



How local authorities can reduce emissions and manage climate risk

Committee on Climate Change | May 2012



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Preface

The Committee on Climate Change (the Committee) is an independent statutory body which was established under the Climate Change Act (2008) to advise UK and Devolved Administration governments on setting and meeting carbon budgets, and preparing for climate change.

Setting carbon budgets

In December 2008 we published our first report, *'Building a low-carbon economy – the UK's contribution to tackling climate change'*, containing our advice on the level of the first three carbon budgets and the 2050 target; this advice was accepted by the Government and legislated by Parliament. In December 2010, we set out our advice on the fourth carbon budget, covering the period 2023-27, as required under Section 4 of the Climate Change Act; the fourth carbon budget was legislated in June 2011 at the level that we recommended.

Progress meeting carbon budgets

The Climate Change Act requires that we report annually to Parliament on progress meeting carbon budgets; we have published three progress reports in October 2009, June 2010 and June 2011.

Advice requested by Government

We provide ad hoc advice in response to requests by the Government and the Devolved Administrations. Under a process set out in the Climate Change Act, we have advised on reducing UK aviation emissions, Scottish emissions reduction targets, UK support for low-carbon technology innovation, design of the Carbon Reduction Commitment and renewable energy ambition. In September 2010 and July 2011, we published advice on adaptation, assessing how well prepared the UK is to deal with the impacts of climate change.

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Foreword

In October 2011 Greg Barker confirmed a request to us to provide advice on the role of local authorities in delivering emissions reductions required to meet carbon budgets. This followed discussion in Parliament of whether it would be appropriate to set local carbon budgets, in the context of the legislation for the Green Deal and the Energy Company Obligation.

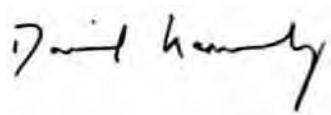
We have previously highlighted the need for a step change in the pace of emissions reductions and we are increasingly focusing on the implementation arrangements required to drive this change. The request is therefore very timely, given that local authorities have a potentially important role in implementation.

Our approach in the report is first to summarise our assessment of national abatement potential and then to translate this to the local level, in order to identify where and to what extent local authorities can influence emissions reductions given the policy levers that they have available.

This analysis highlights the crucial role for local authorities in meeting national carbon budgets, showing that emissions reductions without local action will be insufficient. But we stop short of recommending local carbon budgets, suggesting instead that local authorities should develop carbon plans concentrating on the emissions drivers over which they have some control.

We have also considered the question of whether local authorities are sufficiently incentivised to act on climate change, given the removal of the national indicator framework and the highly constrained fiscal situation. Drawing on survey evidence and our own interviews with local authorities, we conclude that there is a significant risk that there will be limited activity. We therefore recommend that the Government should strengthen incentives, given the need for local authorities to act.

Each of our reports entails a very significant effort on the part of the Secretariat. I would like to thank the team who worked very hard on this report over the last six months.



David Kennedy, Chief Executive

Acknowledgements

The Committee would like to thank:

The core team that prepared the analysis for the report. This was led by Ute Collier and David Kennedy and included: Alina Lazar, Kavita Srinivasan, Indra Thillainathan, Russell Bishop, and Adrian Gault.

Other members of the secretariat who contributed to the report: Tara Barker, Alice Barrs, Sebastian Catovsky, Alex Kazaglis, Swati Khare-Zodgekar, Eric Ling, Laura McNaught, Nina Meddings, Meera Sarda and Dave Thompson.

A number of individuals who provided significant support: Syed Ahmed, Abigail Burrridge and Andrew Gouldson.

A number of organisations for their support, including: Department for Communities and Local Government, Department of Energy and Climate Change, Department for Environment, Food and Rural Affairs, Department for Transport, Friends of the Earth, London Environment Coordinators Forum, Waste Reduction Action Programme (WRAP).

A wide range of stakeholders who sent us evidence, attended our stakeholder meetings, or met with us bilaterally.

The Committee



Lord Adair Turner, Chair

Lord Turner of Ecchinswell is the Chair of the Committee on Climate Change and Chair of the Financial Services Authority. He has previously been Chair at the Low Pay Commission, Chair at the Pension Commission, and Director-general of the Confederation of British Industry (CBI).



David Kennedy, Chief Executive

David Kennedy is the Chief Executive of the Committee on Climate Change. Previously he worked on energy strategy and investment at the World Bank, and the design of infrastructure investment projects at the European Bank for Reconstruction and Development. He has a PhD in economics from the London School of Economics.



Professor Samuel Fankhauser

Professor Samuel Fankhauser is acting Co-Director of the Grantham Research Institute on Climate Change at the London School of Economics and a Director at Vivid Economics. He is a former Deputy Chief Economist of the European Bank for Reconstruction and Development.



Sir Brian Hoskins

Professor Sir Brian Hoskins, CBE, FRS is the Director of the Grantham Institute for Climate Change at Imperial College and Professor of Meteorology at the University of Reading. He is a Royal Society Research Professor and is also a member of the National Science Academies of the USA and China.



Professor Julia King

Professor Julia King CBE FREng is Vice-Chancellor of Aston University. She led the 'King Review' for HM Treasury in 2007/8 on decarbonising road transport. She was formerly Director of Advanced Engineering for the Rolls-Royce industrial businesses. Julia is one of the UK's Business Ambassadors, supporting UK companies and inward investment in low-carbon technologies.



Lord John Krebs

Professor Lord Krebs Kt FRS, is currently Principal of Jesus College Oxford. Previously, he held posts at the University of British Columbia, the University of Wales, and Oxford, where he was lecturer in Zoology, 1976-88, and Royal Society Research Professor, 1988-2005. From 1994-1999, he was Chief Executive of the Natural Environment Research Council and, from 2000-2005, Chairman of the Food Standards Agency. He is a member of the U.S. National Academy of Sciences. He is chairman of the House of Lords Science & Technology Select Committee.



Lord Robert May

Professor Lord May of Oxford, OM AC FRS holds a Professorship jointly at Oxford University and Imperial College. He is a Fellow of Merton College, Oxford. He was until recently President of The Royal Society, and before that Chief Scientific Adviser to the UK Government and Head of its Office of Science & Technology.



Professor Jim Skea

Professor Jim Skea is Research Director at UK Energy Research Centre (UKERC) having previously been Director of the Policy Studies Institute (PSI). He led the launch of the Low Carbon Vehicle Partnership and was Director of the Economic and Social Research Council's Global Environmental Change Programme.

Executive summary

This report responds to a June 2011 request, confirmed in October 2011, from Greg Barker, Minister of State for Energy and Climate Change, asking the Committee on Climate Change (CCC) to provide advice on:

- How local authorities can be encouraged to show strong leadership and responsibility in cutting carbon emissions both from their own estates and operations and those arising within their areas; and
- Benchmark levels for the scale of ambition that local authorities might appropriately set themselves, possible approaches to deliver that ambition and how this would contribute to the national carbon budgets.

Local authorities are well placed to drive and influence emissions reductions in their wider areas through the services they deliver, their role as social landlords, trusted community leaders and major employers, and their regulatory and strategic functions.

Our approach is to first consider where local authorities have the potential to reduce emissions given the policy levers available, and then to quantify the magnitude of the emissions reduction opportunity. We then consider approaches and incentives for local authorities to act, and how national government can support local action. Recognising that some climate change is inevitable, we also consider the role of local authorities in preparing for this (i.e. adapting to a range of potential climate change impacts across the country).

Although the terms of reference relate to England, reflecting the fact that local government is a devolved matter, much of our analysis is relevant at the UK level.

The key messages in the report are:

- There is a crucial role for local authorities in reducing emissions to meet national carbon budgets:
 - Local authorities have significant scope to influence emissions in buildings, surface transport, and waste, which together account for 40% of UK greenhouse gas emissions. There is an opportunity to reduce emissions in these sectors by 20% in 2020 from 2010 levels (30% on 1990 levels).
 - Within this, the largest opportunity for local authorities is supporting energy efficiency improvement in residential buildings, but opportunities also exist in non-residential buildings, sustainable transport and waste management.

-
- There is also an important role for local authorities in supporting power sector decarbonisation through granting planning approval for onshore wind projects and ensuring that these are designed to benefit local communities. In addition, local authorities can play a part through supporting investment in electric vehicle charging infrastructure, which will result in longer term emissions benefits.
 - Reducing local authority own estate emissions is important in the context of carbon budgets, both directly and to underpin the wider leadership role of local authorities.
 - A failure to secure reductions across the areas where local authorities have significant influence would leave emissions above levels required to meet carbon budgets.
 - Local authorities should draw up low-carbon plans which include a high level ambition for emissions reduction (e.g. 20% reduction across buildings, surface transport and waste by 2020 relative to 2010 levels) but focus on drivers of emissions over which they have influence (e.g. number of homes insulated, car miles travelled). Ambition should be set for these drivers, policies developed to encourage action, and monitoring undertaken to ensure that ambition is achieved in practice. It would not be appropriate for local authorities to set (or be set) binding carbon budgets given the multiple drivers of emissions, many of which are beyond their control.
 - There is currently a significant risk that local authorities will not develop and implement sufficiently ambitious low-carbon plans, following the removal of the national indicator framework and given the highly constrained fiscal situation. In order to mitigate this, and the associated risk for meeting national carbon budgets, the Government should seriously consider providing additional funding (e.g. for local authorities to be Green Deal providers/ partners, and to roll out sustainable travel programmes) and/or introducing a statutory duty for local authorities to develop and implement low-carbon plans.
 - There is an important role for local authorities in preparing for climate change, using planning and other policy levers to ensure that buildings and infrastructure are resilient to increased risk of flooding and heat stress. Previous assessments of the Adaptation Sub-Committee question whether adaptation is adequately resourced and whether climate risk has been given sufficient weight in local authority decision making, and suggest the need for increased focus by local authorities in order that climate risk is managed appropriately.

