub>2</sub> and local air pollutants from individual road vehicles have been declining over recent years, much of these gains have been cancelled out by the increasing volume of traffic on the roads. Over recent years, traffic volumes have risen significantly over much of the UK, with the only decline being seen in central London as a result of the congestion charging scheme and considerable investment in upgrading local bus services (see Figure 8, page 12).

22 www.naei.org.uk/

Figure 8 – Traffic increase on major roads between 1997 and 2007 by English Region and Devolved Administration  
(Source, Department for Transport<sup>23</sup>)



23 [www.dft.gov.uk/pgr/statistics/datatablespublications/regionaldata/rts/regtranstats2008](http://www.dft.gov.uk/pgr/statistics/datatablespublications/regionaldata/rts/regtranstats2008)

## 4. Air Quality and Climate Change Interactions

### Key Points

- Emissions of CO<sub>2</sub> and local air pollutants arise mainly from the same combustion sources, and policies to manage these sources should therefore take into account both sets of emissions.
- CO<sub>2</sub> is not the only substance in the atmosphere that affects the temperature of the planet, and many air pollutants also have a warming effect. Reducing air pollution can therefore have a beneficial impact on climate change.
- Air pollution can damage vegetation, reducing its ability to act as a 'carbon sink' by absorbing CO<sub>2</sub>.
- Climate change will bring a greater frequency of hot, dry summers, meaning more summer smog episodes unless emissions of contributing air pollutants are cut substantially.
- Policy decisions can benefit both air quality and climate change, or there may be trade-offs between the two areas.

### Emissions of Carbon Dioxide and Air Pollutants Come From the Same Sources

Emissions of CO<sub>2</sub> and local air pollutants generally arise from the same combustion sources – power stations and industry, homes and offices, and vehicle exhausts. Policies to manage emissions from these sources must consider both sets of emissions, otherwise a reduction in one set of emissions may be achieved at the expense of an increase in emissions of the other.

#### Box 8 – Diesel Vehicles

Since 2002 low CO<sub>2</sub> cars have been encouraged through the tax system – company car tax and vehicle excise duty now vary depending on the car's CO<sub>2</sub> emissions. Several local authorities have also introduced CO<sub>2</sub> related residents' car parking charges. Diesel cars tend to have lower CO<sub>2</sub> emissions than equivalent petrol models, and as a result the proportion of new cars sold powered by diesel has increased from 19% in 2001 to 42% in 2009<sup>24</sup>. However, diesel cars have significantly higher emissions of local air pollutants than their petrol equivalents, and the increasing number of diesel cars on the roads is one reason why air quality hasn't improved as much as expected in recent years. Figures provided by Defra suggest that modern diesel cars have a 20 times greater impact on our health than equivalent petrol vehicles<sup>25</sup>. Diesel cars also emit more black carbon (soot) than petrol equivalents. This has a warming effect, but it is not counted in a car's 'official' CO<sub>2</sub> rating.

### Many Local Air Pollutants Are 'Climate Active'

Although CO<sub>2</sub> is the most significant greenhouse gas, a large proportion of the anticipated warming of our climate will come from other greenhouse gases<sup>26</sup>. These include several local air pollutants, and reducing emissions can therefore have benefits for both air quality and climate change. These pollutants include:

- Black carbon (soot) – black carbon, for example from diesel exhausts, can decrease the amount of sunlight reflected from the earth's surface and therefore have a warming effect. The impact is particularly felt in the Arctic region, where warming due to black carbon is very significant<sup>27</sup>.
- Ozone – ground-level ozone is a powerful greenhouse gas and has a warming impact. It is understood to be the third most important greenhouse gas after CO<sub>2</sub> and methane. In addition to its direct warming impacts, ozone also reduces carbon sinks by stunting the growth of vegetation. This effect is very significant – ozone is estimated to reduce crop yields by 5-15% in Britain<sup>28</sup>.

### Climate Change Will Make Air Quality Problems Worse

The hotter, drier summers predicted for the future will lead to an increase in summer ozone pollution events. The hot summer of 2003 led to a substantial ozone smog event across southeast England and much of Europe – summers of this type are expected to become typical by 2040. Climate change therefore makes meeting some air quality targets harder, and public health will be negatively affected unless emissions of air pollutants are reduced<sup>29</sup>.

### Policy Decisions Can Benefit Both Air Quality and Climate Change, or There May Be Trade-offs

As many air pollutants and CO<sub>2</sub> originate from the same combustion sources, policies to manage these sources may have positive or negative impacts for both areas, or there may be a trade-off involved. Policy decisions include which technologies to encourage or discourage (summarised in Figure 9, page 14) and, for air quality, where combustion sources are sited.

#### Box 9 - Biomass Combustion and Air Quality

Biomass boilers or biomass combined heat and power plants are increasingly being installed as part of new developments to satisfy planning conditions imposed by local authorities that require a certain proportion of a new development's energy needs to be supplied from renewable sources. When compared to gas or electric heating biomass has significantly higher emissions of local air pollutants; therefore increasing the amount of biomass combustion in towns and city centres has a potentially negative impact on air quality. However, if biomass is used in less polluted suburban or rural locations the air quality impacts can be far lower, or even be positive if biomass replaces 'dirty' fuels such as coal. Abatement equipment (filters) can also be used to reduce emissions of particulate matter. In 2009 Environmental Protection UK and Local Government Regulation (formerly LACORS) produced guidance to help local authorities assess the impacts of biomass combustion<sup>30</sup>.

24 Source – Society of Motor Manufacturers and Traders [www.smmmt.co.uk/downloads/MotorIndustryFacts.pdf](http://www.smmmt.co.uk/downloads/MotorIndustryFacts.pdf)

25 Source – [www.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-pollution.PDF](http://www.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-pollution.PDF)

26 See Intergovernmental Panel on Climate Change 4th Assessment Report, page 39 – [www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4\\_syr.pdf](http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf)

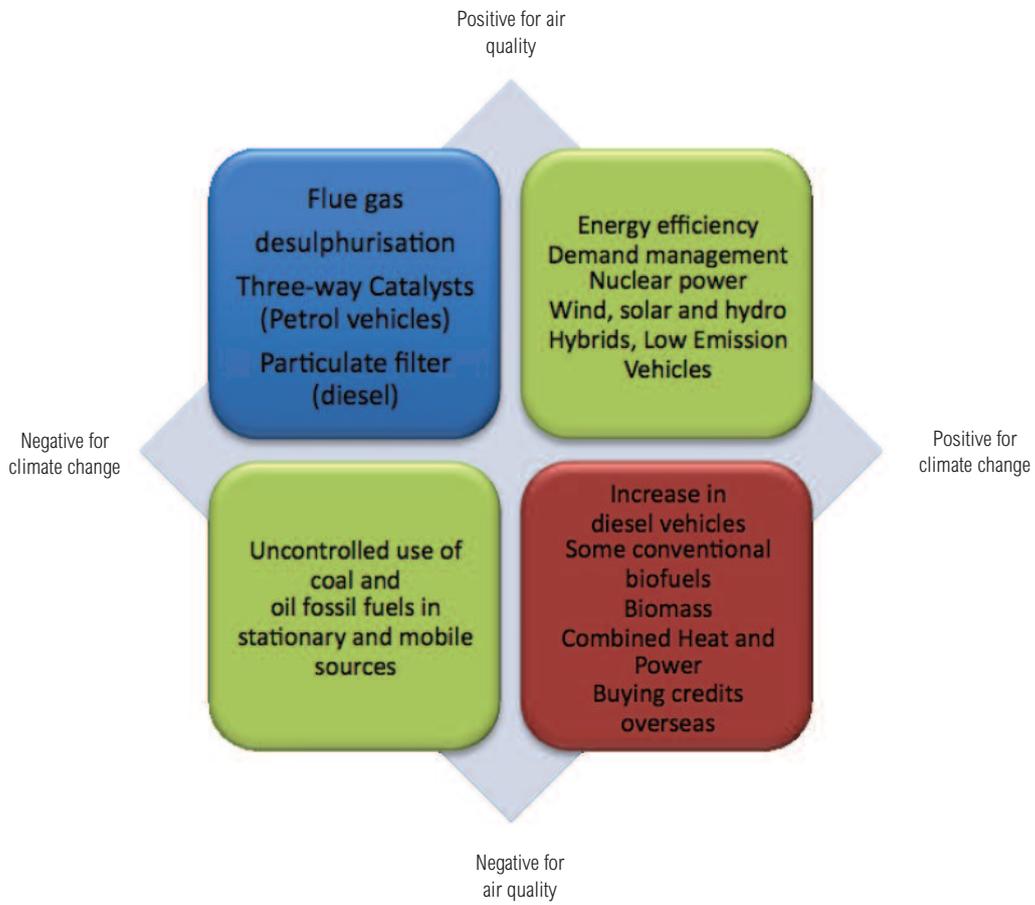
27 See – [www.sootfreeclimate.org](http://www.sootfreeclimate.org)

28 Source – [www.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-pollution.PDF](http://www.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-pollution.PDF)

29 Source – Air Quality Experts Group [www.defra.gov.uk/environment/quality/air/airquality/publications/airqual-climatechange/documents/fullreport.pdf](http://www.defra.gov.uk/environment/quality/air/airquality/publications/airqual-climatechange/documents/fullreport.pdf)

30 See – [www.environmental-protection.org.uk/biomass](http://www.environmental-protection.org.uk/biomass)

Figure 9 – Summary of Common Measures and Their Impacts on Air Quality and Climate Change<sup>31</sup>



<sup>31</sup> Source – Defra. Note that evidence is building on the warming role of black carbon (soot) on climate. Diesel particulate filters could therefore be considered to be neutral or even positive for climate change.

## 5. Benefits of Integrating Air Quality and Climate Change Policy

### Key Points

- Integrated policy can be cheaper and more effective to implement than policies designed to address air quality and climate change separately, as one set of policy measures can be designed to benefit both areas.
- If policy is not integrated unintentional trade-offs can occur – policy measures that benefit one area at the expense of another, requiring resources to correct later.
- Climate benefits of policy decisions are felt in the future and distributed over the entire globe, whilst air quality benefits are felt 'here and now'.
- Air quality benefits can help to convince climate change sceptics of the need for new policy measures, and vice-versa.

### Integrated Policy is Cheaper to Implement

Integrating policy means that measures can be prioritised that benefit both air quality and climate change, as opposed to distinct measures to address each problem separately. This approach can often lead to lower overall costs to local authorities, businesses and the community in general. For example, take an urban local authority aiming to reduce CO<sub>2</sub> emissions from transport and also improve air quality in the city centre. Analysis of emissions could suggest that tackling emissions from the local bus fleet is the best way forward. Non-integrated policy may encourage bus companies to use biodiesel to reduce CO<sub>2</sub> emissions (but with no air quality benefits), whilst to tackle the air quality issue the local authority might introduce a low emission zone (LEZ) to restrict entry to the city centre to only the cleanest buses (which has little benefit for climate change). If policy was integrated, the local authority might work with the bus operators to encourage the use of alternative technologies such as hybrid and biomethane buses, which locally reduce emissions of both CO<sub>2</sub> and air pollutants over pure diesel alternatives.

#### Box 10 – Biomethane Powered Refuse Vehicles in Leeds

Biomethane is simply methane gas produced from the decomposition of organic materials, which can include food and green waste. Once cleaned up to remove impurities it is chemically identical to natural gas, and can be used as a fuel in modified vehicles either by itself or in a 'dual fuel' set up with diesel. Leeds City Council has operated a trial of biomethane powered refuse vehicles in the city using biomethane produced from a landfill site in Surrey. Overall the vehicles offer a 60% reduction in 'well to wheel' greenhouse gas emissions, plus lower NO<sub>x</sub> and almost zero particulate emissions. Importantly they have also performed well as everyday refuse collection vehicles.

### Integrated Policy Reduces Unintentional Trade-offs

As discussed in Section 4, policies may either benefit both air quality and climate change, or benefit one area to the detriment of the other – a trade-off. Unintentional trade-offs occur when policy is introduced to benefit one area without consideration of how it will affect the other; in these cases, negative impacts felt by one area may outweigh the actual benefits that the policy was designed to bring. Integrated policy aims to prioritise actions that benefit both areas and ensure, if trade-offs are needed, that disadvantages are properly assessed and managed.

### Air Quality Helps to Justify Measures Taken to Reduce CO<sub>2</sub> Emissions

The benefits of policy decisions to reduce greenhouse gas emissions will be felt many years in the future and they will form a very small, but essential, part of a global effort – they are not easily tangible on a 'here and now' basis. Climate change science can also be attacked by sceptics who seize upon issues such as the 'Climategate' leaked e-mails affair of 2009, or cold winters such as that of 2009/10, to argue the case for non-action. Human impacts on the climate are concerned with the increasing probability, rather than the certainty, of extreme climatic events happening, and it is highly unlikely that there will ever be a 'smoking gun' proving that a particular climatic event is due to rising greenhouse gas emissions.