Key messages for local authorities:

- 1. Local authorities play an important role in delivering national carbon targets.** They can drive and influence emissions reductions in their wider areas through the services they deliver, their role as social landlords, community leaders and major employers, and their regulatory and strategic functions.
- 2. Action on climate change has many local benefits.** As well as contributing to national carbon budgets, carbon reduction programmes can bring a range of benefits such as lower energy bills, economic regeneration and creation of local jobs, and improved health. Increasing resilience to climate change risks can result in avoided costs from flood damage to buildings, infrastructure and services, enhanced green spaces and improved health.
- 3. Improving energy efficiency in buildings is a key area for action.** The most important role local authorities can play in the residential buildings sector is through implementing home insulation measures in the context of national energy efficiency programmes. The Green Deal and ECO are the key programmes for local authorities to engage with as providers or partners. A number of barriers however may need to be overcome to ensure the benefits for local authorities from this engagement are realised.
- 4. Planning.** Local authorities' planning functions are a key lever in reducing emissions and adapting localities to a changing climate. It is particularly important that local authorities use their plan making and development management/building control functions to: enforce energy efficiency standards in new buildings and extensions; reduce transport emissions by concentrating new developments in existing cities and large towns and/or ensuring they are well served by public transport; work with developers to make renewable energy projects acceptable to local communities; plan for infrastructure such as low-carbon district heating networks, green infrastructure and sustainable drainage systems; and avoid increasing the area's risk to climate change impacts by locating new development in areas of lowest flood risk.
- 5. District heating.** Although local authorities have a unique role in developing and making district heating schemes commercially viable, only low-carbon district heating (e.g. supplied by waste-to-energy plants or low-carbon power stations) should be pursued in the longer term as gas-fired combined heat and power (CHP) will eventually become incompatible with national carbon budgets.
- 6. Transport.** The most important role local authorities can play in reducing transport emissions is through implementing sustainable travel programmes (e.g. encouraging 'Smarter Choices' through car clubs, travel plans, cycling infrastructure etc., and providing better public transport) and promoting low-carbon vehicles by rolling out electric vehicle charging infrastructure, providing incentives for drivers of low-carbon vehicles, and purchasing low-carbon buses.
- 7. Waste.** Local authorities have an important role in waste prevention and sustainable waste management through awareness-raising campaigns, providing separate collection for recycling and food waste, and implementing waste-to-energy schemes.
- 8. Low-carbon plans.** All local authority areas should develop a low-carbon plan that includes a high level of ambition for emissions reductions and focuses on emissions drivers over which local authorities have influence in buildings, transport, waste, renewable power generation and their own estates.
- 9. Own estate.** Reducing emissions from local authorities' own estate and operations is important as it makes a useful contribution to meeting carbon budgets and legitimises a wider role in reducing emissions in the area by demonstrating leadership. The main opportunities are in own buildings, street lighting, transport and procurement.
- 10. Adaptation.** Local authorities have a crucial role in increasing the resilience of buildings and infrastructure in their localities, managing and extending natural resources to promote biodiversity and reduce the risk of flooding, as well as protecting their populations from the health impacts of a changing climate.

We set out the analysis that underpins these conclusions in eight chapters:

1. Context for local authority action
2. Opportunities to reduce emissions at the local level
3. Levers for local authorities to reduce emissions
4. Reducing emissions from local authorities' own estate and operations
5. Developing a low-carbon plan
6. Incentives for local authority action and the role for national Government
7. Local approaches to adapting to climate change
8. Conclusions and recommendations

1



1. Context for local authority action

When considering the role of England's local authorities in reducing emissions and responding to climate change, it is important to distinguish between different types of authorities and the areas of responsibility that they have:

- **125 single-tier authorities** (including 56 unitaries, 36 metropolitan districts and 33 London boroughs including the City of London). In general, these provide all local government services to their areas. They cover approximately 16% of the country by area, and 53% by population – mainly in the cities, urban conurbations and larger towns.
- **27 county councils in two-tier areas.** These provide the major services (education, social services, waste disposal) to 84% of the country by area and 47% by population – mainly in rural areas.
- **201 district councils in two-tier areas.** Each county council area is subdivided into districts, for which there is an independent district council responsible for local services such as refuse collection and planning control.
- The **Greater London Authority (GLA)** has a strategic, city-wide role in economic development and wealth creation, social development and environmental improvement.
- 79 **single purpose local authorities** comprising 30 fire authorities, 37 police authorities, 6 passenger transport authorities and 6 waste authorities.

Table 1.1 summarises the major responsibilities of local authorities in England.

Table 1.1: Local authority responsibility for major services in England

	Metropolitan areas		Shire areas				London area			
	District councils	Single purpose authorities	Unitaries	County councils	District councils	Single purpose authorities	City of London	London boroughs	GLA	Single purpose authorities
Number of authorities	36	20	56	27	201	55	1	32	1	4
Education	✓		✓	✓			✓	✓		
Highways ^(a)	✓		✓	✓			✓	✓	✓	
Transport planning	✓		✓	✓			✓	✓	✓	
Passenger transport		✓	✓	✓					✓	
Social care	✓		✓	✓			✓	✓		
Housing	✓		✓		✓		✓	✓		
Libraries	✓		✓	✓			✓	✓		
Leisure and recreation	✓		✓		✓		✓	✓		
Environmental health	✓		✓		✓		✓	✓		
Waste collection	✓		✓		✓		✓	✓		✓
Waste disposal ^(b)	✓	✓	✓	✓			✓	✓		
Planning applications	✓		✓		✓		✓	✓		
Strategic planning	✓		✓	✓			✓	✓	✓	
Police		✓				✓	✓		✓	
Fire and rescue ^(c)		✓		✓		✓			✓	
Local taxation	✓		✓		✓		✓	✓		

(a) Transport for London (TfL), a body of the Greater London Authority (GLA), is the highways authority for about 5% of London roads.

(b) Waste disposal for some areas of London is carried out by separate waste disposal authorities. The GLA has strategic, but not operational, responsibility for municipal waste.

(c) Combined fire authorities are responsible for fire and rescue services in the shire areas affected by reorganisation from April 1996. Cornwall, Isle of Wight, Northumberland and Isles of Scilly are the Unitary Authorities with responsibility for fire and rescue services. The table excludes 10 park authorities in England – for the eight National Parks, The Broads and the Lee Valley Regional Park. These authorities have various powers and aims that straddle some of the normal functions of local government. In particular, park authorities have responsibility for planning and leisure functions.

Source: Department for Communities and Local Government (2011) *Local Government Financial Statistics England*.

Key local authority functions for reducing carbon emissions and potential benefits from action

Local authorities are well placed to drive and influence emissions reductions in their wider areas through the services they deliver, their role as social landlords, community leaders and major employers, and their regulatory and strategic functions:

- **Service provider.** Local authorities have statutory duties to provide services across a range of sectors, including waste collection and disposal, housing, environment and transport, each of which offers a significant opportunity for emissions reduction.
- **Social housing owner.** Local authorities in England currently own approximately 2 million dwellings (7% of the total national housing stock). While there have already been major improvements in energy efficiency in social housing, there is scope for further low-carbon retrofit (e.g. through solid wall insulation).
- **Community leader.** As trusted leaders and major employers, local authorities have the opportunity to raise awareness about the potential to reduce emissions in their communities, and work in partnership with a variety of organisations to deliver emissions reductions.
- **Planning authority.** Local planning authorities are responsible for producing Local Development Plans and hold the development management and building control functions in their areas. The new National Planning Policy Framework (NPPF), published by the Department for Communities and Local Government (DCLG) in April 2012, calls for local authorities to develop and implement plans that meet the challenges of climate change. Its objectives include the promotion of sustainable transport, planning for new developments in locations and ways to reduce greenhouse gas emissions, actively supporting energy efficiency in buildings, and helping to increase the use and supply of renewable and low-carbon energy.
- **Regeneration coordinator.** Local authorities play a major role in driving local regeneration plans, as recently recognised through the Local Enterprise Partnerships (LEPs).¹ Regeneration projects can offer opportunities for emission reductions, for example through energy efficient new buildings or sustainable transport infrastructure.

¹ LEPs, led by local authorities and businesses across natural economic areas, provide strategic leadership to drive sustainable private sector growth and job creation in their area. There are 39 agreed LEPs in England covering all but one local authority area.

By exercising these functions in a way that results in emission reductions, there can be a range of economic and social benefits for local authorities and their communities. These include:

- Reduction in fuel poverty and improved energy affordability through energy efficiency improvements in the residential sector.
- Cost savings through energy efficiency improvement in the non-residential sector.
- Infrastructure improvements (e.g. sustainable transport options to reduce congestion and improve access to jobs and services).
- Development of local skills and job creation (e.g. through insulation programmes).

The legal and fiscal framework for local authority action on climate change

The policy framework for how local authorities report to central Government on delivering national priorities at the local level has changed recently, with significant implications for action on climate change, both in terms of mitigation and adaptation efforts.

Between 2008 and 2010, a performance framework for local authorities was introduced as a basis for central Government to manage outcomes delivered by local governments. Within this, local councils (as part of Local Strategic Partnerships – LSPs²) reported their performance against 198 indicators reflecting national priorities and negotiated targets with the Government on 35 national indicators through Local Area Agreements (LAAs). The relevant national indicators (NIs) for climate change were:

- NI185 – CO₂ reduction from local authority operations
- NI186 – per capita CO₂ emissions in the LA area, including emissions arising from buildings, industry and surface transport
- NI188 – adapting to climate change

Two-thirds of LSPs in England chose to sign up to NI186 and set out targets to reduce emissions in their local area by 2011. In a 2009 review of NI186, the Audit Commission found that this may have resulted in action in many areas. However, it also suggested that stronger levers may be required to encourage more comprehensive action and more ambitious targets, and recommended that this should be kept under review.

Since then the Coalition Government has reformed the way local government operates, with some of the most important changes set out in the Localism Act 2011. It has also abolished LAAs and national indicators, and now there is no requirement for local authorities to set or negotiate targets to reduce their own or area-wide emissions.

² LSPs were statutory bodies that brought together parts of the public, private, voluntary and community sectors working at a local level.

Regional Development Agencies, which had a statutory role in contributing to sustainable development, were also abolished, and replaced with Local Enterprise Partnerships (LEPs). The primary purpose of LEPs is to drive sustainable private sector-led growth and job creation through a voluntary and predominantly self-funded approach.

Concurrent to these changes in the policy framework, revenue funding from Government to local authorities has been reduced/will be further reduced (26% in real terms between 2010-11 and 2014-15, or a 7% annual reduction). In addition, councils have been encouraged by the government to cap council tax increases.

In this context, and given that the full benefits of action on climate change may not occur at or be visible at the local level, there is a question of whether local authorities will prioritise action to reduce emissions going forward. We now consider the opportunities at the local level in more detail before returning to address this question in Chapter 6.