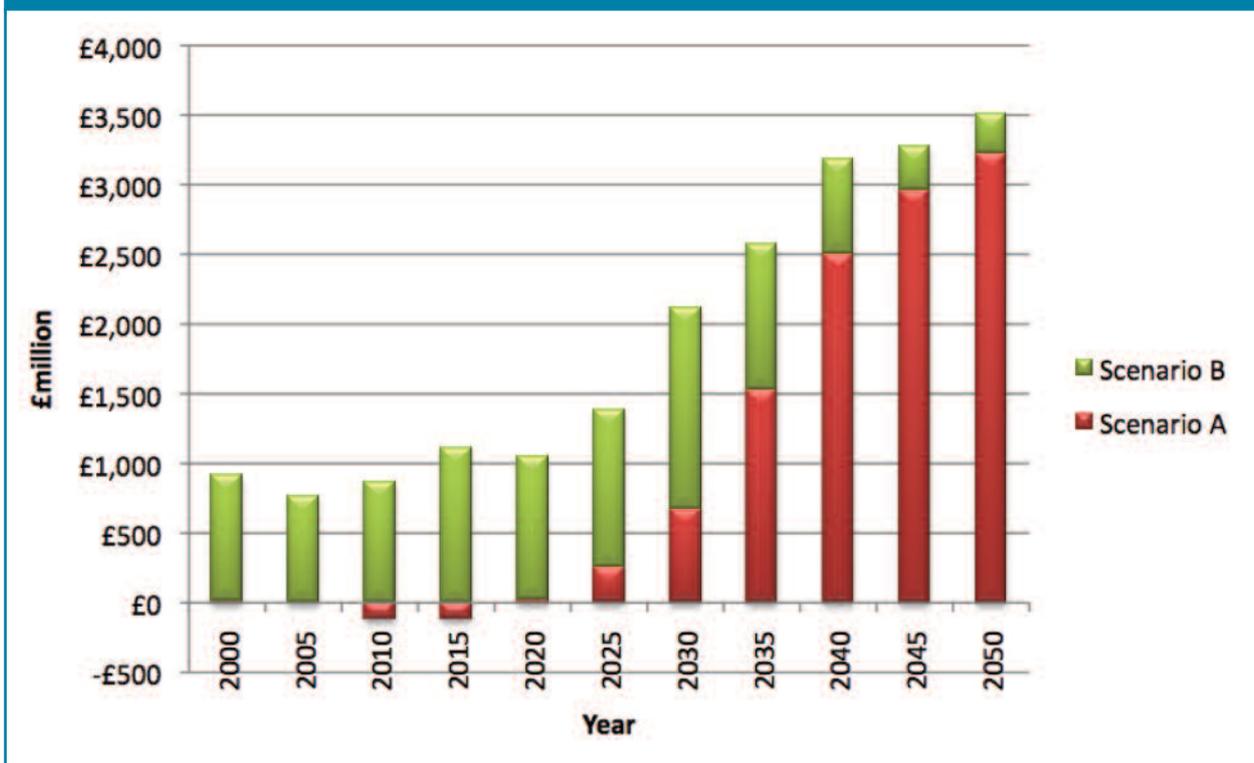
In contrast the benefits of policy decisions aimed at improving local air quality are felt almost immediately and almost entirely in the area where they are introduced. In addition the impacts are easily measurable, and the effect on people's health and quality of life can be directly linked back to the policy decision. Measures that address both air quality and climate change can therefore be justified on both their immediate and long-term benefits – this is one of the most powerful arguments for an integrated approach to policy.

#### Box 11 – Defra Modelling of the Benefits of Policy Integration

In 2008 the Department for Environment, Food and Rural Affairs (Defra) commissioned a study of the benefits of integrated policy for air quality and climate change vs. a 'business as usual' approach to policy in both areas. The study covered policy decisions at a UK level between the present day and 2050<sup>32</sup>. In common with much of modern Government policy analysis, the study attempted to monetise the costs and benefits associated with policy decisions, i.e. assign a financial cost to the health and environmental impacts of poor air quality and emissions of greenhouse gases. The study concluded that integrated policy brought significantly greater benefits than pursuing each area separately. The benefits were particularly felt in early years, where a 'business as usual' approach would actually lead to negative benefits (i.e. an overall cost) due to the air quality impacts of a large increase in residential biomass combustion. The results of the study are shown in Figure 10, page 16, where scenario A is 'business as usual' and scenario B represents the integrated approach.

32 See - <http://www.defra.gov.uk/environment/quality/air/airquality/panels/igcb/documents/uk-markal-model.pdf>

Figure 10 – Defra modelling of the benefits of integrating air quality and climate change policies



## 6. Developing an Integrated Approach

### Key Points

- The foundation of an integrated approach is agreement on emissions reduction measures between staff working on air quality and climate change, who often work in different departments. This requires the establishment of good face-to-face relationships, and an understanding of the importance and drivers for each other's work. Agreement on a coherent vision for emissions reduction amongst staff working on air quality and climate change makes it far more likely that suitable policies will be adopted by other departments and organisations.
- Elected members decide the policy direction of a local authority, so gaining their support and understanding is important. In cabinet systems the most important elected members will be the leader, and the environment portfolio holder.
- In order to deliver air quality and climate change objectives, other local authority plans, strategies and policy documents will need to contain suitable policies. To do so relevant plans, strategies and targets need to be identified along with suitable timescales for input. Early engagement in the development of these plans and strategies is essential to influence their content, as is close cooperation with colleagues in key departments such as strategic, spatial and transport planning.

### The Cornerstone of Integrated Policy is Agreement between Staff Working on Air Quality and Climate Change Issues

Local authority staff provide the expertise to help the council's elected members and managers formulate policy, and will take forward the actual implementation of the policy measures agreed. If policy on air quality and climate change is to be integrated it is essential that staff working on both areas have a good understanding of the importance of each other's work, communicate freely and regularly, and avoid splitting the environment 'voice' by contradicting each other's advice when feeding into the policy process. This last point is particularly pertinent for issues that can appear to be quite black or white, for example urban biomass combustion. If conflicting advice is provided to local policy makers, the result can be unsatisfactory policy which suits neither party.

Air quality staff are usually based in environmental health/protection departments<sup>33</sup> whilst staff working on climate change are very often based elsewhere, for example in private sector housing or policy teams. With staff based in different departments, and often separate buildings, creating a good working relationship is often easier said than done. Despite this, investing time in building strong face-to-face relationships, and consulting early on policies and plans, is crucial. Understanding the needs of each other's work is the foundation of a successful working relationship, which the first two sections of this guidance can help to do ('why do we care about air pollution' and 'why do we care about climate change').

### Integrated Policy Means Plans and Strategies Will Consider Their Impact on Each Other

For an integrated approach to work, climate change (or carbon management) policy needs to influence the Local Air Quality Management (LAQM) system, and air quality management policy needs to influence carbon management. To do this it is important to recognise the differences between the two systems. LAQM is predominantly process driven – the regime operates to a fixed timescale dictated by central Government, and is based on detailed policy and practice guidance provided by the Department for Environment, Food and Rural Affairs (Defra). By contrast, climate change activities operate largely outside of fixed Government timescales and guidance, with assessment and strategy development driven by the local authority's own internal processes, and often using voluntary guidance available from bodies such as the Carbon Trust and the Energy Saving Trust.

There may also be significant differences in the skills base of staff working on air quality and climate change. Air quality responsibilities tend to fall to environmental health officers and technical officers, with many having strong technical backgrounds and significant experience in many aspects of environmental protection. Staff working on climate change come from a wide variety of backgrounds which differ between local authorities, for example policy development, sustainability, public relations and environmental consultancy. These skills bases can frequently be complementary if the two areas are worked on together. The different locations of air quality and climate change staff within a local authority can also be of benefit for an integrated approach, with strong champions for action on both areas embedded within more than one department.

Adopting an integrated approach does not necessarily mean that the two strategies should be merged into one. A climate change strategy, for example, may pay considerable attention to adaptation to a changing climate, whilst an air quality action plan may place a high priority on direct measures to reduce people's exposure to polluted air (e.g. barriers, buffer zones, alert systems). Integrated policy does, however, mean that both documents will be developed with due regard to each other, as shown in Table 3, page 18.

#### Box 12 – Climate change in the Perth & Kinross Council Air Quality Action Plan

In common with other Scottish cities, the city of Perth in Central Scotland experiences air quality problems and the local authority has declared an Air Quality Management Area for both particulate matter and nitrogen dioxide. As they began the process of drawing up their air quality action plan, staff working on air quality took the opportunity to assess the impacts of potential measures on greenhouse gas emissions, and also their cost effectiveness in terms of greenhouse gas reduction. This work was carried out in the context of development of a greenhouse gas emissions inventory for the whole authority, with aspects of the report specifically dedicated to the impact of the air quality action plan. Most of the proposed action plan measures showed benefits in terms of greenhouse gas emissions; the few measures that showed negative impacts were not taken forward in the final plan.

33 This is the most common case, however staff can also be based in regulatory services or other departments

**Table 3 – How climate change and air quality policy might influence each other in practice**

Climate Change Strategy	Air Quality Action Plan
<ul style="list-style-type: none"> <li>Reference is made to air quality action plans where measures common to both areas are planned</li> <li>Measures that show strong win/win benefits are prioritised</li> <li>Measures that have a negative impact on air quality are de-prioritised, or targeted towards geographical areas where the impacts will be low (e.g. rural areas with good air quality)</li> <li>Climate measures that show strong air quality benefits are geographically targeted, where possible, at areas of poor air quality</li> </ul>	<ul style="list-style-type: none"> <li>Reference is made to climate change strategies where measures common to both areas are planned</li> <li>Climate benefits or dis-benefits of action plan measures are assessed and, where possible, quantified</li> <li>Measures that show strong win/win benefits are prioritised</li> <li>Measures with strong carbon dis-benefits (e.g. new roads) are de-prioritised</li> </ul>

### Gaining the Understanding and Support of Elected Members is Crucial

Local authorities are democratic bodies, where elected members control the policy approach of the organisation. Gaining understanding and support of the need to address air quality and climate change from elected members, and the importance of integrated policy, is therefore crucial if headway is to be made. Many local authorities now have an executive system, with an elected leader who then appoints a number of their party colleagues to form a cabinet. One party (or a coalition) therefore decides the policy direction of the council, and responsibilities are concentrated within a relatively small number of individuals. In these systems the leader of the council and the environment portfolio holder are the two main individuals who need to be engaged. Another important group of councillors are those sitting on Overview and Scrutiny Committees (a statutory requirement where an executive system has been adopted). These committees scrutinise policies and decisions made by the cabinet and senior management, and can therefore be a useful place to raise the need for integrated climate change and air quality policy.

It is often useful to have more than a single line of argument when raising issues with elected members. Individuals and the parties they represent will have their own political views and priorities, and in most cases it will be easier to work with these than against them. The integrated approach to policy can help here – if elected members are sceptical on the need for action to address climate change they may be more interested in the need to improve air quality and public health, and vice-versa. Elected members who do not feel that either air quality or climate change are a priority may be won over by economic arguments. Some measures, energy efficiency in particular, have the effect of putting more money into residents' pockets, which can boost the local economy. Understanding individual political priorities and views, and getting a realistic sense of what is achievable, is crucial before trying to engage with elected members.

### An Integrated Approach Needs to Influence Local Authority Policy and Practice

To capture the benefits of integrated policy discussed in sections 4 and 5, local authorities will need to consider what measures they should take forward in their area, and what policies and strategies need to be influenced to implement them. Guidance on common measures is provided in section 7, whilst Appendix A examines the plans and strategies where an integrated approach can be embedded.

### Local Authorities Produce Many Relevant Plans and Strategies

Local authorities may produce separate climate change strategies and air quality action plans; in most cases, however, these will need to influence other strategies and service plans that the local authority produces in order to actually implement policy measures. With respect to local authorities in multi-tier areas, the plan or strategy that needs to be influenced may be the responsibility of another local authority – for example in England air quality is the responsibility of district/ borough level authorities whilst transport falls to county councils.

The key to influencing the content of plans and strategies is to get involved at an early stage. This can be complicated by the current trend of reducing central Government obligations on local government, which is reducing the number of statutory plans and strategies that a local authority has to produce. The practical upshot of this is that there are fewer plans and strategies that local authorities are required to produce to a centrally imposed deadline, and it can therefore be unclear when any particular local authority will be starting the review process for a plan or strategy. This underlines the need for good communication with colleagues in other departments, and indeed other local authorities, to ensure that opportunities for early engagement in plans and strategies are taken.

A useful approach is therefore to identify what plans and strategies need to be influenced, and when opportunities to do so will arise. Ideally this would be done in an integrated fashion, with air quality and climate change staff adopting a common approach. Generally it is easier to work by a top down approach – if the need to address air quality and climate change is featured in a local authority's high level overarching strategies it is easier to push policies into the plans and strategies that sit below them. Appendix A contains a list and descriptions of the main local authority plans and strategies relevant to air quality and climate change.

### Policy Can Also Be Integrated With Other Areas of Environmental Work

Local authorities are also active, and have legal responsibilities, in other areas of environmental protection. Climate change and air quality policies should integrate with these areas to ensure that opportunities to forward policies that benefit multiple areas of work are taken. Areas of work that local authorities should consider include:

### Waste and Recycling

Local authorities are responsible for the collection and disposal<sup>34</sup> of waste, and face significant pressures to reduce the amount of waste sent to landfill. Some waste disposal options have significant potential to benefit both air quality and climate change, particularly in the area of disposal of organic waste. Biogas (or biomethane) can be produced from organic waste through a process known as anaerobic digestion, and used to produce power or fuel vehicles. Several local authorities have used biomethane to power public service vehicles (see Box 10, page 15), whilst the city of Lille in France fuels its buses on biomethane produced from the city's waste<sup>35</sup>.

### Environmental Noise

Environmental noise is the unwanted sound we are exposed to in our everyday environment, predominantly from transport sources such as road vehicles, rail engines and aircraft. Noise causes annoyance and sleep disturbance, and is also associated with poor health. Many measures taken to improve air quality and climate change will also reduce noise, such as reducing the number of vehicles on the road and the use of cleaner quieter technologies such as electric or hybrid vehicles. Some measures though may increase noise and disturbance – for example wind turbines have the potential to damage amenity, and in some cases affect health, due to acoustic impacts and flicker, if they are not thoughtfully sited. The Environmental Noise Directive has introduced a duty for some local authorities to create Noise Action Plans that will reduce the overall levels of noise. Larger urban areas must also designate and protect quiet urban spaces under the Environmental Noise Directive – see the Environmental Protection UK report 'Quietesting City Open Spaces'<sup>36</sup>. These problem areas often appear in areas that have already been designated Air Quality Management Areas, and therefore effective corrective action may reduce levels of noise and improve local air quality.

### Managing Land Sustainably

Soil is a significant carbon sink, and if it is not managed in a sustainable fashion its ability to lock away carbon from the atmosphere may be significantly impaired. Local authorities have a responsibility to manage land sustainably through the planning system, and preserving the ability of soil to absorb carbon should be an important part of a local authority's climate change strategy. Good quality development can help to protect soil by, for example, reducing 'soil sealing' which occurs through the use of impervious surfaces and soil compaction by construction equipment.

### Biodiversity and Green Spaces

Climate change and air quality both impact directly on biodiversity. Air pollution leads to issues of acidification and nutrient (nitrogen) deposition in vulnerable ecosystems, whilst ozone pollution attacks vegetation directly, leading to leaf damage and stunted growth. Climate change presents a significant challenge to vulnerable ecosystems, which may be unable to adapt to warmer conditions. Managing biodiversity sustainably can bring direct benefits for climate change and air quality – for example managing woodlands can boost biodiversity whilst providing a sustainable source of wood fuel. Green open spaces in urban areas can also benefit air quality and climate change – urban trees can be a significant carbon sink, locking away carbon, whilst open spaces themselves can provide a buffer zone between sources of noise and air pollution, and the places where people live and work. Providing better quality green open space in urban areas also has significant benefits in the area of adaptation to climate change, for example by reducing rainwater run-off, increasing urban humidity and reducing urban temperatures.

<sup>34</sup> District level authorities are responsible for waste collection and county level for waste disposal. Unitary authorities and London Boroughs are responsible for both collection and disposal.

<sup>35</sup> See a short video about Lille's biomethane buses at [www.youtube.com/watch?v=Xz-l\\_EKU22A](http://www.youtube.com/watch?v=Xz-l_EKU22A)

<sup>36</sup> [http://www.environmental-protection.org.uk/assets/library/documents/Quietesting\\_Open\\_Spaces\\_july2010\\_lower\\_res%29.pdf](http://www.environmental-protection.org.uk/assets/library/documents/Quietesting_Open_Spaces_july2010_lower_res%29.pdf)

## 7. Common Measures and Their Impacts on Air Quality and Climate Change

This section provides guidance on the air quality and climate change impacts of typical measures and technologies that can be used to address both sets of emissions. A traffic light system is used to indicate what kind of an impact the measure/technology has on both areas:

- Green – The measure generally has a positive impact.
- Amber – The measure may or may not have a negative impact, depending on where or how it is installed.
- Red – The measure generally has a negative impact (although please note that there may be situations where it does not).
- Neutral – The measure will generally have no significant impact.

The examples covered in this section are not an exhaustive list – it is intended to cover typical measures that local authorities can take to reduce emissions of greenhouse gases and air pollutants. Some other measures, for example product

standards, can have very large impacts but they need to be negotiated at a national or even European level. Measures such as large scale renewable energy projects may be the subject of planning applications at a local level, but will make more of an impact on emissions at the national scale.

Note that this system provides a guide only. The impact of some measures depends very much on the technology used, and where (geographically) the measure is installed – please read the associated page for further information on these considerations. A red or amber rating in one category does not mean that a measure should be ruled out – in an area where air quality is poor then a relatively small carbon disbenefit may be acceptable if a measure has a significant positive impact on air quality, conversely if a measure has very significant carbon savings a small air quality and disbenefit may be acceptable. In these situations, however, the negative impacts should be identified and managed to minimise their size, and, in the case of air pollutants, their direct impacts on human health.

Measure/ technology	Impact on air quality	Impact on climate change	Page
<b>Transport Measures</b>			
Alternative fuels <sup>37</sup>	Green	Green	21
Retrofit of exhaust abatement equipment	Green	Amber	22
Low emission zones	Green	Amber	23
Low emission strategies	Green	Green	24
Fleet management and driver training	Green	Green	25
Emissions related car parking charges	Amber	Green	26
Travel plans	Green	Green	27
Car clubs	Green	Green	28
<b>The Built Environment</b>			
Domestic energy efficiency	Green	Green	30
Commercial energy efficiency	Green	Green	31
Combined heat and power	Amber	Green	32
Biomass heat <sup>38</sup>	Red	Green	33
Micro wind turbines	Neutral	Green	34
Solar <sup>39</sup>	Green	Green	35
Heat pumps <sup>40</sup>	Green	Neutral	36

<sup>37</sup> Biodiesel and bioethanol would have 'amber' status for air quality, as they have little impact on air pollutant emissions

<sup>38</sup> In locations where coal and oil are the realistic alternatives for heating fuels biomass would have 'green' and 'amber' status for air quality respectively

<sup>39</sup> Solar thermal (hot water) would have 'green' status for air quality, solar photovoltaic would be 'neutral' as this displaces power station emissions, rather than emissions from domestic hot water heating usually provided by gas, oil or solid fuel appliances

<sup>40</sup> Heat pumps used in areas where mains gas is not available would have 'green' status for climate change

**Transport Emissions**

Transport is the problem sector for both air quality and climate change – despite improvements in emissions from individual vehicles, overall emissions of CO<sub>2</sub> from the transport sector have grown over the past decade, and most air quality problems still relate to the use of vehicles in urban centres.

Measures to tackle emissions from vehicles fall roughly into two areas – technology measures to reduce emissions from individual vehicles, and demand management measures to reduce the overall demand for transport, and shift journeys onto lower emission modes of transport.

<b>ALTERNATIVE FUELS</b>	
<p>Alternative fuels simply refer to vehicles that do not run on conventional petrol or diesel. Alternative fuels include:</p> <ul style="list-style-type: none"> <li>• Gas fuels – for example compressed natural gas (CNG) or liquefied petroleum gas (LPG). Can be used in modified petrol vehicles</li> <li>• Biofuels – include biodiesel, bioethanol and biomethane. Can be used in modified petrol or diesel vehicles</li> <li>• Battery electric – electric vehicles which are charged using mains electricity</li> <li>• Hybrid electric – vehicles with both an electric motor and conventional engines. Normal hybrids do not require charging by mains electricity; 'plug in' hybrids have a longer all electric range and can be plugged into the mains to charge</li> <li>• Hydrogen fuel cell – electric vehicles powered via electricity produced by reacting hydrogen fuel and oxygen from the air in a fuel cell</li> </ul>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Most reputable alternative fuels will have a beneficial impact on air quality compared to the conventional diesel and petrol vehicles that they will replace. The exceptions are biofuels such as biodiesel and bioethanol, which have similar emissions to conventional diesel and petrol vehicles. Battery electric and hydrogen fuel cell vehicles are zero emission at the point of use; emissions may be associated with power stations used to provide mains electricity, but here they are reasonably well regulated and removed from densely populated areas.</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Most alternative fuels will significantly reduce emissions of CO<sub>2</sub>, subject to impacts of fuel production. Battery electric and hydrogen fuel cell vehicles are zero emission at the point of use; emissions may be associated with the production of hydrogen fuel or power stations used to provide electricity, however the greatly enhanced efficiency of electric vehicles means lower overall emissions. Use of biomethane (methane gas produced from the decomposition of organic material) can actually have a net positive impact on climate change if it is produced from organic waste, as methane (a powerful greenhouse gas) would have otherwise been released into the atmosphere.</p>	<p>Green</p>
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>Various packages of support are available for the many low emission technologies, for both the public and organisations. These are summarised by the Government's Office for Low Emission Vehicles.</p> <p>In June 2010, The Scottish Government announced £7.7 million funding for green initiatives – £4.3 million has been allocated to help boost the use of low carbon vehicles by Scotland's public services and £3.4 million towards a new green bus scheme.</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>Local authorities can lead by example by introducing alternative fuelled vehicles into their own fleets, where they have direct ownership of suitable vehicles. Many local authorities will also have strong influences (through direct contacts or via licensing requirements) over private fleets such as buses and refuse collection vehicles which may be suitable for the use of alternative fuels. Local authorities can also encourage their residents to use alternative fuels through measures such as the provision of electric vehicle charging points and emissions related car parking charges (see page 26).</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>Due to the Government's Renewable Transport Fuels Obligation traditional road fuels now include a proportion of biofuel, typically 5%. Higher blend biofuels can also be used, although modifications to the vehicle may have to be made. When considering the carbon impact of different fuels and technologies it is important to take account of the whole lifecycle of both the vehicle and the fuel, as significant emissions may occur away from the actual use of vehicles on the road.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>The Government's Office for Low Emission Vehicles – <a href="http://www.dft.gov.uk/pgpr/sustainable/olev/">www.dft.gov.uk/pgpr/sustainable/olev/</a></p> <p>The Energy Saving Trust provides advice to local authorities on fleet improvements – <a href="http://www.energysavingtrust.org.uk/business/Business/Transport-advice">www.energysavingtrust.org.uk/business/Business/Transport-advice</a></p>	

RETROFIT OF EXHAUST ABATEMENT EQUIPMENT	
<p>Retrofit involves installing equipment to reduce air pollutant emissions from existing vehicles, usually larger diesel vehicles (e.g. buses, heavy goods vehicles, refuse vehicles). Popular technologies include particulate filters (which reduce emissions of PM<sub>10</sub> and PM<sub>2.5</sub>) and selective catalytic reduction, which reduces emissions of nitrogen oxides. Retrofit is usually carried out as part of an overall plan to reduce emissions from fleets (such as bus fleets), or in order to comply with policies such as low emission zones (see page 23). Retrofit is not normally a cost effective option for smaller vehicles such as private cars.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Retrofit can be a cost effective means of reducing emissions from vehicles, and is particularly effective where analysis shows that an area's air quality problems are associated with larger, diesel vehicles.</p>	Green
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Installation of retrofit abatement equipment usually involves a fuel economy penalty, which can mean higher emissions of CO<sub>2</sub>. There are two caveats though, firstly engines are often tuned to reduce air pollutant emissions at the expense of fuel economy – installation of retrofit equipment can therefore mean that the engine can be retuned to maximise economy with the retrofit equipment taking care of the air pollutant emissions. Secondly the installation of a diesel particulate filter may reduce overall warming emissions, as they reduce emissions of black carbon which have a significant warming effect on the climate.</p>	Amber
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>Since the end of the 'Clean Up' grants programme there has been no central Government support for retrofit exhaust abatement equipment. Several local authorities have set up bus or freight voluntary partnerships with local operators. These partnerships aim to secure investment and improvement in services, for example a local authority might agree to install a bus lane if the bus company can provide new low emission buses on the route.</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>Local authorities can lead by example by retrofitting their own fleets, where they have direct ownership of large diesel vehicles. Many local authorities will also have strong influences (through direct contacts or via licensing requirements) over private fleets such as buses, taxis and refuse collection vehicles; for example several local authorities have worked with bus operators to encourage them to install retrofit equipment. Where air quality problems are particularly bad local authorities can set up a Low Emission Zone (see page 23), which requires vehicles entering an area to meet a certain emission standard.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>There is some evidence that equipment installed to reduce particulate emissions may increase emissions of NO<sub>x</sub> – this is specific to some technologies and can be explored with equipment manufacturers.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>Information from Transport for London on fitting retrofit equipment – <a href="http://www.tfl.gov.uk/roadusers/lez/comply/5074.aspx">www.tfl.gov.uk/roadusers/lez/comply/5074.aspx</a></p> <p>Defra Local Air Quality Management Practice Guidance Note on retrofit – <a href="http://www.defra.gov.uk/environment/quality/air/airquality/local/guidance/documents/practice-guidance4.pdf">www.defra.gov.uk/environment/quality/air/airquality/local/guidance/documents/practice-guidance4.pdf</a></p>	