2



2. Opportunities to reduce emissions at the local level

The UK is committed under the Climate Change Act to an 80% emissions reduction in 2050 on 1990 levels, and has legislated five-year carbon budgets covering the period to 2027 that are compatible with this long-term target.

Our analysis has shown that the 2050 target and carbon budgets are technically feasible at affordable cost, but that achieving them in practice will require a step change in the pace of emissions reduction across all sectors.

We have previously highlighted the importance of regional action driving the step change at the level of devolved administrations (i.e. scope for action in the devolved administrations in Scotland, Wales and Northern Ireland). In this report we focus on the role of local authorities in England, as required under our terms of reference.

Our starting point is a recap of the overall ambition in carbon budgets. We then move to disaggregated budgets, distinguishing between traded and non-traded sectors (i.e. those covered by the EU Emission Trading System (EU ETS) and those outside the system), and further disaggregate to the sector level (e.g. buildings and surface transport). We conclude with a high-level discussion of which emissions reduction opportunities local authorities are best placed to control or influence.

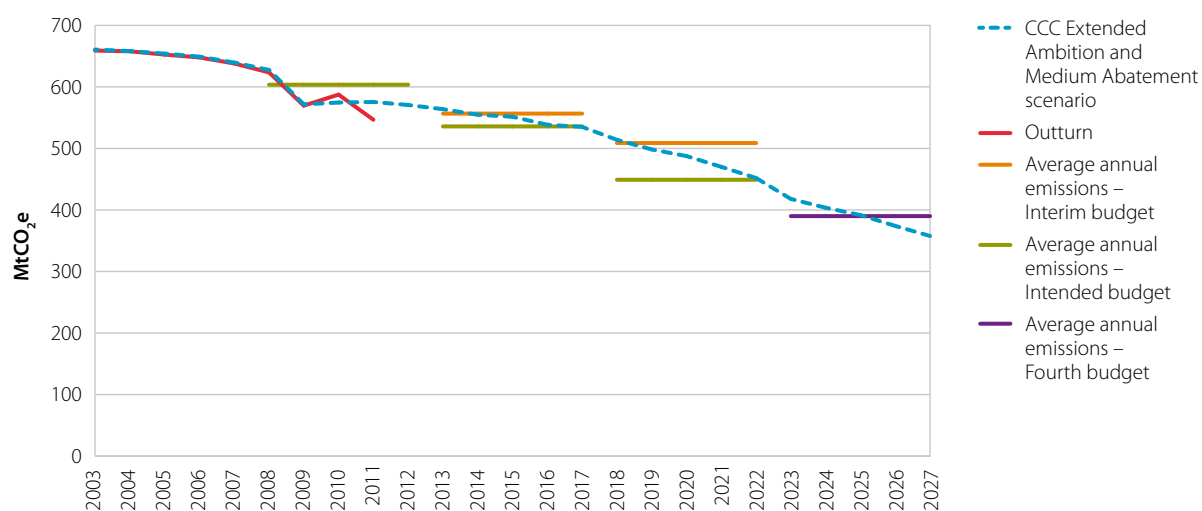
The first four carbon budgets (2008-2027)

There are currently four carbon budgets in legislation, committing to a 17% emissions cut by 2020 on 2010 levels (34% emissions cut on 1990 levels) and a 50% cut by 2025 (Figure 2.1):

- **Carbon Budgets 1-3.** The first three carbon budgets cover the periods 2008-2012, 2013-2017 and 2018-2022. They require annual emissions reduction of 2% to 2020, and an emissions reduction of 17% in 2020 on 2010 levels (34% on 1990 levels).
- **Fourth Carbon Budget.** The fourth carbon budget covers the period 2023-2027. It limits emissions in this period to 1,950 MtCO₂e, and requires a 34% cut in emissions by 2025 on 2010 levels (50% on 1990 levels). The rate of emissions reduction required to meet the fourth carbon budget accelerates to 5% per year from 2020.

The Climate Change Act distinguishes between the non-traded and traded sectors of the economy, that is sectors outside and within the EU ETS. We now consider each of these in turn.

Figure 2.1: UK greenhouse gas emissions under the first four carbon budgets



Source: NAEI (2012); DECC (2012) 2011 UK Greenhouse gas emissions, provisional figures; CCC calculations.

Notes: Interim budgets indicate the legislated UK carbon budgets based on a 2020 emissions reduction of 34% relative to 1990 levels. Intended budgets are based on a 42% emissions reduction in 2020 originally proposed to be enacted if and when there was progress towards a global deal to reduce global emissions. In our December 2010 advice on the fourth carbon budget, we recommended that the second and third budgets be adjusted to reflect the level of ambition in the Intended budget for the non-traded sector, giving an economy-wide reduction of 37% in 2020 relative to 1990 levels ("Extended Ambition" scenario). The Medium Abatement scenario forms the basis of what the UK should plan for in the 2020s to meet the fourth budget recommendation and prepares sufficiently for 2050 whilst being feasible, sustainable and cost-effective.

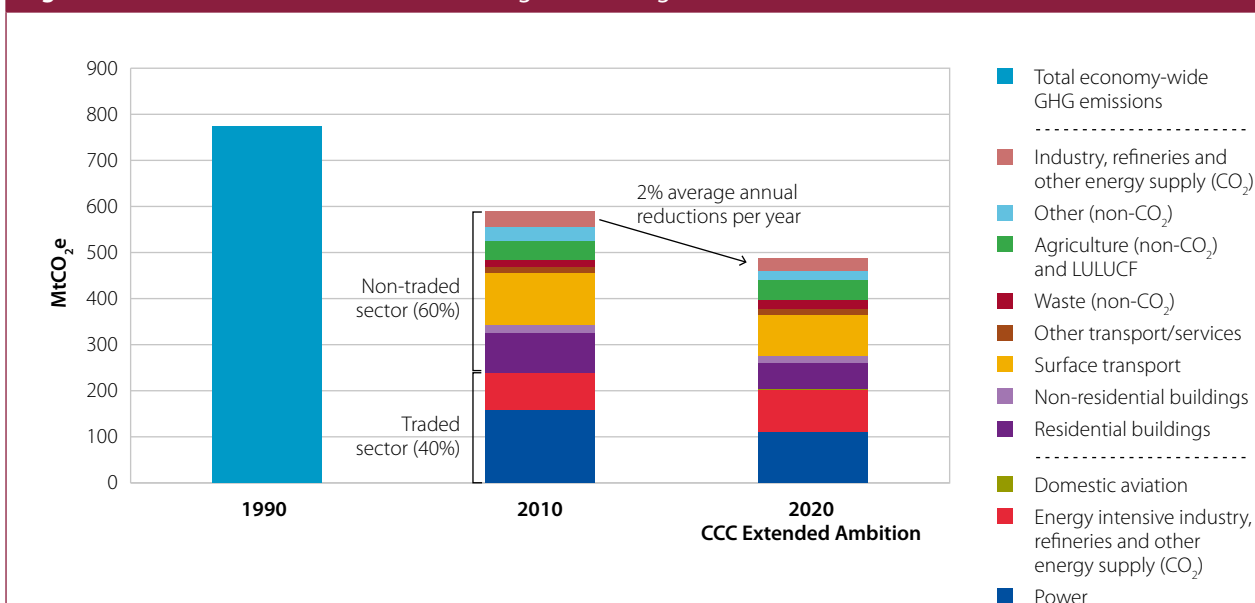
The non-traded sector

The non-traded sector covers direct carbon dioxide (CO₂) emissions (i.e. arising from burning fossil fuels) from buildings and non-energy intensive industry, surface transport, and most non-CO₂ emissions, including from agriculture and waste. It accounts for around 60% of total emissions (Figure 2.2).

Non-traded emissions have fallen by 26% from 1990 levels. Our analysis suggests that there is scope for these to be further reduced by around 20% in 2020 on 2010 levels (40% on 1990 levels), with significant emissions reduction potential in buildings, transport, waste, industry and agriculture:

- **Buildings.** Direct emissions from buildings arise from the burning of fossil fuels (e.g. natural gas) for heat. They include emissions from residential, public sector, commercial and industrial buildings and comprise 17% of economy wide and 29% of non-traded emissions.
 - Direct buildings emissions have increased by 2% relative to 1990, reflecting an overall increase in the number of buildings, with some evidence of improved energy efficiency of the housing stock.
 - Key measures for further reducing these emissions include insulation (in particular loft, cavity, and solid wall), boiler replacement, behaviour changes such as turning down thermostat levels, and switching to renewable heat.
 - Our analysis suggests that implementing these measures could reduce emissions in 2020 by 32% relative to 2010 levels (31% on 1990).

Figure 2.2: UK traded and non-traded sector greenhouse gas emissions to 2020



Source: NAEI (2012).

Notes: NAEI (2012); DECC (2012) 2011 UK greenhouse gas emissions, provisional figures; CCC calculations.

- **Surface transport.** Emissions arising from cars, vans, buses, heavy goods vehicles and rail transport account for around 20% of economy-wide emissions and just over 30% of non-traded sector emissions.
 - Surface transport emissions have increased by 3% since 1990 as a result of an increase in transport demand, partially offset by the lower carbon intensity of new vehicles.
 - There is scope to reduce emissions through measures to improve the fuel and carbon efficiency of vehicles (e.g. increases in the efficiency of new conventional vehicles and in the longer term, switching to electric vehicles), and through consumer behaviour change (e.g. through modal switch from cars to public transport), which can be effectively incentivised at the local level.
 - Surface transport emissions in 2020 could be reduced by 21% relative to current levels (19% relative to 1990 levels) through uptake of the above measures.
- **Waste.** Emissions from waste are predominantly (90%) methane (CH₄), a greenhouse gas which arises as biodegradable waste decomposes in landfill in the absence of oxygen. They account for 3% of economy-wide greenhouse gas emissions and 5% of non-traded emissions.
 - Waste emissions have fallen by 70% since 1990, driven by the UK landfill tax which has diverted waste from landfills, in accordance with EU Landfill Directive targets.
 - Scope for additional reduction exists through further diversion of waste from landfill, using this either for recycling, composting, or for production of energy.
 - Given reduced waste in landfill, there is scope to reduce emissions in 2020 by 23% on 2010 levels (75% on 1990 levels).