<b>LOW EMISSION ZONES</b>	
<p>A low emission zone (LEZ) is an area where only vehicles that meet a certain exhaust emission standard can enter. In addition to vehicles that meet the required standard from new, retrofit of older vehicles with emissions abatement technology is usually allowed. LEZs can be city wide, or apply to certain parts, or streets, of an urban area. LEZs can apply to only certain classes of vehicles (e.g. buses, taxis, heavy goods vehicles, construction traffic) or to a wider selection of vehicles, including private cars. Where LEZs relate to only a small number of operators (for example LEZs that only apply to buses) enforcement is greatly simplified, as the compliance of the limited number of vehicles can be easily checked.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Where air quality problems are particularly bad LEZs are probably the single most effective means of tackling the problem. LEZs are particularly effective where addressing a certain vehicle sector (e.g. buses or heavy goods vehicles) can secure significant air quality benefits.</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Low emission zones are not designed to reduce emissions of CO<sub>2</sub> from vehicles. Some benefits may be experienced through the zone encouraging the purchase of newer, more fuel efficient, vehicles.</p>	<p>Amber</p>
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>To establish an LEZ local authorities need to know which vehicles comply with the scheme criteria, a process which is complicated by the need to include vehicles that have installed retrofit emissions abatement equipment (and therefore have different emissions standards from when they were first registered). The Vehicle and Operator Services Agency (VOSA) is able to provide details for PM<sub>10</sub> standards; there is, however, currently no central register for NO<sub>x</sub> standards. The establishment of a NO<sub>x</sub> register is currently under discussion between the UK Government and the Mayor of London (for use in the London LEZ).</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>Local authorities normally lead the introduction of a low emission zone.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>In the UK LEZs are in operation in London, Oxford and Norwich, with Reading soon to follow. The London Low Emission Zone is the most high profile example of a LEZ in the UK and is a city wide scheme enforced by number plate recognition cameras. However, other cheaper models are in use around Europe. These include models where vehicles are given a coloured window sticker, with the colour denoting the vehicle's emission standards. Compliance is enforced by parking enforcement officers checking stickers during their normal duties.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>Defra Local Air Quality Management Practice Guidance Note on Low Emission Zones – <a href="http://www.defra.gov.uk/environment/quality/air/airquality/local/guidance/documents/practice-guidance2.pdf">www.defra.gov.uk/environment/quality/air/airquality/local/guidance/documents/practice-guidance2.pdf</a></p> <p>Information on the various low emission zones in operation across Europe – <a href="http://www.lowemissionzones.eu">www.lowemissionzones.eu</a></p> <p>Research commissioned by the Department for Transport on the implementation of Low Emission Zones in Europe - <a href="http://www.dft.gov.uk/pgr/scienceresearch/orresearch/lez/pdf/lowemissionzones.pdf">http://www.dft.gov.uk/pgr/scienceresearch/orresearch/lez/pdf/lowemissionzones.pdf</a></p>	

LOW EMISSION STRATEGIES	
<p>Low Emission Strategies are a package of measures applied to reduce emissions of both air pollutants and greenhouse gases from new (or significantly altered) developments. They are secured via the planning system, using a combination of planning conditions and obligations (Section 106 agreements in England and Wales, Section 75 in Scotland). Low Emission Strategies usually apply technical measures (e.g. support for alternative fuels, public transport improvements, low emission zones in the development phase, etc), as non-technical measures such as travel plans are often attached as planning conditions separately.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>The exact air quality impact of a Low Emission Strategy will depend on the package of measures implemented, although the overall package will be designed to significantly reduce emissions. Some local authorities are now examining how Low Emission Strategies can make developments 'air quality neutral', i.e. have no, or even a beneficial, impact on air quality.</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Low Emission Strategies are designed as an overall package to reduce emissions of both air pollutants and CO<sub>2</sub>. As with air quality, the exact impact will depend upon the package of measures chosen.</p>	<p>Green</p>
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>The Low Emission Strategies Partnership has been established by a group of leading local authorities to promote the concept of Low Emission Strategies and develop best practice in their use. The partnership provides advice and guidance through written materials and events; funding has also been secured to develop a low emissions toolkit and to fund a number of regional pilot projects in England.</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>Local authorities normally lead the production of Low Emission Strategies.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>Many Low Emission Strategies are funded through developer contribution secured by Section 106 agreements. The system of planning obligations in England and Wales is currently changing, with the forthcoming Community Infrastructure Levy set to provide a more uniform means of setting developer contributions, and the role for Section 106 agreements restricted to mitigating the direct impacts of a development. Many local authorities are now looking at how Low Emission Strategies can be progressed under this new system, with several planning to use the CIL to fund implementation of low emission schemes.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>Defra provide practice guidance to local authorities on Low Emission Strategies – <a href="http://www.defra.gov.uk/environment/quality/air/airquality/local/guidance/">www.defra.gov.uk/environment/quality/air/airquality/local/guidance/</a></p> <p>The Low Emission Strategies Partnership provides information, advice and guidance – <a href="http://www.lowemissionstrategies.org">www.lowemissionstrategies.org</a></p>	

<b>FLEET MANAGEMENT AND DRIVER TRAINING</b>	
<p>Large organisations (including local authorities) often have significant vehicle fleets, and also significant numbers of drivers using fleet (or their own) vehicles for business use. Emissions of both air pollutants and carbon dioxide can be achieved through purchasing alternatively fuelled vehicles (see page 21), retrofitting existing vehicles or just simply purchasing best in class conventional vehicles. However, in addition to initial purchasing decisions, the way in which vehicles are maintained and driven has a significant impact on emissions. Sticking to manufacturers' service schedules ensures that emissions performance is maintained, whilst fitting best in class consumables (for example low rolling resistance tyres) can even reduce emissions over the 'as new' vehicle. Driver training in 'eco' or 'smarter' driving can also reduce fuel consumption and hence emissions – indeed driver training can be one of the quickest and cheapest ways to reduce vehicle emissions.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Well maintained fleets and well trained drivers will help to keep emissions of air pollutants to a minimum.</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>As with air quality, well maintained fleets help to ensure fuel efficiency (and hence carbon emissions) is maintained. Driver training is a quick and low cost way to reduce emissions.</p>	<p>Green</p>
<p><b>Support mechanisms</b></p> <p>The Energy Saving Trust provides a free fleet consultancy service to help organisations reduce emissions from their fleets, including advice on 'smarter' driving.</p>	
<p><b>What support can local authorities provide?</b></p> <p>Local authorities can lead by example by ensuring their own fleets are managed in accordance with best practice, and that drivers, including staff using their own vehicles, receive training in 'smarter' driving techniques. Local authorities can also signpost other organisations in their areas towards services such as the Energy Saving Trust's fleet consultancy services, through groups such as business and climate change partnerships.</p>	
<p><b>Other issues to consider</b></p> <p>The importance of tyres is often overlooked, but as they form the contact between the car and the road their performance is crucial to the safety and fuel efficiency of the vehicle. Tyres vary significantly in their rolling resistance, and the use of low rolling resistance tyres can significantly improve a vehicle's fuel efficiency. Tyres are also the main source of vehicle noise at high speed, and again the use of quieter tyres can reduce road noise, a major problem in many parts of the UK. Industry publications can help fleet managers identify best in class quieter, lower rolling resistance tyres. Mandatory EU standards and labelling for tyre noise and rolling resistance will be introduced in 2012 – Environmental Protection UK is running a campaign in advance of this to encourage early uptake the best performing tyres.</p>	
<p><b>Further information and reading</b></p> <p>Energy Saving Trust fleet advice - <a href="http://www.energysavingtrust.org.uk/business/Business/Transport-advice/Advice-for-organisations">www.energysavingtrust.org.uk/business/Business/Transport-advice/Advice-for-organisations</a></p> <p>The Yorkshire 'Eco Stars' fleet scheme has taken some innovative approaches to management of emissions - <a href="http://www.care4air.org/eco_stars_scheme.html">www.care4air.org/eco_stars_scheme.html</a></p> <p>Environmental Protection UK's Campaign for Better Tyres, to be launched end March 2011, will provide advice and information on choosing energy efficient, low noise tyres – <a href="http://www.buybettertyres.org.uk">www.buybettertyres.org.uk</a></p>	

EMISSIONS RELATED CAR PARKING CHARGES	
<p>Emissions related car parking charging schemes vary the charge levied for residents' (or other long term parking) car parking permits depending on the rated emissions of the vehicle – these can be its CO<sub>2</sub> emission band, its Euro emission standard or a combination of the two. Such schemes aim to encourage residents to purchase lower emission vehicles by making it considerably cheaper to park than higher emission models.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Most current schemes are based on CO<sub>2</sub> criteria alone. This indirectly encourages diesel vehicles, which tend to have lower CO<sub>2</sub> emissions than comparable petrol models but higher emissions of local air pollutants. This undesirable situation can be avoided by including air quality criteria in the scheme, or introducing a diesel penalty whereby diesel vehicles pay more than petrol vehicles with the same CO<sub>2</sub> emissions. The charging structure can also be used to incentivise emerging technologies such as electric vehicles.</p>	Amber
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>If the scheme includes CO<sub>2</sub> based criteria it will encourage residents to purchase vehicles with lower CO<sub>2</sub> emissions, which should reduce overall emissions from their driving.</p>	Green
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>Several local authorities have already introduced emissions related car park charges, therefore providing templates for other local authorities to copy.</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>Local authorities will normally lead the introduction of emissions related car parking schemes.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>Some local authorities are now examining how they can introduce emissions related schemes to short term car parking charges. For example, the London Borough of Richmond has run a trial of a system of emissions related charging via a new pre-paid smart card system for paying for short term parking around the Borough.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>Read more about emissions related car parking charging in the Local Government Regulation (formerly LACORS) Climate Change Toolkit for Regulatory Services – <a href="http://www.lacors.gov.uk/lacors/upload/18297.pdf">www.lacors.gov.uk/lacors/upload/18297.pdf</a></p>	

<b>TRAVEL PLANS</b>	
<p>Travel plans are a package of measures designed to reduce single occupancy car journeys. Typical measures include incentives to use public transport, car sharing, car clubs, walking and cycling. Travel plans can be produced for workplaces, or for major new residential, commercial or retail developments. Individual or personalised travel plans are a relatively new form of travel planning – these involve working with people on an individual basis to provide personalised travel advice and support.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Travel plans aim to reduce single occupancy car journeys, and therefore the amount of traffic on the road. Road traffic is the single biggest source of air pollution in urban areas, therefore reducing traffic volumes will have a beneficial effect on air quality through fewer vehicles and less traffic congestion.</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Reducing traffic volumes will also reduce carbon emissions, particularly if zero carbon modes of transport such as cycling and walking are strongly encouraged.</p>	<p>Green</p>
<p><b>Support mechanisms</b></p> <p>A number of pilot schemes have been funded by the Government, including the Sustainable Travel Towns initiative and Cycle Demonstration Towns schemes.</p>	
<p><b>What support can local authorities provide?</b></p> <p>Local authorities can lead by example by establishing their own workplace travel plans, and also providing advice and guidance for companies who wish to set up their own. Many county level local authorities have focused on developing school travel plans, often employing a member of staff to support and champion these. The planning system is perhaps the most powerful tool local authorities have to push forward travel plans, and many local authorities have introduced planning conditions that require travel plans to be established for new developments (and the companies associated with them).</p>	
<p><b>Other issues to consider</b></p> <p>The use of travel plans should be considered alongside physical improvements to public transport provision, and walking and cycling infrastructure to ensure that appropriate services are available for individuals affected by the travel plans.</p>	
<p><b>Further information and reading</b></p> <p>Advice from the Department for Transport – <a href="http://www.dft.gov.uk/pgr/sustainable/travelplans/">www.dft.gov.uk/pgr/sustainable/travelplans/</a></p> <p>Department for Transport advice on school travel plans - <a href="http://www.dft.gov.uk/pgr/sustainable/schooltravel">www.dft.gov.uk/pgr/sustainable/schooltravel</a></p> <p>ACT Travelwise is an networking organisation dedicated to promoting sustainable transport – <a href="http://www.acttravelwise.org/home">www.acttravelwise.org/home</a></p>	

CAR CLUBS	
<p>Car clubs are a short term form of car hire. Cars are parked at convenient locations round an urban area; club members can use these by booking online or by phone, and then accessing the car via a pin code or smart card. Members typically pay a flat rate cost per hour and/ or per mile. Car clubs tends to attract people that would otherwise keep a car for the occasional journey. Car club members also tend to use public transport more than they would if they had their own vehicle; costs associated with owning a car are 'up front' whilst the costs of using it (i.e. fuel) are quite low; by contrast car club members pay very little up front but are billed for actual use of the car. Each car club vehicle typically replaces eight private cars, and results in an overall reduction in miles driven of 25%.<sup>41</sup></p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Car clubs are an effective means of reducing numbers of car journeys, as car club users are more likely to use public transport than people keeping an 'occasional' car. Car club vehicles are also normally reasonably new, and therefore have lower emissions than the older vehicles typically used as second cars.</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Car clubs help to reduce numbers of car journeys, which reduces CO<sub>2</sub> emissions. In addition the vehicles themselves tend to be small, modern cars with low CO<sub>2</sub> emissions. Some car clubs offer a variety of vehicles with users able to use small, low emissions vehicles for day to day journeys, but with larger vehicles also available when needed.</p>	<p>Green</p>
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>Car clubs are operated by commercial organisations across the UK, who can offer support and advice to local authorities who wish to set one up.</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>Car clubs need car parking spaces that are close to potential users; car clubs work particularly well in city centres where population densities are high and car parking spaces are at a premium. Local authorities can help by working with operators to identify and provide spaces. Many local authorities have helped to establish car clubs by using them to replace their own fleet vehicles, thereby helping to create enough demand for the car clubs to be viable – vehicles can be used by local authority staff during the day and local residents outside of working times. The planning system can also be a strong means of encouraging car clubs, with many local authorities requiring the establishment of a car club as part of an overall strategy (or travel plan) to reduce car use in major new development.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>Car clubs can be used to introduce alternative fuel vehicles such as hybrids or electric vehicles – in addition to the direct benefits this enables people to become familiar with new technologies, which they may then choose if and when they go on to purchase a vehicle. Electric vehicles may be particularly suited to urban areas where the limited range of the vehicles is less of an issue, and charging infrastructure can be provided for suitable car club spaces.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>Advice from the Department for Transport – <a href="http://www.dft.gov.uk/pgr/sustainable/cars/promotingcarsharingandcarclu6188">www.dft.gov.uk/pgr/sustainable/cars/promotingcarsharingandcarclu6188</a></p> <p>Car Plus is a national charity who can provide support and advice on car clubs – <a href="http://www.carplus.org.uk">www.carplus.org.uk</a></p>	

<sup>41</sup> Source: Greater London Authority

### The Built Environment

Air quality and climate change can both be addressed by improving building energy efficiency, and installing small scale renewable energy technologies. Energy efficiency is probably the most cost effective means of reducing both CO<sub>2</sub> and air pollutant emissions. Despite significant attention in recent years there is still huge potential to save energy by improving the efficiency of homes and workplaces. Improving energy efficiency can involve reducing the energy demands of buildings through insulation measures, the use of more efficient appliances, and supplying heat and power to buildings through more efficient means.

Small scale renewable energy technologies installed in homes, offices and retail developments are an increasingly popular means of reducing CO<sub>2</sub> emissions. The impact of these technologies on air quality and CO<sub>2</sub> emissions depends a great deal on the following factors:

- The quality of the equipment installed, and the quality of the installation
- The suitability of the technology to its location
- The type of fuel displaced by the new equipment

Good quality renewable installations should normally have a beneficial impact on CO<sub>2</sub> emissions, particularly if they displace high carbon fuels such as coal, oil or electricity. The greatest impacts will be seen where there is a very good renewable resource available to exploit (e.g. south facing unshaded roofs for solar; high and consistent wind speeds for wind).

For air quality the greatest benefits will be seen where non combustion technologies (e.g. solar thermal) replace combustion (e.g. boilers) in urban areas with poor air quality. Electricity generation technologies will have a marginal impact on air quality – emissions will be reduced, but from power stations rather than directly from the local area. Combustion technologies such as biomass may have a negative impact on air quality in urban areas where the most common heating fuel is natural gas, although if biomass displaces oil or coal fired heating it may have no impact, or even improve, air quality.

A location based approach to renewables can therefore help secure maximum benefits for air quality and carbon reduction. This approach encourages technologies that reduce emission of both CO<sub>2</sub> and air pollutants (such as solar thermal) in urban centres with poor air quality, and technologies that may have an air quality penalty, such as biomass, in rural and suburban areas.

<b>DOMESTIC ENERGY EFFICIENCY</b>	
<p>Domestic energy efficiency can be improved by upgrading elements such as wall and loft insulation, installing higher efficiency appliances (boilers, lighting and white goods) and minor changes in behaviour. Domestic energy efficiency can be one of the most cost effective means of reducing CO<sub>2</sub> emissions, and also helps to ensure that residents can affordably heat their homes.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Most homes are heated using combustion appliances (gas, coal or oil boilers). Improving energy efficiency means less fuel needs to be burnt, and fewer air pollutant emissions are produced. Upgrading boilers to modern high efficiency models also improves NO<sub>x</sub> emissions directly, as modern boilers are manufactured to meet higher NO<sub>x</sub> standards than older models. Reducing electricity use in a home also reduces emissions of air pollutants from power stations.</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Improved domestic energy efficiency means lower emissions of greenhouse gases, either directly from boilers or indirectly from power stations.</p>	<p>Green</p>
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>The Energy Saving Trust (EST) provides advice and guidance for both the public and local authorities on domestic energy efficiency. The EST's services include a network of local centres which are able to work with local authorities to implement domestic energy efficiency programmes. Energy supply companies provide funding for energy efficiency measures through the Carbon Emissions Reduction Target (CERT) scheme, under which they provide discounted insulation and energy efficient products. The WarmFront scheme also provides 100% grant funded measures to households in receipt of certain benefits or tax credits (this scheme operates in England, with comparable schemes in Northern Ireland, Scotland and Wales).</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>Local authorities can work with EST local centres and energy supply companies to provide energy efficiency advice, and encourage residents to take up energy efficiency measures funded through the CERT and WarmFront schemes. Some local authorities also provide top up grants for certain energy efficiency measures. Many local authorities have worked on energy efficiency under the Home Energy Conservation Act (now in the process of being repealed), that required local authorities to improve the energy efficiency of all housing in their areas.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>Some homes are known as 'hard to treat' as common energy efficiency measures such as loft insulations, cavity wall insulation and/ or high efficiency boilers can not be fitted. These homes require more expensive insulation products such as solid wall insulation, which has traditionally been hard to access under grant schemes such as CERT and WarmFront.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>The Energy Saving Trust provide advice and guidance for local authorities, as well as businesses and the general public – <a href="http://www.energysavingtrust.org.uk/business">www.energysavingtrust.org.uk/business</a></p> <p>The Carbon Action Network is a networking group of local authorities, working on energy efficiency and carbon reduction – <a href="http://carbonactionnetwork.org.uk/">http://carbonactionnetwork.org.uk/</a></p>	

<b>COMMERCIAL ENERGY EFFICIENCY</b>	
<p>Energy efficiency in offices, shops and other commercial premises is another cost effective way of reducing CO<sub>2</sub> emissions. Insulation and lighting measures can be similar to those in the domestic sector; however appliances, such as computers, printers, photocopiers, etc are also areas to address.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Most commercial premises are heated using combustion appliances (gas, coal or oil boilers). Improving energy efficiency means less fuel needs to be burnt, and fewer air pollutant emissions are produced. Upgrading boilers to modern high efficiency models also improves NO<sub>x</sub> emissions directly, as modern boilers are manufactured to meet higher NO<sub>x</sub> standards than older models. Reducing electricity use in commercial premises also reduces emissions of air pollutants from power stations.</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Improved energy efficiency means lower emissions of greenhouse gases, either directly from boilers or indirectly from power stations.</p>	<p>Green</p>
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>The Carbon Trust is the main source of advice and guidance on improving energy efficiency in the commercial sector. The Trust provides detailed advice to businesses, and can provide 0% loans for investment in energy efficiency measures. Many private sector organisations undertake significant work around the Corporate Social Responsibility, and work to improve energy efficiency can be linked in.</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>Local authorities can lead by example, by improving the energy efficiency of their own premises. The Carbon Trust runs a local authority programme to provide advice and guidance. Local authorities can also help signpost local business to appropriate advice and guidance through services such as business advice and licensing, as well as groups such as business/ economic forums and via links to local chambers of commerce.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>The majority of commercial property is rented rather than owned by the occupier; this causes problems of split responsibilities where one party is responsible for ownership of the building (and therefore incurs the costs of energy efficiency improvements), whilst the occupier pays for fuel bills.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>The Carbon Trust provide advice, guidance and 0% energy efficiency loans for businesses and local authorities – <a href="http://www.carbontrust.co.uk">www.carbontrust.co.uk</a></p>	

COMBINED HEAT AND POWER	
<p>Combined Heat and Power (CHP) plant produces both electricity and heat. CHP is more efficient than producing heat and electricity separately as power stations lose much of the energy in the fuel they burn through waste heat; transmission losses are also much lower if electricity is produced near to where it is consumed. CHP can be used on a wide variety of scales, from large plant providing heat to an entire town to smaller plant that supplies a single office development or block of flats. Single house 'micro CHP' is now also starting to appear on the market. CHP plant can use a wide variety of fuels, including oil, gas and biomass.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>The overall impact of CHP on air quality depends upon the location of the plant, and the technology and fuel used. Although CHP is more efficient than producing electricity and heat separately, the localised nature of CHP means that combustion takes place near to where people live and work rather than in large, remote power stations. Fuels such as oil or biomass are inherently dirtier from an air quality perspective than natural gas.</p>	Amber
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>CHP normally has lower overall emissions than separate provision of electricity and heat, as the process is more efficient. Use of reputable renewable fuels such as biogas or biomass will lead to lower emissions still.</p>	Green
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>Electricity produced by good quality CHP is exempt from the Climate Change Levy, a charge that business users of electricity have to pay on their bills. Electricity from CHP plants exported into the grid therefore attracts a premium payment from supply companies. Businesses installing CHP equipment are allowed 100% first-year capital allowance, i.e. are able to write-off the whole cost of their investment against their taxable profits during the period in which they make the investment. CHP burning renewable fuels will also be able to claim payments for heat produced under the forthcoming Renewable Heat Incentive (see biomass on page 33).</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>Local authorities can lead by example by installing CHP systems in buildings they own and operate. The planning system is perhaps the most powerful tool for local authorities to promote and control CHP. Many local authorities have established a 'Merton Rule' that requires a certain proportion of a development's energy needs to be met through renewable sources – although CHP is not necessarily renewable it is often considered as such under these conditions.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>CHP systems are particularly well suited to buildings with a constant 'round the clock' heat load – hotels, hospitals, student halls of residence, etc. Single house 'micro' CHP systems are heat led – they only produce electricity when heat is needed, and tend to be suited to large houses with a relatively high heat load.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>The Carbon Trust produce a number of CHP publications – <a href="http://www.carbontrust.co.uk/cut-carbon-reduce-costs/products-services/technology-advice/pages/combined-heat-power.aspx">www.carbontrust.co.uk/cut-carbon-reduce-costs/products-services/technology-advice/pages/combined-heat-power.aspx</a></p> <p>The CHP Association works to promote the wider use and uptake of CHP – <a href="http://www.chpa.co.uk/">www.chpa.co.uk/</a></p>	

<b>BIOMASS HEAT</b>	
<p>Biomass heat is the provision of heat by burning organic material; in the vast majority of cases this will be wood. Biomass can be burnt in boilers to provide heat only, or in combined heat and power plant to provide both heat and electricity. Biomass can be used on a variety of scales, from small stoves that heat individual rooms to larger plant that can provide heat to an entire office building or block of flats. At the very largest scale biomass can be used in power stations, either on its own or 'co-fired' with coal.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Biomass boilers generally have higher emissions of local air pollutants than gas or oil boilers, but lower emissions than coal boilers. The exact impact on air quality will therefore depend upon where the biomass boiler is installed – if this is in urban areas the air quality impact is likely to be negative, but if biomass displaces coal in rural areas the impact may be positive. The emission performance of the boiler and any emissions abatement equipment fitted will strongly affect the overall impact.</p>	Red
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Biomass is considered a carbon neutral fuel – burning the fuel simply releases CO<sub>2</sub> absorbed whilst the fuel was growing. There are, however, carbon emissions associated with agriculture, forestry practices and the transport of fuel, which can be substantial.</p>	Green
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>Biomass will be supported by the Renewable Heat Incentive<sup>42</sup>, which should come into effect during April 2011. Earlier grant schemes that supported the capital cost of installing a biomass boiler have now been closed. At the larger scale biomass used in power stations is supported under the Renewables Obligation<sup>43</sup>.</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>The planning system is the main means for local authorities to promote and control biomass heat. Many local authorities have implemented 'Merton Rules' which require a proportion of a development's energy requirements to be provided by on site renewables. The planning system can also be used to control the air quality impacts of biomass heat where plant is part of a new development, or where a planning application is needed to install the plant in an existing building. Planning conditions can stipulate that biomass boilers must meet certain emission standards, or that emissions abatement equipment must be installed. Local authorities also have responsibilities to regulate the installation and operation of biomass boilers under the Clean Air Act.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>Using biomass fuel will involve vehicle movements to deliver fuel and remove ash residue – these need to be factored into considerations of the suitability of biomass for any particular site. Biomass from non-virgin sources may fall under the scope of the EU Waste Incineration Directive, in which case the regulatory requirements regarding emissions from the boiler may be more stringent than for boilers burning virgin wood.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>General information on biomass as a fuel from the Biomass Energy Centre – <a href="http://www.biomassenergycentre.org.uk">www.biomassenergycentre.org.uk</a></p> <p>Biomass and air quality guidance from Environmental Protection UK and LACORS – <a href="http://www.environmental-protection.org.uk/biomass">www.environmental-protection.org.uk/biomass</a></p>	