- **Industry, refineries and other energy supply.** Emissions from industry not covered by the EU ETS account for around 6% of economy-wide emissions, and 10% of non-traded sector emissions.
 - These have fallen by 44% since 1990, with scope for reductions of 26% to 2020 from 2010 levels (approximately 60% from 1990).³
 - To 2020, reductions are likely to be achieved mainly through the implementation of energy efficiency measures.
- **Agriculture.** Emissions from agriculture account for around 7% of economy-wide emissions and 12% of non-traded sector emissions.
 - They have fallen by 17% since 1990 due to a decrease in livestock numbers and reductions in the amount of fertiliser applied to pasture land.
 - There is scope for emissions reductions of 12% in 2020 on 2010 levels (27% on 1990) through implementation of low-cost soils and livestock measures.

Addressing the vast majority of this potential will be required to meet legislated carbon budgets.

The traded sector budget

The traded sector, including the power sector and energy-intensive industries covered by the EU ETS, accounts for 40% of total UK emissions (Figure 2.2). Emissions have fallen by 20% since 1990, with scope for a further 15% reduction by 2020 (a total 30% emissions reduction on 1990).

- **Power sector** emissions arise from the combustion of fossil fuels to generate electricity. They account for 27% of economy-wide emissions and 65% of traded sector emissions. Emissions have fallen by 23% since 1990, mainly due to the 'dash for gas' (i.e. switching from coal to gas-fired power generation). There is scope to reduce emissions by a further 30% in 2020 on 2010 levels (46% on 1990 levels), mainly through investment in renewable power generation and end-use energy efficiency improvement (e.g. through more efficient appliances and lighting).
- **Energy-intensive industry, refineries, and other energy supply** emissions include refineries, chemical, paper, cement and other industrial producers. They account for 14% of economy-wide and 34% of traded sector emissions. Emissions from these industries have fallen by 14% since 1990, with limited scope to reduce emissions further to 2020 given timescales required to deploy relevant measures (e.g. electrification and combined capture and storage technologies are not available until the 2020s).

³ 1990 emissions data do not directly split traded and non-traded sector. We have estimated an approximate split.

Potential for local authority influence: non-traded sector

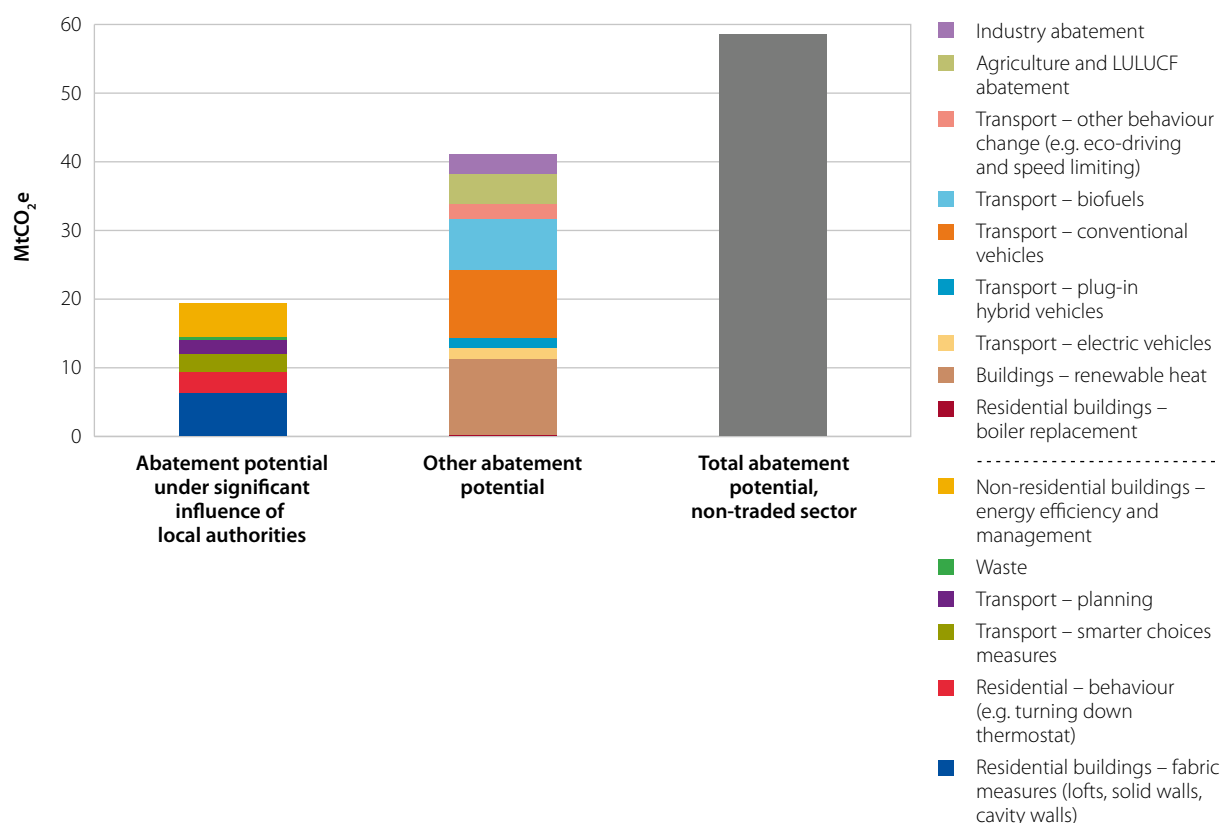
Local authorities have most scope to influence emission reductions in the non-traded sector (Box 2.1). In particular, there are important roles for local authorities in the reduction of direct emissions through encouraging the uptake of energy efficiency measures in buildings, promoting sustainable transport, and reducing the amount of waste sent to landfill:

- **Buildings energy efficiency measures.** There is scope for local authorities to lead or to participate in programmes to improve energy efficiency and encourage behaviour change in both the residential and non-residential sectors. Furthermore, through planning and building control functions, local authorities play an important role in enforcing energy efficiency standards in new buildings and building extensions.
- **Sustainable transport.** There is a crucial role for local authorities to design and implement local sustainable transport plans. Measures such as parking charges or congestion charging can have an impact on consumer behaviour (e.g. resulting in the rationalisation of car journeys and the purchase of low emission vehicles). In addition, local authorities have an important role to play in supporting investment in electric vehicle charging infrastructure, and in ensuring that new residential and office developments are designed to encourage the uptake of sustainable transport options.
- **Waste.** Although the landfill tax is determined nationally, local authorities are key to encouraging waste prevention and supporting the diversion of waste from landfill, via policies and strategies for reducing overall levels of waste generated, implementing separate food waste collection systems, and facilitating recycling centres and energy from waste plants.

These three areas account for two-thirds of emissions and one-third of the abatement potential in the non-traded sector in 2020 (Figure 2.3), and failure to act here would result in carbon budgets not being achieved (Figure 2.4). Therefore, given their potential influence in areas where action is required, there is a crucial role for local authorities in meeting national carbon budgets.

The precise opportunity at the local level will depend on specific local characteristics (e.g. action to date, nature of housing stock, population density, public transport options, and proximity to amenities). For example, a recent assessment by the Centre for Low Carbon Futures found that cost effective abatement potential in the local authorities comprising the Leeds City Region could range from 20% in Harrogate to 30% in Bradford by 2022 relative to 2010 levels (Box 2.2).

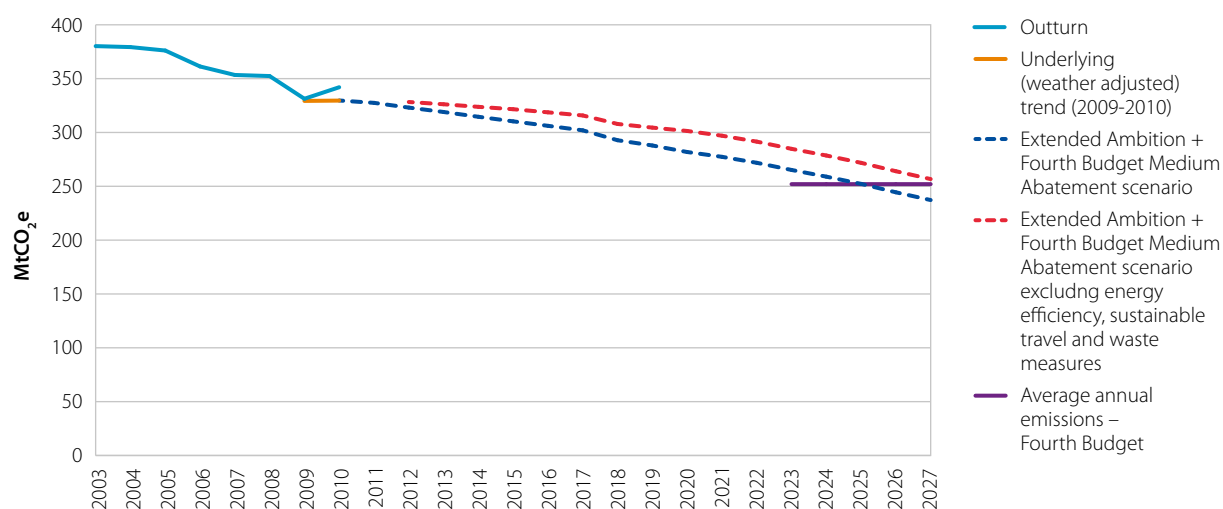
Figure 2.3: Abatement potential under the influence of local authorities in the non-traded sector (2020)



Source: CCC (2010) *The Fourth Carbon Budget: Reducing emissions through the 2020s*; CCC calculations.

Notes: Abatement potential in the transport sector from sustainable land use planning is included here but not currently factored into our economy-wide emissions trajectories. Waste emissions reduction potential is considered part of baseline emissions (as the landfill tax predates pre-dates the UK Climate Change Act). Moreover actions taken today to further divert waste from landfill will impact emissions occurring over the next two decades given time lags caused by the long life of rotting materials in landfill. The chart illustrates the impact of actions taken by local authorities today to further divert waste away from landfill in line with the increased landfill tax, which will deliver an additional 0.4 MtCO₂e in abatement potential by 2020 (Defra MELMod model (2012)).

Figure 2.4: Non-traded sector greenhouse gas emissions excluding measures under the influence of local authorities and the Fourth Carbon Budget (2003-2027)



Source: CCC analysis; NAEI (2012); DECC (March 2012) *2011 UK Greenhouse gas emissions, provisional figures*; CCC calculations.

Note: Energy efficiency measures include fabric measures in buildings (e.g. loft, cavity and solid wall insulations), behaviour measures (e.g. turning down thermostats), and energy management measures in non-residential buildings; sustainable travel measures include Smarter Choices and planning; waste measures include additional diversion of waste from landfill above 2011 levels.

Box 2.1: Emissions under the influence of local authorities

The Department for Energy and Climate Change (DECC) has collected estimates of emissions within the scope of influence by UK local authorities since 2005. Estimates included in the data set are based on 'real' local data, where possible, such as electricity and gas consumption meter data, and include the following:

- **Residential buildings** based on DECC electricity and gas consumption data
- **Non-residential buildings** as above plus fuel usage statistics reported by larger organisations
- **Road transport** based on all road traffic data using Department for Transport (DfT) traffic flow data disaggregated to the local level, excluding emissions arising from traffic on motorways.

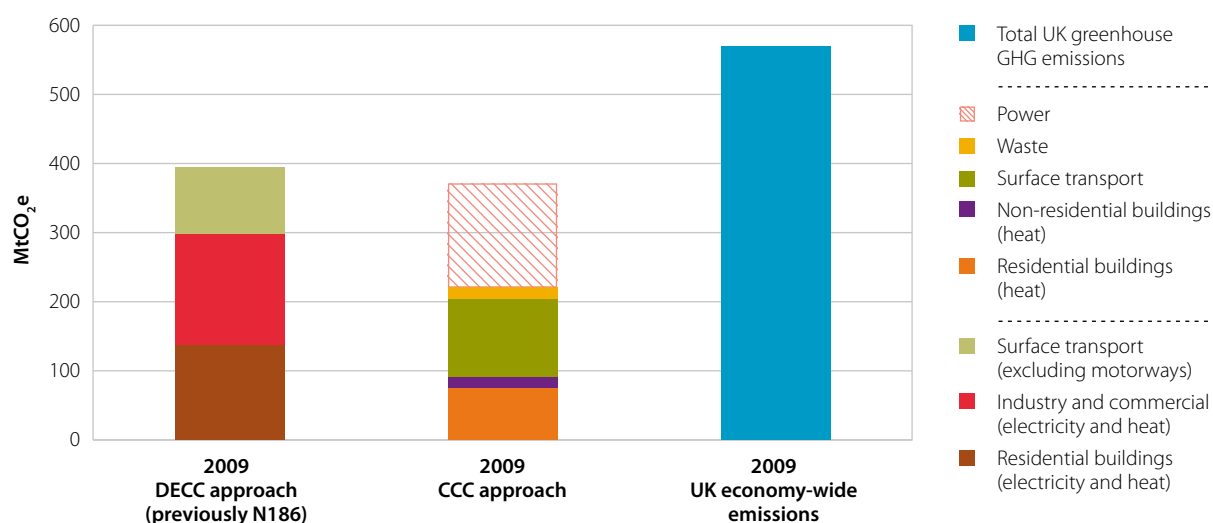
Certain activities outside the scope of influence of local authorities and those affected by data limitations were excluded. These include EU ETS installations, with the exception of energy suppliers (e.g. power stations) whose emissions are indirectly included via end-user electricity consumption, land use, land use change and forestry activities as well as emissions arising from aviation, shipping and military transport activities.

Non-CO₂ emissions arising from agriculture and waste were also excluded. Although local authorities were recognised as having potential influence over waste emissions, limited data was available on waste emissions arising at the local level. This is further complicated by the fact that emissions arising in the waste sector in a given year reflect waste management activities occurring decades ago (e.g. biodegradable waste sent to landfill in the past).

According to the DECC data set, emissions under the influence of UK local authorities in 2009 were 393 MtCO₂e, or approximately 70% of economy-wide emissions.

DECC's data set includes a broader set of sectors than we have identified as potentially under the influence of local authorities. Our approach has been to identify sectors where local authorities have a role in delivering national policies or areas where national policies to drive down emissions do not necessarily exist (e.g. local transport), and where local authorities therefore are likely to have a more direct influence in driving down emissions and influencing behavioural change. We also recognise the important facilitation role local authorities can play in areas where they have less direct influence (e.g. developing district heating, approving applications for onshore wind generation, and encouraging reductions in electricity use).

Figure B2.1: UK greenhouse gas emissions under the influence of local authorities (2009)



Source: DECC (2009), Emissions under the influence of local authorities data sets; CCC analysis, NAEI (2011).

Notes: CCC bar: power sector emissions denoted in dotted lines to reflect less direct role by local authorities to reduce emissions; surface transport include all sources of emissions, including motorways; industry emissions are excluded.

Box 2.2: Variation in abatement potential by local authorities

Opportunities for local authorities to reduce greenhouse gas emissions in line with national trajectories to meet the first four carbon budgets will vary, depending on local factors and circumstances. For example:

- Abatement potential in residential buildings in a given local authority will depend on the age, quality and composition of its housing stock (e.g. the number of solid walls and the number of hard-to-treat properties), as well as action taken to date.
- Opportunities for reducing surface transport emissions through behaviour change are likely to be more limited in less densely populated areas where there is a heavy reliance on cars.

Identifying abatement opportunities at the local level will thus require local analysis (e.g. of housing stock and car trip patterns), building on existing data sets and national indicators.

An approach to determining abatement potential at the local authority level has been developed by the Centre for Low Carbon Futures (CLCF), which builds upon marginal abatement cost curves developed by the CCC and downscales abatement opportunities using local data on housing and transport.

Centre for Low Carbon Futures approach to determining abatement opportunities at the local level

- Data is extracted from the CCC marginal abatement cost curves, which are constructed from national data sets on the performance of low-carbon options for key sectors including residential and non residential buildings and surface transport.
- National data sets are adjusted for the scale of each sector within a local area (e.g. the total number of dwellings in the housing stock).
- The number of low-carbon measures already taken up within each sector in the local area (e.g. the number of houses with cavity wall insulation) are taken into account.
- The potential for further take-up of low-carbon measures within each sector in the local area (e.g. the number of houses that could have cavity wall insulation) is identified.

Table B2.2a provides a breakdown of the analysis conducted for the Leeds City region, comprising ten local authorities. It demonstrates variation in abatement potential at the local level, which reflects local factors and circumstances.

Key data sources (and limitations) for downscaling abatement potential at the local level include:

- **Residential sector.** The Home Energy Efficiency Database managed by the Energy Saving Trust provides data on the scale and composition of the housing stock (e.g. how many cavity walls filled under policies such as the Carbon Emission Reduction Target).
- **Non-residential.** Office of National Statistics data on floor space was used as a key indicator but limited data exists that takes into account variation in energy efficiency of buildings or scope to absorb low-carbon measures. Instead, national averages for abatement potential were used. CLCF note that better data from Energy Performance Certificates (EPCs) and Display Energy Certificates (DECs) would greatly improve the accuracy and reliability of the non-residential analysis.
- **Surface transport.** Data on the levels of vehicle ownership at the local authority level was used but data on the composition of the vehicle stock and the number of kilometres travelled only exists at the regional level. As no national data set exists for public transport and demand management options, these were generated at the city region scale.

While the CLCF approach has only been applied to some areas, there is potential for it or other similar approaches to be used more widely to identify local abatement opportunities and thus appropriate local levels of ambition for emissions reduction.

Table B2.2a: Leeds City Region emissions abatement potential by 2022 relative to 2010					
Area	Baseline trend (2010-2022)	Demand fall from price effects	Power decarbonisation	Cost-effective measures	Carbon reduction by 2022
Leeds City Region	14%	-13%	-12%	-15%	-26%
Barnsley	9%	-12%	-10%	-12%	-25%
Bradford	16%	-14%	-13%	-19%	-30%
Calderdale	16%	-13%	-11%	-17%	-25%
Craven	11%	-11%	-10%	-13%	-24%
Harrogate	13%	-12%	-10%	-12%	-20%
Kirklees	11%	-12%	-11%	-17%	-29%
Leeds	18%	-14%	-13%	-15%	-24%
Selby	9%	-12%	-9%	-10%	-23%
Wakefield	11%	-13%	-11%	-14%	-26%
York	15%	-13%	-14%	-14%	-26%
CCC economy-wide scenarios¹					-23%

Source: Centre for Low Carbon Futures (2012), 'Detecting Variations in Energy Efficiency and Small Scale Renewable Generation Performance and Potential at the Local Authority Level', CCC calculations;

¹ CCC Extended Ambition scenario. The methodology is close but not identical to that used by CLCF.

Potential for local authority influence: traded sector

Although policies for reducing power sector emissions are set at the national and European level, there is also potential for local authorities to contribute to power sector decarbonisation and reduced electricity consumption through:

- **Planning approval** for renewable projects. Approximately 10 gigawatts (GW) of additional onshore wind capacity is required in the UK by 2020 to meet renewable energy targets and carbon budgets, of which a significant proportion is likely to be at a scale requiring local planning approval. Although some of the required capacity has already received planning approval, further approvals are required. The associated emissions reduction from projects likely to require local approval is of the order of 1 to 2 MtCO₂ (i.e. comparable in size to insulating all lofts or all cavity walls in residential buildings).
- Involvement in low-carbon **decentralised energy** (e.g. city centre combined heat and power plants linked to district heating).
- **Encouraging reductions in electricity use** (e.g. information campaigns to raise awareness of the importance of buying more efficient domestic appliances).

In summary, there are significant reduction opportunities to reduce emissions at the local level (Table 2.1).

We now consider in more detail opportunities for local authorities to contribute to emissions reductions in these areas (i.e. buildings, surface transport, waste and power generation).

Table 2.1: Summary of sectors and greenhouse gas emissions under the influence of local authorities in the UK

	Sectors	MtCO ₂ e 1990 ¹	MtCO ₂ e 2010	MtCO ₂ e 2020	2010 change (on 1990)	2020 change (on 2010)	Local authority influence	
							Direct role	Leadership/ facilitation role
Traded sector	Power (including end-user electricity)	203	156	111	-23%	-29%	Low (community renewables)	Public support/ planning approval
	Industry, refineries & other energy supply CO ₂	95	81	92	-14%	+14%	n/a	Promoting district heating
	Domestic aviation	1	2	3	+31%	+61%	n/a	
	Total traded	300	239	206	-20%	-14%		
Non-traded sector	Residential buildings	79	87	58	+10%	-32%	High (e.g. Green Deal)	Awareness- raising
	Non-residential buildings	22	16	11	-27%	-31%	High (e.g. Green Deal)	Awareness- raising
	Surface transport	110	113	89	+3%	-21%	High (for sustainable travel measures)	Encouraging low-carbon vehicles
	Other transport/ services	13	12	13	-10%	+9%	n/a	n/a
	Waste (non-CO ₂) ²	52	16	20	-69%	+21%	High	Waste prevention
	Agriculture (non-CO ₂) & LULUCF ³	59	42	44	-29%	+4%	Low (own estate)	
	Other non-CO ₂	76	29	21	-62%	-28%	n/a	
	Industry, refineries & other energy supply CO ₂	63	35	26	-44%	-26%	n/a	Promoting district heating
	Total non-traded	474	350	282	-26%	-19%		
	Total UK emissions	774	589	488	-24%	-17%		

Source: NAEI (2012); CCC calculations under Extended Ambition scenario.