<sup>42</sup> [www.decc.gov.uk/en/content/cms/what\\_ve\\_do/uk\\_supply/energy\\_mix/renewable/policy/renewable\\_heat/incentive/incentive.aspx](http://www.decc.gov.uk/en/content/cms/what_ve_do/uk_supply/energy_mix/renewable/policy/renewable_heat/incentive/incentive.aspx)

<sup>43</sup> [www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/Pages/RenewablObl.aspx](http://www.ofgem.gov.uk/Sustainability/Environment/RenewablObl/Pages/RenewablObl.aspx)

MICRO WIND TURBINES	
<p>Micro wind turbines are simply small wind turbines that can either be mounted on a pole or directly onto the roof of a building. Electricity produced by the turbine can be used in the building it is connected to, or exported into the national grid. Micro wind turbines need sufficient wind speeds to generate appreciable quantities of electricity – adequate assessment of potential sites before installation is therefore crucial<sup>44</sup>.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Local emissions of air pollutants will be unaffected; however any electricity produced by the turbine will displace electricity from the national grid, potentially reducing emissions from power stations.</p>	<p>Neutral</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Any electricity produced by the turbine will displace electricity from the national grid, reducing CO<sub>2</sub> emissions from power stations. Turbines in the urban environment need to be well sited to produce appreciable quantities of electricity – see below, other issues to consider.</p>	<p>Green<sup>45</sup></p>
<p><b>Support mechanisms</b></p> <p>Operators of micro wind turbines can claim payments for electricity generated under the Clean Energy Cashback<sup>46</sup> scheme. Payments can also be claimed from energy supply companies for electricity exported into the national grid.</p>	
<p><b>What support can local authorities provide?</b></p> <p>The planning system is the main means for local authorities to control micro wind turbines. Many local authorities have implemented 'Merton Rules' which require a proportion of a development's energy requirements to be provided by on site renewables. Turbines installed on existing buildings will require a planning application, although roof mounted and free standing wind turbines will become permitted development (i.e. no planning application needed) at some point in the future at detached properties that are not in conservation areas.</p>	
<p><b>Other issues to consider</b></p> <p>Correct siting of micro wind turbines is essential to ensure that the turbine generates appreciable quantities of electricity, and that noise and vibration problems are minimised. In built up urban areas the wind can be turbulent (changing direction rapidly), and wind speeds low which can make them unsuitable for the use of micro wind turbines. Turbine noise in neighbouring properties, and any vibration issues where the turbine is mounted directly onto a building, need to be taken into account.</p>	
<p><b>Further information and reading</b></p> <p>General information on micro wind turbines from Renewables UK – <a href="http://www.bwea.com/small/index.html">www.bwea.com/small/index.html</a></p>	

<sup>44</sup> See the Energy Saving Trust report 'Location, Location, Location' - [www.energysavingtrust.org.uk/Global-Data/Publications/Location-location-location-The-Energy-Saving-Trust-s-field-trial-report-on-domestic-wind-turbines](http://www.energysavingtrust.org.uk/Global-Data/Publications/Location-location-location-The-Energy-Saving-Trust-s-field-trial-report-on-domestic-wind-turbines)

<sup>45</sup> 'Green' is for turbines installed in locations with an adequate wind resource

<sup>46</sup> [www.energysavingtrust.org.uk/Generate-your-own-energy/Sell-your-own-energy/Feed-in-Tariff-Clean-Energy-Cashback-scheme](http://www.energysavingtrust.org.uk/Generate-your-own-energy/Sell-your-own-energy/Feed-in-Tariff-Clean-Energy-Cashback-scheme)

<b>SOLAR</b>	
<p>Solar technologies capture energy from the sun. Two types of technology are available – solar photovoltaic panels produce electricity, whilst solar thermal panels heat water, most commonly for domestic hot water supply. At the time of writing solar thermal was a more cost effective technology than solar photovoltaic, although the latter is a more flexible technology as any electricity not used in the building that the panel supplies can be exported back into the grid.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Solar thermal panels have a direct positive impact on air quality if they displace fossil fuel fired hot water supplies, as they reduce the need for combustion. Solar photovoltaic panels will also benefit air quality to a smaller extent, as they displace electricity from the national grid, reducing emissions from power stations.</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>Solar thermal panels reduce the need for fossil fuel combustion or electricity drawn from the grid to provide hot water. Electricity produced from photovoltaic panels will displace electricity from the national grid, reducing CO<sub>2</sub> emissions from power stations.</p>	<p>Green</p>
<p style="text-align: center;"><b>Support mechanisms</b></p> <p>Solar thermal panels will be supported by the Renewable Heat Incentive<sup>47</sup>, which should come into effect during April 2011. Operators of solar photovoltaic panels can claim payments for electricity generated under the Clean Energy Cashback<sup>48</sup> scheme. Payments can also be claimed from energy supply companies for electricity exported into the national grid.</p>	
<p style="text-align: center;"><b>What support can local authorities provide?</b></p> <p>The planning system is the main means for local authorities to support solar technologies. Many local authorities have implemented 'Merton Rules' which require a proportion of a development's energy requirements to be provided by on site renewables. Solar panels installed on existing developments are now permitted development (no planning application is required) in most circumstances. Some local authorities have set up schemes with local installers to encourage the installation of solar panels, and in some circumstances provide grant aid.</p>	
<p style="text-align: center;"><b>Other issues to consider</b></p> <p>Solar panels are a passive technology with no issues related to noise, smoke, fuel deliveries, etc. This makes them particularly suited to the urban environment.</p>	
<p style="text-align: center;"><b>Further information and reading</b></p> <p>General information on solar energy from the Solar Trade Association – <a href="http://www.solar-trade.org.uk">www.solar-trade.org.uk</a></p>	

<sup>47</sup> [www.decc.gov.uk/en/content/cms/what\\_ve\\_do/uk\\_supply/energy\\_mix/renewable/policy/renewable\\_heat/incentive/incentive.aspx](http://www.decc.gov.uk/en/content/cms/what_ve_do/uk_supply/energy_mix/renewable/policy/renewable_heat/incentive/incentive.aspx)

<sup>48</sup> [www.energysavingtrust.org.uk/Generate-your-own-energy/Sell-your-own-energy/Feed-in-Tariff-Clean-Energy-Cashback-scheme](http://www.energysavingtrust.org.uk/Generate-your-own-energy/Sell-your-own-energy/Feed-in-Tariff-Clean-Energy-Cashback-scheme)

<b>HEAT PUMPS</b>	
<p>Heat pumps are essentially 'reverse fridges' – they move heat from one area to another to provide space heating and hot water. The 'heat collector' element can either be immersed in a body of water (water source), buried underground (ground source) or simply be in the open air (air source). Heat pumps use electricity to operate, so are not zero carbon unless renewable electricity is used, but effectively act as an energy multiplier – i.e. more energy is provided in the form of heat than the electricity used to operate the heat pump. Some heat pumps can also be used to provide cooling for a building, as well as heating.</p>	
<p style="text-align: center;"><b>Air quality impacts</b></p> <p>Heat pumps have zero emissions of air pollutants at the point of use, and will have a direct positive impact on air quality if they displace fossil fuel fired heating and hot water supplies. Electricity is however, required to run the heat pumps which will result in emissions of air pollutants from power stations (but these are usually remote from population centres and relatively well regulated).</p>	<p>Green</p>
<p style="text-align: center;"><b>Climate change impacts</b></p> <p>The three main heat pump technologies vary in their efficiency. Electricity supplied from the national grid is a high carbon fuel, and therefore the impact on carbon emissions depends upon which heating fuel the heat pump displaces. If it replaces electric or coal fired heating there will be a large reduction in carbon emissions; there is, however, little difference in emissions between those from a heat pump and an equivalent modern, high efficiency gas boiler.</p>	<p>Neutral</p>
<p><b>Support mechanisms</b></p> <p>All types of heat pumps will be supported by the Renewable Heat Incentive<sup>49</sup>, which should come into effect during April 2011.</p>	
<p><b>What support can local authorities provide?</b></p> <p>The planning system is the main means for local authorities to promote heat pump technologies. Many local authorities have implemented 'Merton Rules' which require a proportion of a development's energy requirements to be provided by on site renewables. Ground source heat pumps will normally not require a planning application, and air source heat pumps may become permitted development in the near future. Some local authorities have grant aided heat pumps, particularly when they're used in rural fuel poverty initiatives.</p>	
<p><b>Other issues to consider</b></p> <p>Air source heat pumps can be noisy; this and their comparable carbon emissions to a gas boiler means that care is needed when using the technology in an urban environment. Heat pumps are particularly suited to rural environments where lots of space is available (useful when installing a ground source heat pump), and the alternative heating fuels are electricity, coal and oil.</p>	
<p><b>Further information and reading</b></p> <p>The Heat Pump Association – <a href="http://www.heatpumps.org.uk">www.heatpumps.org.uk</a></p>	

<sup>49</sup> [www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/energy\\_mix/renewable/policy/renewable\\_heat/incentive/incentive.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/policy/renewable_heat/incentive/incentive.aspx)

## Appendix A – Local Authority Strategies and Plans

This Appendix provides background information on local authority plans and strategies that climate change and air quality policy may seek to influence. This is not an exhaustive list, and requirements to produce plans and strategies may change over time in line with UK Government and Devolved Administration policies.

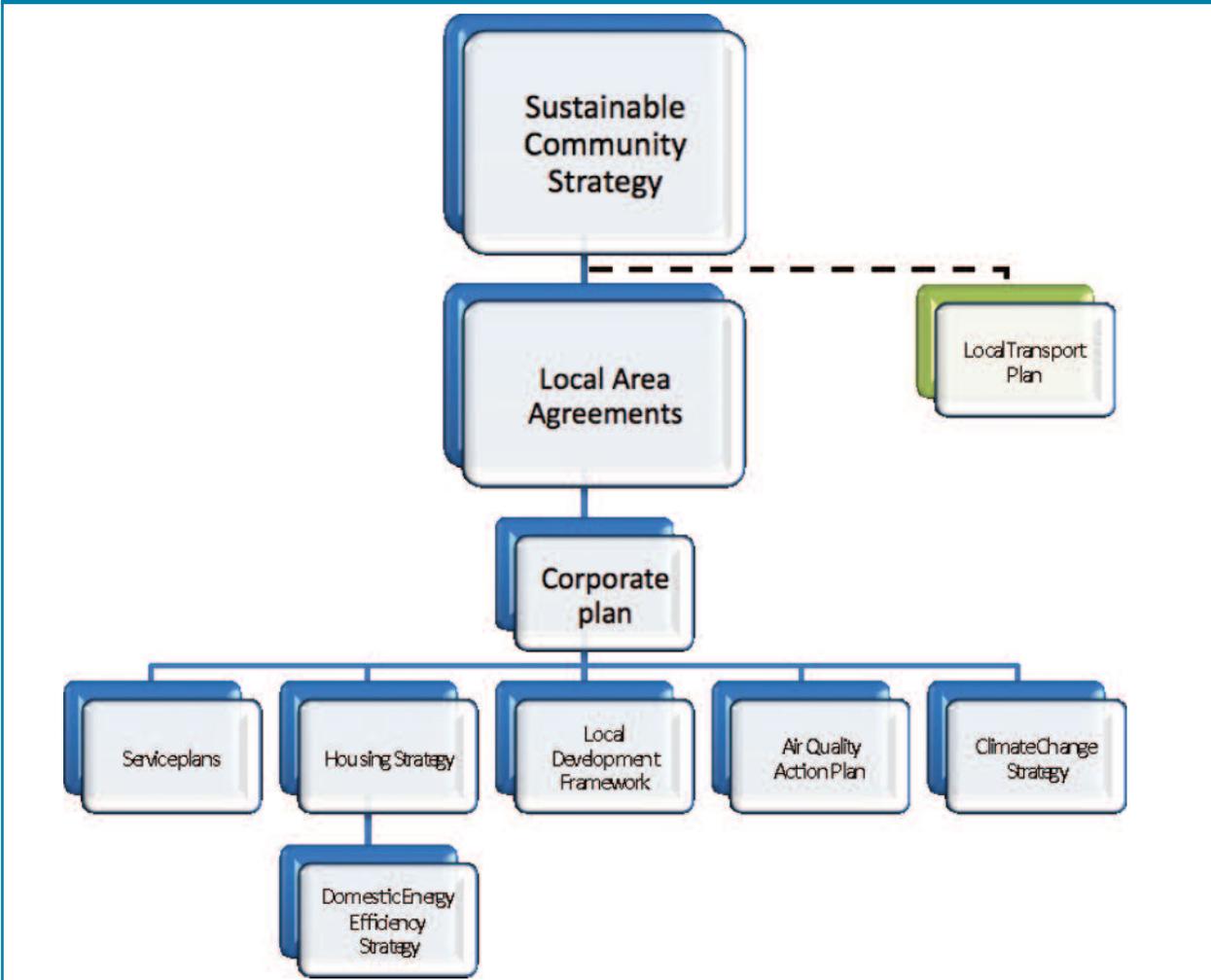
Note that requirements for plans and strategies differ between England, Wales, Scotland and Northern Ireland, and also that some special provisions apply to London where the Mayor has significant powers and responsibilities.