Notes: ¹The split between 1990 traded and non-traded emission does not exist prior to 2005 (e.g. pre-EU ETS) and has been estimated using current proportions of traded and non-traded sector emissions. ²Since publishing our December 2010 advice on the fourth carbon budget, the Government has updated historic and projected emissions for waste, which suggest that waste emissions will fall more quickly to 12.5 MtCO₂e in 2020, or a 20% reduction on 2010 levels (rather than increase as reflected above). We will reflect these changes in waste emissions in our 2012 progress report to Parliament and subsequent reports. ³Agriculture emissions are grouped with emissions arising from the Land Use, Land Use Change and Forestry sector.

3



3. Levers for local authorities to reduce emissions

In this chapter, we consider local authority policy levers to address emissions reduction potential in buildings, transport, waste and power generation. We consider the scope for reducing own estate emissions in Chapter 4.

(i) Reducing buildings emissions

There is scope for local authorities to contribute to buildings sector emissions reductions through programmes and measures to improve energy efficiency (in particular in the residential sector) and investment in district heating.

Reducing emissions from new homes

Up to 7 million new homes will be required over the next two decades in order to accommodate the expected growth in the number of households, with Government projections suggesting that the number of households could increase from 26 million to 33 million by 2030.

Building regulations set the minimum standards for the design and construction of new buildings (as well as extensions to existing buildings) in England, with energy efficiency standards dealt with under Part L of the regulations. Energy efficiency standards of new homes are being progressively tightened, and from 2016 all new homes will be required to be zero carbon (for emissions covered by the building regulations, i.e. arising from heating, fixed lighting, hot water and building services).

Local authorities have an important role in ensuring new housing is energy efficient through their functions of:

- **Development management.** Under the planning system, local authorities can prepare Local Development Plans which identify sites for specific land uses (e.g. new housing) and set out the criteria for approving planning applications. For example, a local authority can set energy efficiency standards for new homes that exceed current building regulations.
- **Building control.** To ensure compliance with the standards, local authorities, have a general duty to enforce building regulations. Where standards are not met, local authorities have powers to undertake enforcement action, which can result in prosecution.

Both roles require a well resourced and trained work force, which in the current context of local authority budget cuts may be difficult to sustain.

Reducing emissions from the existing housing stock

Due to the very slow turnover of stock, England's existing housing profile is relatively old, with around 38% of dwellings (or 8 million homes) built before 1945, of which almost 5 million were built before 1919. This makes it relatively energy inefficient compared to most of Europe, and although there have been some improvements in recent years, further progress is needed:

- Improved energy efficiency has increased the average SAP⁴ rating over time from 41 in 1996 to 54.5 by 2010.
- The social housing sector achieved the highest rating (of over 60) by 2010 (Figure 3.1). This higher rating reflects the younger age profile of the social housing sector (e.g. only a fifth of homes owned by local authorities were built before 1945 compared to over half of the private rented market), and local authority actions to improve energy efficiency for its tenants.
- However, given that the social housing sector (which also comprises housing association stock) only accounts for around 17% of all residential housing, and that SAP ratings are well below the average for new homes of around 80, there still remains significant scope to reduce emissions from the existing housing stock.

Going forward, the main opportunities for reducing emissions are insulation, boiler replacement, and more efficient appliances:

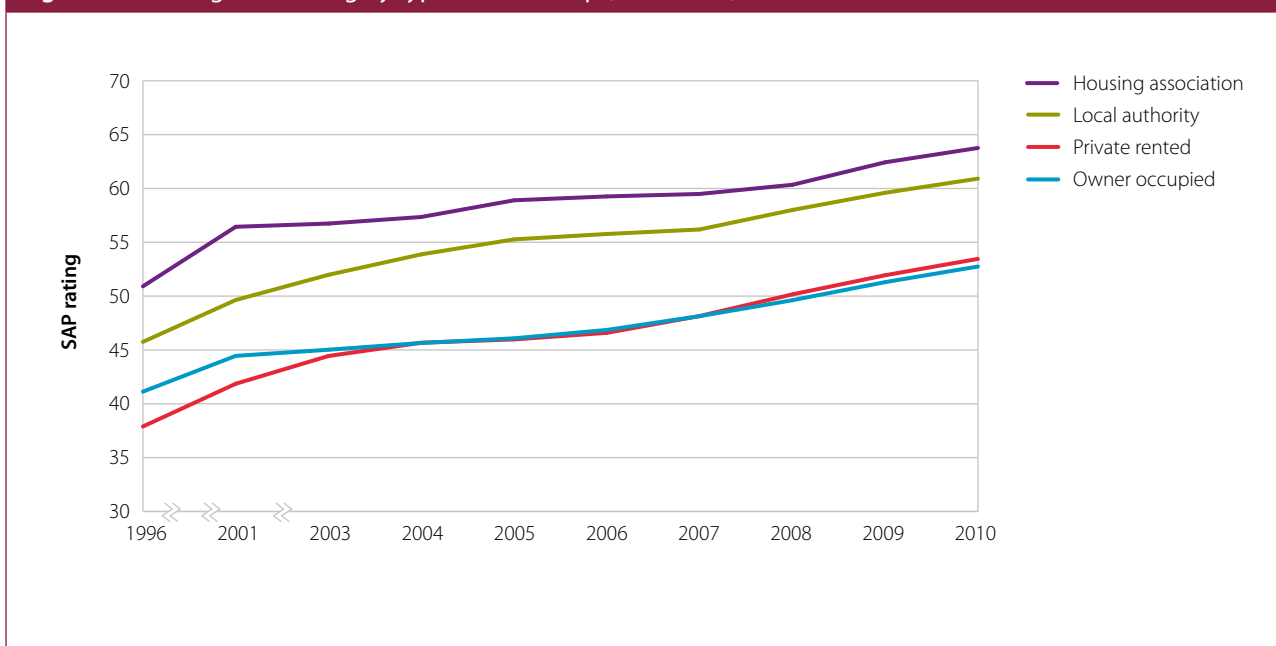
- **Insulation.** This improves the energy efficiency of the fabric of buildings, thereby reducing heat demand and energy bills for householders. Simple cost-effective measures include loft and cavity wall insulation, which offer scope to reduce emissions by 6% across the housing stock as a whole. Solid wall insulation is a more expensive and disruptive measure but could offer an additional 5% emission reduction in the residential sector.
- **Boiler replacement.** Building regulations require that when a boiler is replaced, it must be with an energy efficient condensing type. We estimate that between 2012 and 2020, 8 million boilers will be replaced. This could result in emissions reductions of around 6%.
- **More efficient appliances.** Buying more efficient domestic appliances (e.g. fridges and washing machines) and using these in an efficient manner (e.g. on the economy cycle for a washing machine) reduces demand for electricity. Together these measures offer scope for reducing indirect (i.e. electricity related) emissions from the residential sector by around 14% in 2020.

These opportunities offer benefits in terms of emissions reduction, improved energy affordability and the creation of local jobs:

- **Emissions reduction.** Implementing the above measures would reduce direct residential emissions by 23% and indirect emissions by 36% by 2020.

⁴ The Government's Standard Assessment Procedure (SAP) used to measure the energy efficiency of homes.

Figure 3.1: Average SAP rating by type of ownership (1996-2010)



Source: DCLG, 1996 to 2007: *English House Condition Survey*; 2008 onwards: *English Housing Survey*, dwelling sample.

- **Affordability.** Reduced energy demand will lower energy bills, which for vulnerable households can help to alleviate fuel poverty. Our energy bill analysis⁵ suggests that the implementation of energy efficiency measures together with boiler replacement can offset the additional costs associated with renewable power generation, such that typical household energy bills in 2020 remain at around current levels. Improved energy affordability can also deliver health benefits by reducing the risks of illness due to living in inadequately heated homes.
- **Local jobs.** Energy efficiency retrofit programmes can provide opportunities for the creation of local jobs (e.g. local installers of insulation measures) and wider economic regeneration. For example, in Kirklees a programme to insulate 51,000 homes has been estimated to have created almost 250 jobs.⁶

Within these opportunities, local authorities have least influence over the use of more efficient appliances given that policy is set at the national and European level (e.g. Eco-design of Energy Using Products Directive), but they can play a useful role as an information provider. They exert most influence over the implementation of insulation measures in the context of helping to implement national energy efficiency programmes, as well as enforcing energy efficiency standards in home extensions through building control.

⁵ Committee on Climate Change (2011) *Household energy bills – impacts of meeting carbon budgets*, <http://www.theccc.org.uk/reports/household-energy-bills>

⁶ Carbon Descent (2011). *Kirklees Warmzone Economic Impact Assessment*.

Energy efficiency programmes

Until the end of 2012, the main government policies for energy efficiency are the Carbon Emissions Reduction Target (CERT) and the Community Energy Savings Programme (CESP). Local authorities have played an important role in these programmes⁷:

- CERT offers made in conjunction with local authorities or endorsed by them represented one of the largest delivery routes for private householders.
- In many cases local authorities have been able to leverage CERT funding to support their own insulation schemes (e.g. Kirklees Warm Zone).
- In the delivery of CESP, local authorities and housing associations have been the key partners, driven largely by their role as social landlords.

From 2013, CERT and CESP will be replaced by the Green Deal and the Energy Company Obligation (ECO):

- **Green Deal.** This will provide finance for investment in energy efficiency measures at no up-front cost to the householder. Finance will be secured as a charge on the property to be repaid through the electricity bill over a period of up to 25 years.
- **Energy Company Obligation.** This is the new legal obligation on energy suppliers to deliver emissions reductions to vulnerable and low income groups, and through implementation of solid wall insulation more generally.

Under this new approach, local authorities could act as direct providers or partners to other Green Deal providers:

- **Provider.** The local authority would take the lead in delivering the Green Deal, procuring a partner to deliver the scheme and possibly raising finance. Birmingham City Council has opted for this approach, suggesting that this would best enable it to achieve objectives to create jobs, alleviate fuel poverty and improve health, while earning an income stream (Box 3.1).
- **Partner.** Delivery and finance of the scheme is undertaken by a commercial partner, with the local authority helping to deliver the scheme. For example, local authorities could coordinate different Green Deal providers in their area, raise awareness amongst consumers, offer joint branding and marketing, provide information about the local housing stock, and provide access to social housing.

⁷ DECC (2011) *Evaluation of the delivery and uptake of the Carbon Emissions Reduction Target*; DECC (2011) *Evaluation of the Community Energy Saving Programme*.

Box 3.1: Birmingham and the Green Deal

Birmingham City Council (BCC), the UK's largest local authority and social landlord, is set to become the country's first Green Deal provider with a plan to refurbish 200,000 properties by 2026, saving an estimated 260,000 tonnes of CO₂ annually. BCC recognizes that improving the energy efficiency of its housing stock is essential if it is to meet its wider target to reduce CO₂ emissions in the area by 60% by 2026 (against 1990 levels).

BCC considers that being a direct provider of the Green Deal will enable it to deliver strategic objectives beyond the reduction of carbon emissions that cannot be guaranteed by a private sector provider:

- Ensure coverage of those most in need and avoid potential cherry picking of customers that could occur if the deal is delivered by a private company. BCC would like take up to reflect the social circumstances of the city and wider West Midlands region (e.g. at 25% of households, the West Midlands has the highest fuel poverty rate of any region).
- Ensure the local area reaps the wider benefits in terms of job creation and re-investment of income.

Under the 'Pathfinder' programme, the first phase of the scheme will target the refurbishment of a minimum 15,000 properties by 2015 in Birmingham, and a further 45,000 properties across the West Midlands. The estimated average cost is put at £6,500 per property, with the local authority committing £75m of its own resources and a further £25m provided through the ECO. It is hoped that successful take-up of the scheme will attract private sector funding for the second phase, with the refurbishment of a further 45,000 properties in Birmingham and another 69,000 planned across the rest of the region.

Non-residential buildings will also benefit, although numbers will be limited to around 50 (mainly public buildings), in the first phase. In general, there is reluctance among some local authorities to invest in energy efficiency measures on their own estate, given the uncertainty as to whether these buildings could be sold off in the future (or schools become academies). However, for BCC the Green Deal provides a mechanism that will guarantee a return on investment given that the charge remains with the building irrespective of any change in ownership. The second phase to 2020 will extend coverage to small businesses which are considered to be highly energy inefficient, therefore offering the scope for quick returns.

However, there are currently a number of barriers for local authorities in fulfilling roles of provider or partner:

- **Consumer demand.** We have previously expressed concerns that under the current proposals, there is likely to be very limited uptake of loft and cavity wall insulation under the Green Deal. If this is the case, then the focus of local authority activity would have to be on solid wall insulation – where there is considerable uncertainty over scope for delivery given significant barriers to uptake – and implementation of measures in low-income households.
- **Funding.** Given current budget constraints, many local authorities lack the in-house staff and expertise required to prepare and execute plans to act as a Green Deal provider or partner. Adopting either of these roles could have significant resource requirements.

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- **Information.** Some local authorities have limited information about opportunities for energy efficiency improvement in the private housing sector, undermining their ability to design targeted schemes:
 - Targeting households that would most benefit from the scheme requires a good understanding of the local housing stock.
 - While local authorities hold good data on their own social housing stock, there is a large variation in the quality and quantity of private housing stock data held by local authorities (e.g. this has been identified as a barrier in the context of CESP implementation).
 - Although local authorities will in future have access to Energy Performance Certificates, these provide only limited coverage of the housing stock.

Given these barriers, local authority participation in the Green Deal entails a degree of risk:

- **Adoption risk.** A critical mass of uptake is required to make the scheme economically viable. However, many local authorities have expressed scepticism as to how they will be able to convince householders to take up Green Deal measures that are not “free” (e.g. are charged through energy bills):
 - Difficulties have been experienced in trying to give away measures for free under other schemes. For example, Greater Manchester’s ‘Get Toasty’ campaign offers free loft and cavity wall insulation, but to date has only achieved a 10% take-up rate of those householders requesting a survey since its launch in early 2011.
 - For solid wall insulation, a study⁸ by Element Energy for the CCC suggested that even if provided at no cost, solid wall insulation uptake would be no more than 47%.
 - Recognising this adoption risk, many local authorities are focusing, in the early stages, on public buildings and social housing to provide the scale needed. Others are looking to join forces with neighbouring local authorities in a regional consortium to share the risks and provide scale (e.g. a consortium of north east councils led by Newcastle will target 15,000 households over a three year period).
- **Financial risk.** Risk attached to take-up has implications for the financial risk of being a Green Deal provider. Local authorities will have to incur initial start-up costs (e.g. Birmingham City Council will invest about £1.5m for procurement and marketing) before a single householder has been signed up. Low take-up could severely impact the ability to recover these costs as well as discourage private sector investment to fund any extension to the scheme. Additional financial risks include the failure to procure a suitable private partner to deliver the scheme.

⁸ Element Energy (2009) *Uptake of energy efficiency in buildings*, report prepared for the UK Committee on Climate Change.

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- **Reputational risk.** Concerns also arise from the risk of attaching the local authority's name to a potentially unsatisfactory delivery partner (e.g. poor installation of insulation measures), thereby undermining the local authority's reputation within the local area. It is intended, however, that the accreditation system for installers will mitigate such risks.

There is scope to limit some of the risks through changing the design of the ECO such that this includes loft and cavity wall insulation in addition to solid wall insulation, and/or linking loft and cavity wall insulation with extensions and boiler replacements through the building regulations ("consequential improvements"). We recently made recommendations on this to Government⁹.

However, even with potentially higher levels of take-up, and given the current fiscal situation, further incentives for local authority participation may be required; we return to this issue in Chapter 6.

Other levers – enforcing energy efficiency standards and performance assessment

Outside of delivering and promoting energy efficiency programmes, local authorities have powers of enforcement with regards to energy efficiency standards for extensions to existing homes under the building regulations, and can require additional energy efficiency improvements for extensions requiring planning permission:

- Around 150,000 extensions are built every year – similar to the rate of new built properties.
- Under Part L of the building regulations, they have to meet high energy efficiency standards which are enforced by local authority building control officers.
- There is also scope for local authorities to require energy efficiency improvement in return for granting planning permission. For example, Uttlesford District Council in Essex has a requirement for homeowners being granted planning permission for home extensions to put in cost-effective energy efficiency measures in the house as a whole.

Additionally, local authorities have a role in enforcing Energy Performance Certificate (EPC) legislation. EPCs, which provide an assessment of the energy efficiency of a home, are mandatory on re-letting or a sale of a property, and compliance is carried out by local authority trading standard departments.

⁹ CCC (2012) Letter on proposals for the Green Deal/Energy Company Obligation, <http://www.theccc.org.uk/news/latest-news/1134-ccc-expresses-concern-about-green-deal-proposals-20-december-2011>. CCC (2012) Letter on changes to building regulations, http://hmccc.s3.amazonaws.com/AndrewStunellIMP_Letter190312.pdf

Reducing emissions from commercial and public buildings

Emissions from buildings in the commercial and public sector totalled 49 MtCO₂ and 18 MtCO₂ respectively in 2010, together accounting for 11% of economy-wide emissions. There is scope to reduce these emissions by 28% to 2020 through building fabric measures, efficient lighting and appliances, buildings energy management and renewable heat.

Much of the potential for emissions reduction is currently covered by the Carbon Reduction Commitment (CRC), which targets emissions reductions amongst the larger energy consumers. UK CRC emissions for commercial and public buildings totalled 57 MtCO₂ in 2010/22, with the commercial sector accounting for 83% of these emissions¹⁰.

To the extent that finance is a barrier to implementing measures in this sector, this should be addressed by the Green Deal, which will also cover the non-residential sector. However, lack of information and lack of financial incentives are likely to limit uptake even when Green Deal finance is available. This is likely to be particularly true for the SME sector, which is not covered by the CRC.

Therefore, there is a potentially important role for local authorities both in raising awareness of opportunities and delivering schemes directly (e.g. as in the case of Kirklees, Box 3.2, and as is planned in Birmingham, Box 3.1). In addition, local authorities could strengthen financial incentives through introducing differential business rates depending on energy efficiency performance, which would be allowed under the Localism Act.

Local authorities are also responsible for enforcing building regulations both for new and existing non-residential buildings. In the case of extensions for existing buildings exceeding 1,000 m², buildings regulations have a requirement for consequential improvements. Energy efficiency improvements have to be carried out to the whole building, up to a value of 10% of the value of the principal works and include measures such as boiler replacement or upgrading lighting.

¹⁰ Excludes 8% of CRC emissions allocated to light manufacturing sector.

Box 3.2: Micro-business grant scheme in Kirklees Council

Since April 2011, Kirklees Council (in conjunction with CO₂Sense) has been providing grants of up to £1,000 to local micro-businesses that employ 10 people or less to take up energy efficiency measures and renewable technologies. In Kirklees, it is estimated that 90% of all businesses are categorised as micro-businesses.

The scheme involves the provision of free on-site advice on low-carbon energy measures. To date, over 150 businesses have benefited, with more than 70 receiving a grant from an available fund of £67,000. Measures installed have included a wind turbine at a vineyard, solar panels at a community sports club and an energy efficient boiler at a print workshop.

Kirklees estimate that around 348 tCO₂ a year are being saved as a result of the new measures, while combined savings from reduced energy bills are put at £58,000 each year. Advice on waste disposal and water efficiency has also delivered additional carbon savings, while the scheme has generated business for the local supply chain.

Kirklees is looking to extend the scheme to larger businesses with up to 100 employees with the offer of a £2,000 grant, while larger businesses will be signposted to the CO₂Sense Resource Efficiency Voucher where more funding and advice will be made available.

Source: Kirklees Council

Investing in district heating

District heating is prevalent in many European cities, in particular in Scandinavia, Germany, Austria and Eastern Europe. In Sweden and Denmark district heating provides 40% and 60% respectively of total heat demand. In Germany, district heating supplies a lower percentage of heat (14%) but there are plans for a significant expansion as part of achieving Germany's climate change targets. Berlin has one of the largest district heating networks in Western Europe, with more than 1,500 km of pipes.