**Table 4 – Relevant plans and strategies with review dates**

Strategy/ Plan	Scope	Who is responsible <sup>50</sup> ?	Statutory or non-statutory	Relevant review dates
Sustainable Community Strategy	England and Wales	All local authorities	Statutory	Normally reviewed to fit in with the Local Area Agreement process
Community Plans	Scotland	All local authorities	Statutory	Normally reviewed every five years
Local Area Agreements	England and Wales	All local authorities	Statutory	LAAs run for three years (currently 2008-2011)
Single Outcome Agreements	Scotland	All local authorities	Statutory	Normally reviewed annually
Corporate Plan and Service Plans	UK	All local authorities	Non-statutory (but all local authorities will produce these)	In England and Wales these are normally three year plans to fit with LAA cycle, but refreshed annually
Air Quality Action Plans	UK	District/ borough level authorities	Statutory	Three year cycle under Local Air Quality Management regime, the next one begins in 2012
Climate Change Strategy	UK	All local authorities	Non-statutory	Decided by individual local authorities
Local Transport Plan	England	County level authorities in England	Statutory	LTP 3 will start in 2011, with most local authorities consulting during 2010
Local Transport Strategies	Scotland and Wales	Local transport partnerships	Statutory	Varies
Housing Strategy	England, Scotland, Wales	District/ borough level authorities	Statutory	Decided by individual local authorities
Domestic Energy Efficiency/ Fuel Poverty Strategy	UK	District/ borough level authorities	Non-statutory (were previously statutory)	Decided by individual local authorities
Local Development Framework	England	All local authorities (although responsibilities differ)	Statutory	Decided by individual local authorities, details contained in the 'Local Development Scheme' document
Local Development Plan	Wales	All local authorities	Statutory	Reviewed every 4 years
Local Development Plan	Scotland	All local authorities (although responsibilities differ)	Statutory	Refreshed annually

<sup>50</sup> Note that unitary authorities will cover the responsibilities of both district/ borough and county level authorities. Scotland only has unitary authorities.

Figure 11 – Hierarchy of relevant local authority plans and strategies in a district/ borough level authority that air quality and climate change policy may seek to influence (England and Wales)



- a) The Local Transport Plan is produced by the county level authority; it is informed by the Sustainable Community Strategy(ies) of the local authorities in the area covered, and may incorporate the Air Quality Action Plan(s) of the local authorities covered.
- b) Both the Local Transport Plan and the Local Development Framework needed to be developed with due regard to the Regional Spatial Strategy (RSS). The RSS is now in the process of being abolished by the UK Government in favour of devolving powers down to local government, the mechanisms for devolution were however unclear at the time of writing.

**The Sustainable Community Strategy (England and Wales), Community Plans (Scotland)**

The Sustainable Community Strategy is the overarching strategy for a particular local authority region, setting out the 'big picture' and identifying cross cutting themes and needs. A wide range of stakeholders will be involved in drawing up and delivering the strategy; although a local authority may lead on developing the strategy it will guide the work of a large number of public and voluntary sector bodies who will all play a part in delivering it. Development of a strategy is a requirement of the Local Government Act (2000); in two tier authority areas both the county and district/ borough level authorities will develop a strategy, although the two levels will be expected to tie together.

The vast majority of Sustainable Community Strategies will include an environment theme, and including air quality and climate change within this in an integrated fashion is highly desirable. Although there is no statutory requirement to regularly review the strategy, in practice most local

authorities will do so to fit in with the three year cycle of Local Area Agreements.

In Scotland the equivalent document is the Community Plan, which is developed by similar Community Planning Partnerships as in England and Wales.

**Box 13 – The Cambridge Sustainable Community Strategy**

The city of Cambridge has had a great deal of success in promoting bus use, with the city's park and ride scheme proving particularly popular. However, the city centre and areas of the inner ring road suffer air quality problems, with emissions from buses being the single largest source. These issues are recognised in the city's Sustainable Community Strategy, with information and aims for air quality integrated into the climate change section of the strategy, which also integrates aims for waste management. The city and county councils, and bus operators, are now working together to address emissions through a Quality Bus Partnership. The city also has an ambitious strategy for reducing greenhouse gas emissions, and adapting Cambridge to a warming climate.

**Local Area Agreements (England and Wales), Single Outcome Agreements (Scotland)**

Local Area Agreements (LAAs) are three year plans to deliver on priorities set out in the Sustainable Community Strategy. They are the main means in which priorities and targets are agreed between national and local Government, and the targets within them formed the criteria by which authorities were judged during the Comprehensive Area Assessment process (now abolished). LAAs contain 16 statutory targets for education and early years development, and a further 35 targets for indicators that local authorities pick from the national indicator set (of 198) to reflect local priorities, as identified in the Sustainable Community Strategy. The targets are agreed with the relevant Government Office for the regions, and signed off by Ministers<sup>51</sup>.

The national indicator set includes indicators for both air quality and climate change, and getting targets for these included in the LAA is therefore desirable for those seeking to progress work in these areas. It is worth noting that the LAA can contain targets for areas not covered by the national indicator set, in addition to the 51 indicators required. This can be important for air quality, as there is no indicator for 'community' air pollutant emissions, just those emitted by the local authority's own estates and operations. The current round of LAAs runs from 2008 to 2011; a further three year LAA cycle may follow, depending on the policies of the UK Government elected in 2010. LAAs are usually refreshed annually to ensure they still meet local needs, with discussions and negotiations usually taking place between July and December.

In Scotland the equivalent system is Single Outcome Agreements. These are agreements between the Scottish Government and Community Planning Partnerships, based on 15 National Outcomes. The agreements set strategic priorities for local areas and outline how these priorities will be delivered by the partners. They also show how these outcomes will contribute to the Scottish Government's relevant National Outcomes.

**Service Plans (UK)**

**Box 14 – Air quality in the City of London's Local Area Agreement**

The City of London is a unique local authority governing a unique area. The resident population of the City's area is very small, but the businesses resident in the area are very significant on a national level. As such the City has a unique LAA with only 6 indicators rather the usual 35. Air quality in the City is very poor, and therefore one of the 6 indicators chosen for the LAA is 'NI 194 Level of air quality – reduction in NO<sub>x</sub> and primary PM<sub>10</sub> emissions through local authority's estate and operations'. The target is for a 5% reduction in emissions over the 2 year period of the LAA; at the time of writing the City had exceeded this target with a reduction in NO<sub>x</sub> of 8.4% and PM<sub>10</sub> of 10% in the first year, mainly through energy efficiency and fleet management measures.

All local authorities will produce service plans; these relate to the services that a local authority provides. The overarching document will be the Corporate Plan, which links the Local Area Agreement and Community Strategy to the council's other business and service plans. Service plans will be developed to fit in below this, either on a departmental basis or using cross cutting delivery themes.

In England and Wales service plans usually run on a three

year cycle to fit in with the Local Area Agreement cycle, and are usually refreshed annually. Getting air quality and climate change included in relevant service plans in an integrated fashion is highly desirable – this is easiest if it can be done in a 'top down' fashion, i.e. rolled down from the Corporate Plan, rather than driven from the 'bottom up' into each relevant service plan.

**Air Quality Action Plans (UK)**

**Box 15 – Climate change and air quality in the Sheffield City Council Corporate Plan**

Long a leading authority in the field of managing air quality, Sheffield City Council has recognised the need for addressing climate change in its Corporate Plan. The plan sets out the Council's ambitions for raising community awareness, insulating more homes and schools and switching to low emission vehicle technologies. In doing this, the plan recognises that significant air quality benefits can also be secured. Sheffield has also worked to integrate the delivery of air quality and climate change functions, with the establishment of a Carbon Reduction and Air Quality Team. The city's new Air Quality Action Plan, currently in development, will consider carbon impacts, and aim to prioritise 'win-win' measures that show benefits for both air quality and greenhouse gas emissions.

Under the Local Air Quality Management (LAQM) regime local authorities are required to periodically assess air quality in their area, and declare an Air Quality Management Area (AQMA) if exceedances of national air quality standards are found. Once they have declared an AQMA they need to produce a further assessment to investigate the nature and scale of the problem, and an action plan setting out what measures they propose to take 'in pursuit of the achievement of air quality standards and objectives'. The LAQM regime is a requirement of the Environment Act (1995). The regime follows a three year cycle, with the last round of review and assessments completed in 2009. Air quality action plans are normally reviewed after each round of review and assessments to ensure that they address the problems identified.

LAQM is the responsibility of district/ borough level authorities, and in recent years they have been encouraged to integrate air quality action plans into Local Transport Plans produced by county level authorities. This has met with mixed success, in part due to the differing timescales for the development of air quality action plans and Local Transport Plans. Special provisions apply in London where the Mayor is required to produce a London air quality strategy setting out proposals and policies for implementation of the national air quality strategy, and for the achievement of air quality standards and objectives in London. The Mayor is also required to scrutinise reports and plans submitted by the London Boroughs under the LAQM regime, which elsewhere in the UK is the responsibility of Defra or the relevant Devolved Administration.

The next cycle of LAQM will begin in 2012. It is desirable for those drawing up air quality action plans to involve those responsible for developing the local authority's policies on reducing emissions of greenhouse gases at an early stage, and for the plan to take account of measures designed to reduce emissions of greenhouse gases – both air quality action plans and climate change strategies will largely be addressing the same sources of pollution.

51 Government offices for the regions have been abolished by the new UK Government; however at the time of writing it was not clear what systems would replace them

### Local Transport Plans (England), Local Transport Strategies (Scotland and Wales)

Local Transport Plans (LTPs) contain a local authority's plans and priorities for transportation, covering areas such as roads, public transport provision and walking and cycling facilities. They are prepared by county level and unitary authorities, or in metropolitan regions by the Passenger Transport Executive in conjunction with district/ borough level authorities. LTPs must have regard to Regional Spatial Strategies (abolished by the current UK Government, but still in place during the LTP3 development phase) and Sustainable Community Strategies. LTPs are used by the Department for Transport to set funding allocations.

The current round of LTPs (LTP 2) ends in March 2011, with the new round 'LTP 3' starting where LTP 2 left off. Unlike its predecessors LTP 3 will have no fixed end date, and instead most LTP 3s will have a long term strategy (25 years) and a short term 3-5 year implementation plan. In drawing up their LTP 3s local authorities need to give regard to five goals set out in the Department for Transport's 'Delivering a Sustainable Transport System' document. These include 'To reduce transport's emissions of carbon dioxide and other greenhouse gases' and 'to improve quality of life for transport users and non-transport users, and to promote a healthy natural environment' (which includes air quality). Many local authorities integrated their air quality action plans into LTP 2 (which was encouraged by central Government), a process which should continue with LTP 3. With transport being a 'problem sector' for both air quality and climate change influencing the content on the Local Transport Plan is key to addressing both problems.

#### Box 16 – The Local Transport Plan and air quality in West Sussex

Although predominantly rural the county of West Sussex contains a number of Air Quality Management Areas, a consequence of the area's busy roads. Transport planning at the county level, and air quality management at the district level, are brought together in the Sussex Air Quality Partnership, with a county transport planner taking an active part in the group. Measures that have helped to improve air quality include school travel plans, improvements to bus fleets and infrastructure, and measures to encourage cycling. The county is now planning to implement a number of new measures including variable messaging signs on busy roads, electric vehicle charging points and larger infrastructure measures including Park & Ride, bus priority and cycle bridges.

In Scotland and Wales the equivalent document to the LTP is known as the Local Transport Strategy. These are produced by Local Transport Partnerships covering a region of the devolved administration. Unlike the English LTP system there are no fixed dates for the production or refreshing of the strategy, with most partnerships choosing to implement a long term strategy with a shorter term implementation plan (as with the English LTP 3).

In Northern Ireland transportation is the responsibility of the Department for Regional Development, who produce a Regional Transport Strategy.

### Housing Strategies (UK)

Most local authorities have now transferred ownership of their own council housing to registered social landlords, although district/ borough level authorities still have a key role in shaping and delivering private housing services in their areas. These

duties include provision of new housing (which has a knock-on impact on transport in the area), and encouraging improvements to energy efficiency in all of the housing in their area. In common with the general theme of reducing statutory requirements on local authorities it is no longer a requirement in England to produce a housing strategy for assessment by the relevant Government Office; instead local authorities are encouraged to incorporate the Housing Strategy within their Sustainable Community Strategy, with freedom as to how and when they document their policies. In practice most local authorities are continuing to produce separate housing strategies but without a fixed timetable imposed by central Government.

In Northern Ireland housing is the responsibility of the Northern Ireland Housing Executive, rather than individual local authorities.

### Domestic Energy Efficiency/ Fuel Poverty Strategy (UK)

Under the Home Energy Conservation Act (1995) all local authorities with a housing responsibility were required to draw up a strategy for effecting a 30% improvement in domestic energy efficiency across all housing in their area over a 10-15 year timescale. By 1997 most local authorities had prepared their strategy, and annual reporting to central Government commenced. The Home Energy Conservation Act is now in the process of being repealed, and annual reporting requirements have been dropped; however many local authorities still have a domestic energy efficiency strategy, and in some cases these are being updated to fit with current climate change targets, either as stand alone documents or subsumed into housing or climate change strategies.

Many local authorities have also developed fuel poverty or 'affordable warmth' strategies, linked to their statutory HECA strategies. These aim to use energy efficiency and other measures to reduce the number of people unable to adequately heat their home due to high fuel bills. They may be a separate document, a bolt on to the HECA strategy or alternatively produced in conjunction with other local authorities to cover a wider geographical area (e.g. a county).

#### Box 17 – Gloucestershire's Warm and Well scheme

Gloucestershire's successful Warm and Well scheme aims to improve energy efficiency and reduce fuel poverty across the county. The scheme was developed by the Severn Wye Energy Agency in partnership with the local authorities of Gloucestershire, and provides both energy advice and a holistic approach to the provision of grants for energy efficiency measures. Households using the scheme are referred to suitable grant providers for measures such as insulation and heating upgrades – the Government's WarmFront scheme, a local authority funded Gloucestershire Energy Efficiency Grant, or discounted insulation schemes run by energy suppliers. The scheme has also periodically provided heat recovery extract fans and solar water heating when funding has been available. In operation since 2001, Warm and Well has grown into the main vehicle for improving domestic energy efficiency in the county, with over 30,000 households installing energy efficiency measures, with lifetime savings of over 188,000 tonnes of carbon.

### Local Development Framework (England and Wales),

### Local Development Plan (Scotland)

The Local Development Framework (LDF) is now the mechanism for local authority's forward spatial planning in England and Wales, replacing the previous Local Plan system. The LDF drives development control decisions, i.e. it is the local authority's vision for spatial planning in the area. LDFs comprise a 'folder' of documents, and as such documents can be reviewed and refreshed as necessary rather than the whole plan having to be reviewed to a set timetable. LDFs contain a number of statutory documents, the main ones being:

- A Local Development Scheme – this sets out what Development Plan Documents will be developed and when.
- A Statement of Community Involvement – this outlines the local authority's plans for consultation on Development Plan Documents.
- Development Plan Documents – these set out the local authority's planning policies. They take the form of a core strategy for spatial planning and a proposals map; they can also include Area Action Plans to detail planning policies for particular areas. DPDs are the subject of two stages of formal consultation, and an independent examination by the Planning Inspector.
- Annual monitoring reports – these need to be submitted to central Government.

LDFs can also include Supplementary Planning Documents (SPDs), these are optional documents that can set out planning policies for areas such as air quality.

Ideally air quality and climate change should be addressed via a 'hook' (short policy statement) in the main core strategy of the LDF, with more detailed policy spelt out in a Supplementary Planning Document. Many local authorities have used this approach to take forward Low Emission Strategies, which aim to reduce emissions of air pollutants and greenhouse gases from development related transport. The Local Development Scheme document provides a timetable to help identify when relevant parts of the LDF are scheduled to be created, reviewed or refreshed.

### Box 18 – Low Emission Strategies and the Local Development Framework in Mid Devon

In 2005 Mid Devon District Council recognised the importance of a robust policy for air quality and development, and air quality staff began early engagement with strategic planning staff as they started to draw up the Council's Local Development Framework. This led to the inclusion of a policy 'hook' in the core strategy in 2007, and the adoption of a Supplementary Planning Document in 2008. Mid Devon's policies use a unique formula to gain developer contributions to fund low emission infrastructure. Since 2008 over £1.3 million in developer contributions has been obtained. The Council is now planning for the introduction of the Community Infrastructure Levy, a new system for gaining contributions from developers, with their draft Allocations and Infrastructure Development Plan Document joining up air quality and climate change by requiring low emissions strategies and/ or contributions for major new developments.

In Wales the equivalent document is known as the Local Development Plan (LDP). Unlike the LDF in England the LDP is a single development document. The LDP replaced the previous Unitary Development Plans in Wales in 2004. Compared to UDP, the LDP is smaller and more concise and there is greater emphasis placed on the sustainability of the plan, mainly through the use of Strategic Environmental Assessment (SEA). The LDP is reviewed every 4 years. There is more information about the plans on the Welsh Assembly Government website<sup>52</sup>.

In Scotland the equivalent document is known as the Local Development Plan. This is made up of a local development plan and supplementary guidance; in the four main cities (Aberdeen, Dundee, Edinburgh and Glasgow) and their surrounding areas a strategic development plan must also be prepared. Every year all planning authorities in Scotland produce a development plan scheme which sets out the programme for preparing and reviewing their development plans, and what is likely to be involved at each stage. An overview of their timetables is available on the Scottish Government's website<sup>53</sup>.

<sup>52</sup> See - <http://wales.gov.uk/topics/planning/devplan/?lang=en>

<sup>53</sup> See - [www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/dev-plan/DPtimeline](http://www.scotland.gov.uk/Topics/Built-Environment/planning/National-Planning-Policy/themes/dev-plan/DPtimeline)

## Appendix B – Glossary of Terms Used

**(EU) Air Quality Directive** – A European Directive (2008/50/EC) that sets standards for the concentration of several pollutants in the air that all European member states must meet. This is the pre-eminent piece of legislation affecting how air quality is managed in the UK.

**Air Quality Experts Group (AQEG)** – A Government advisory body.

**Air Quality Management Area (AQMA)** – An area where levels of one or more air pollutants breach air quality standards, as designated by the relevant local authority. AQMAs are part of the system of Local Air Quality Management.

**(UK) Air Quality Standards** – UK objectives for maximum concentrations of several pollutants in the air – in the main these follow the standards imposed by the EU Air Quality Directive. The Scottish Government has also set tougher standards for several pollutants, which only apply in Scotland.

**(UK) Air Quality Strategy** – The Air Quality Strategy sets out the Government's policies for achieving the Air Quality Standards. Production of an Air Quality Strategy is a requirement of the Environment Act (1995).

**Biofuels** – Fuels derived from biological material such as plants or trees. They can be solid, liquid or gaseous fuels.

**Biomass** – Solid biofuels, such as wood. Biomass is typically burnt to provide heat or electricity.

**Biomethane** – Natural gas (methane) produced by the decomposition of organic material. Biomethane can be extracted from landfills, or produced using a process known as anaerobic digestion. 'Raw' gas from these processes is known as biogas; once the gas has had impurities removed it is known as biomethane.

**Black carbon** – Soot arising from vehicle exhausts, and domestic and industrial combustion. Black carbon can have a significant warming effect on the climate, as it reduces the amount of solar radiation reflected from the Earth's surface.

**Carbon dioxide (CO<sub>2</sub>)** – CO<sub>2</sub> is exhaled by living organisms, as well as emitted from the combustion of fuels. CO<sub>2</sub> in the atmosphere exists in a 'carbon cycle' where CO<sub>2</sub> emitted into the atmosphere is balanced by processes that remove it, keeping concentrations in the atmosphere roughly steady. Emissions from human activities have upset this balance, and concentrations in the atmosphere are climbing. As CO<sub>2</sub> is a greenhouse gas, this is causing the Earth's climate to change.

**Clean Air Act** – The Clean Air Act dates back to the 1950s, where it was introduced to deal with the problem of coal smoke smogs. It regulates the use of solid fuels and emissions of smoke in commercial and domestic premises, and sets a number of responsibilities on local authorities to act as local regulators. The Act was last updated in 1993. Similar controls for Northern Ireland are contained in the Clean Air (Northern Ireland) Order 1981.

**Carbon Emissions Reduction Target (CERT)** – An obligation on domestic energy supply companies (gas and electricity) to reduce carbon emissions from domestic buildings. Typically

CERT is discharged through subsidised home insulation, appliances and lighting schemes.

**Clean Energy Cashback** – The Government's support package for small scale renewable electricity generation. Operators of technologies such as solar photovoltaic and micro wind turbines are able to claim payments from energy supply companies for the electricity they generate (whether they use it on site or export it into the electricity grid), and also claim extra payments for electricity exported into the grid.

**Climate Change Levy** – A levy charged on energy supplied to business users. The levy is not charged on energy supplied from renewable sources, or that supplied by good quality Combined Heat and Power systems.

**Combined Heat and Power (CHP)** – Systems that produce both heat (for space heating or hot water) and electricity. CHP tends to be more efficient than separate heating boilers and electricity from the grid, as much of the energy consumed by power stations is wasted as unused heat. Losses incurred during electricity generation are also reduced if electricity is generated near to where it is consumed.

**Department of Energy and Climate Change (DECC)** – The Government department with responsibility for climate change and energy policy.

**Department for Environment, Food and Rural Affairs (Defra)** – the Government department with responsibility for air quality, and also adaptation to climate change.

**Environmental Audit Committee (EAC)** – A cross party select committee of MPs set up to scrutinise the Government's performance against their environmental objectives. The EAC has undertaken several investigations in the areas of air quality and climate change.

**European Limit Values** – Limit Values are targets for the concentration of several pollutants in the air, as set in the EU Air Quality Directive. Limit Values are legally binding – if member states do not achieve them they can be subject to legal action in the European Courts, and ultimately receive fines ranging into hundreds of millions of pounds.

**Eutrophication** – An increase in the chemical nutrients in an ecosystem leading to increases in 'primary production', e.g. photosynthesis. Examples include algal blooms, where large increases in the amount of algae in bodies of water depletes the water of oxygen, harming other organisms such as fish.

**Fuel Cell** – A device that generates electricity via the chemical reaction of two substances, for example hydrogen and oxygen. Fuel cells work rather like batteries, although they are re-fuelled (the tank of fuel can be filled up) rather than re-charged.

**Great London Smog** – The Great London Smog was a seminal air pollution event that took place in the winter of 1952. London had suffered from coal smoke smogs (or 'pea soupers') for many years; however in December 1952 climatic conditions served to trap the polluted air over the city for several days. As a result the smog became so thick that people became lost in the streets, and theatres had to close as the audience could not see the stage. Tens of thousands of people are thought to have

died due to the smog. As a result political will was galvanised to act on the causes of smog, resulting in the Clean Air Acts which aimed to reduce the impact of coal smoke pollution.

**Greenhouse Gas** – Any atmospheric gas that traps heat in the atmosphere. Like the panes of glass in a greenhouse, greenhouse gases allow radiation from the sun to pass through, but trap heat re-radiated from the Earth's surface.

**Hybrid vehicle** – Vehicles that use two sources of power to propel them – most commonly an internal combustion engine coupled with an electric motor and battery. Hybrid vehicles are more efficient than equivalent conventional diesel and petrol vehicles, and usually have lower emissions of air pollutants too.

**Local Air Quality Management (LAQM)** – LAQM is the system under which local authorities review and assess air quality in their areas against agreed national standards. Where air quality is found to be in breach of the standards they must declare an Air Quality Management Area and produce an action plan to pursue attainment of the standards.

**Low Emission Zone (LEZ)** – A designated area where only vehicles that meet a certain emission standard (for air pollutants) are allowed to enter.

**Merton Rule** – Planning rules which state that a certain proportion of a new development's energy needs must be met by on-site renewable energy generation. Named after the London Borough of Merton which was the first to introduce such conditions.

**National Indicator Set** – A national set of indicators used by central Government to judge the performance of local authorities (does not apply in Scotland or Northern Ireland)

**Nitrogen Dioxide (NO<sub>2</sub>)** – A common air pollutant emitted by combustion processes, including road vehicles, aircraft and domestic and industrial combustion. NO<sub>2</sub> is a respiratory irritant, and in strong sunlight is a precursor for ozone formation.

**Ozone (O<sub>3</sub>)** – Ground level (tropospheric) ozone is a common air pollutant, formed by other pollutant gases reacting in strong sunlight. Ozone is relatively long lived and is transported over long distances by the winds. This factor combined with chemical processes that destroy ozone in polluted urban environments means that ozone levels can actually be highest in rural areas. Ozone is associated with lung disease, exacerbation of conditions such as asthma, and damage to vegetation and crops.

**Particulate Filter** – A device to filter particles from exhaust gases, commonly found on newer diesel vehicles.

**PM<sub>10</sub> and PM<sub>2.5</sub>** – Airborne particle pollution, with the number denoting the appropriate size of the particle in micro-meters. Fine particles are taken deep into the lung's membrane, and can even cross over into the bloodstream. Particle pollution is strongly associated with illness and premature death from heart and lung disease. Common sources of particles include diesel vehicles, solid fuel combustion and vehicle tyre and brake wear.

**(Solar) Photovoltaic** – Technology that produces electricity from sunlight.

**WarmFront** – A Government funded grant scheme giving free insulation and energy efficient heating measures to households in receipt of certain benefits. Operates in England only, comparable schemes operate in Northern Ireland, Scotland and Wales.

**Renewable Heat Incentive (RHI)** – A proposed scheme to provide payments to people producing heat from renewable sources (e.g. biomass, solar, heat pumps). Payments would be provided based on the amount of heat produced, rather than an upfront grant to cover the costs of installation. The RHI would be the heat equivalent of the Clean Energy Cashbacks available for renewable electricity generation.