While much of this district heating has traditionally been supplied by fossil fuels, there has been a marked shift towards low-carbon heat generation. For example, biomass accounts for 62% of district heating fuel in Sweden and almost 40% in Denmark (Box 3.3). This trend is likely to continue into the future, for example in Denmark where the Danish Government recently announced that by 2035 all heat supply will be provided by renewable energy.

Box 3.3: Transition from fossil fuel to low-carbon district heating – examples from Scandinavia and Germany

The evolution of district heating in Scandinavia/Germany and the changes in fuel mix are exemplified by the following cities:

- **Malmö:** The 550 km district heating network – originally owned by the municipality and now by E.ON – supplies 95% of buildings in district heating areas. The fuel mix supporting the system has changed substantially since the 1950s, from oil and coal to energy-from-waste, surplus heat from industry, natural gas CHP and large biomass boilers. Approximately 65% of district heating is supplied from renewable sources.
- **Gothenburg:** The district heating network, owned by energy company Göteborg Energi, extends over a length of 700 km, and provides heating for more than 90% of all blocks of flats and commercial premises, and 20% of all houses. In 2008, the energy used for district heating output was 81% waste heat (including from refuse incineration, refineries and other industries), 15% renewables and 4% fossil fuel. Current plans include a major effort to produce biogas through the gasification of forestry waste.
- **Copenhagen:** The municipally-owned district heating system now covers more than 98% of heating demand in Copenhagen through a 1,500 km network supplied mainly by CHP plants and waste incineration. In 2008 the fuel mix in the heat production was 41% gas, 19% coal, 33% biomass and waste incineration, and 7% oil. Current plans include replacing coal with renewable energy.
- **Munich:** Owned by the local authority, Munich's 800 km district heating network supplies heat from gas-fired CHP (70%), coal-fired CHP and energy from waste. The network is being expanded by a further 100 km and by 2040 and aims to operate on 100% renewable sources (primarily geothermal heat, with some biogas).
- **Flensburg:** This German town on the border to Denmark has the highest connection rate to district heating anywhere, with 98% of buildings supplied with heat from the 80% efficient central CHP plant. Until 2007, the plant was exclusively coal-fired but is now co-firing with up to 25% waste-derived fuel and wood chips. The municipally-owned energy company has committed to switch the heat network to 100% renewable energy by 2050.

In the UK, although district heating has been used since the 1950s, it currently only provides a small proportion (approximately 2%) of total heat demand, with many schemes abandoned in favour of individual heating systems. Where it has succeeded, it has brought benefits of lower heating costs – reflecting the relatively high efficiency of CHP plants – and carbon savings, in particular where district heating has been supplied by low-carbon fuels or where it replaced electric heating (Box 3.4).

Box 3.4: Examples of district heating in the UK

In the UK, district heating has traditionally developed in clusters around specific local opportunities (e.g. geo-thermal or waste-to-energy), or drivers such as the alleviation of fuel poverty. Examples of established schemes include:

- Sheffield's 44 km district heating network (operated by Veolia on behalf of Sheffield City Council) provides 140 buildings (including the City Hall, universities, hospitals, flats and leisure facilities) with low-carbon heat generated by Sheffield's Energy Recovery Facility which converts 225,000 tonnes of waste into energy, producing up to 60 MWe of thermal energy and up to 19 MWe of electrical energy per year. The scheme saves an equivalent 21,000 plus tonnes of CO₂ each year¹.
- Aberdeen Heat & Power Ltd (set up by Aberdeen City Council) has developed a district heating scheme providing heat to approximately 1,200 flats as well as eight Council buildings, including a leisure centre, through gas-fired CHP in three energy centres. The scheme's benefits include reducing heating bills by 50% in multi-storey blocks where previously 70% of residents were fuel poor, and reducing carbon emissions by 45% due to the displacement of electric heating.
- Other established schemes include Birmingham, Leicester, Southampton and Nottingham.

In terms of development of new district heating capacity, the Greater London Authority (GLA) is pursuing a strategic approach consisting of:

- Identifying and developing opportunities (e.g. London Heat Map and capacity building in London Boroughs).
- Delivering district heating and CHP through planning (e.g. energy master planning for London's largest regeneration opportunity areas and London Plan's district heating policies. In 2010, the London Plan policies delivered a commitment for 27,000 new flats and 6 very large mixed use developments to be connected to 28 MWe of CHP capacity).
- Enabling commercialisation (e.g. using €3 million of European Investment Bank ELENA funding to support London Boroughs and others to bring projects to market, and providing financial support for energy from waste infrastructure with heat off-take).

This strategic approach is the result of analysis to inform the Mayor's target to deliver 25% of London energy from decentralised sources by 2025.

Other new schemes include those funded by the Homes and Communities Agency (HCA)'s Low Carbon Infrastructure Fund in 2009, which provided £26 million to 16 local authority-led projects in England. The first 13 projects evaluated by the HCA will deliver savings of 52,598 tonnes CO₂ per annum and connect 24,167 homes. The fund was oversubscribed by more than £50 million, showing an appetite among local authorities for developing district heating schemes.

¹ Combined Heat and Power Association (CHPA).

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In the future, given the need for early electricity sector decarbonisation to meet national carbon budgets, the appropriateness of increased district heating will depend crucially on the carbon intensity of the heat source. In particular, district heat based on gas-fired CHP is incompatible with meeting long-term emissions reduction targets. Therefore, the focus should be on low-carbon sources of heat, namely from bioenergy or waste heat from low-carbon power generation. There is a clear, albeit small-scale opportunity from the former, and a much larger (but more uncertain) opportunity from the latter:

- There is clear scope for district heating using local waste and local biomass for heat generation. However, the potential for this is limited, reflecting low levels of local bioenergy supply, and the high value placed elsewhere in the energy system on tradable bioenergy (e.g. energy-intensive industry, aviation, applications with carbon capture and storage (CCS)) as suggested by our 2011 Bioenergy Review. In our advice on the inclusion of international aviation and shipping in carbon budgets, we assumed only 10 TWh of locally-sourced bioenergy (e.g. municipal waste) could be available for district heating compared to 213 TWh of bioenergy resources available nationally.
- There is a much bigger opportunity for district heating using waste heat from thermal sources of low-carbon power generation (i.e. nuclear and CCS). We have published analysis suggesting that this could meet up to 40% of building heat demand in 2050. However, this is uncertain from technical, economic and public acceptability perspectives:
 - **Location of low-carbon heat supply.** New low-carbon power stations would need to be located within reasonable connection distances to thermal heat demand to avoid prohibitively long connections. However, public opposition may be a barrier to locating these close to centres of population.
 - **Demand uncertainty.** Investors may be averse to raising the high capital cost required for the installation of district heating unless there is a degree of certainty that sufficient heat demand will be connected once the network is in place.
 - **Transmission infrastructure.** Connecting clusters of heat demand to low-carbon heat supply requires significant roll-out of transmission pipelines for heat. This would be a challenge both in terms of the distances and the number of connections required in urban areas, requiring the digging up of many roads. Local opposition and planning constraints could therefore be a problem.

Further assessment is required before we can be confident that waste heat from thermal sources of power is a viable future source. Given these uncertainties, local authorities should focus their support on schemes using heat from local sources of bioenergy (especially waste) which are likely to remain available as bioenergy demand from other sectors increases over time. Investment in large-scale district heating schemes based on waste heat from low-carbon power generation may be appropriate if and when better evidence is available about costs and feasibility.

Where long-term potential for low-carbon district heating is identified, local authorities have an important role in supporting this, for example, through identifying opportunities, committing

to connect their own buildings and securing consumer support, approving schemes through planning, and possibly delivering or helping to deliver projects:

- **Identifying opportunities.** Local authorities are ideally placed to identify opportunities for district heating as they hold, or are able to collect, relevant data such as the energy demand of existing buildings and planned new developments, the distribution of existing or planned low-carbon energy sources and location of other relevant infrastructure. Local authorities can use the National Heat Map¹¹ (a comprehensive database of heat demand of buildings across England) as a starting point for a more detailed assessment of opportunities in their areas.
- **Developing schemes.** Local authorities can undertake options appraisals once opportunities have been identified, as well as feasibility studies to determine technical and economic viability of schemes. Local authorities can increase or even secure the viability of schemes by committing their own buildings and social housing as heat loads for new schemes, and promoting these to their partners.
- **Using the planning system.** Local authorities can use their planning function to require new developments (and in particular large regeneration projects with diverse heat loads) to incorporate new district heating networks or connect to existing schemes. The planning system can also be used to explore opportunities for new waste-to-energy facilities to be designed for heat off-take and located near heat loads.
- **Delivery.** Delivery options for district heating include private, public or hybrid Energy Service Companies (ESCos) as well as stakeholder-owned special purpose vehicles. If negotiating heat supply contracts with private sector ESCos for schemes based around public sector buildings, local authorities can ensure both affordability and carbon reduction objectives are part of the contract.

(ii) Reducing surface transport emissions

The main drivers of emissions reduction in surface transport will be improvements in the fuel and carbon efficiency of vehicles (i.e. which account for 80% of surface transport abatement potential identified in 2020 in our scenarios for decarbonising the transport sector). There are also opportunities to influence travel behaviour (20% of abatement potential) which can be effectively incentivised at the local level.

The key areas where local authorities can help to reduce surface transport emissions are through promoting sustainable travel and ensuring that new developments are designed in a way that minimises transport emissions. There are numerous local economic benefits to promoting sustainable travel, including reduced congestion and enabling better physical access to jobs and amenities. There are also potential health and social benefits from promoting cycling and walking as alternative modes to car travel (e.g. walking to school campaigns can improve physical activity in children, involve them in their local area, and increase levels of independence).

¹¹ DECC (2012) *National Heat Map*, <http://ceo.decc.gov.uk/nationalheatmap/>

There are also opportunities for local authorities to support the uptake of low-carbon vehicles, through installing charging infrastructure for electric vehicles, providing incentives for drivers (e.g. free parking and exemption from congestion charges), and leading by example through purchase of low-carbon vehicles (e.g. public buses and council vehicles).

Promoting sustainable travel through the roll-out of Smarter Choices and other measures

Evidence from sustainable travel town pilot projects suggests that there is a significant opportunity to reduce emissions and gain wider economic benefits (e.g. through reduced congestion and enabling better physical access to jobs and services) through sustainable travel programmes. This includes a range of measures (“Smarter Choices”) that promote voluntary reductions in levels of car use, achieved either through elimination of unnecessary trips, or through modal shift to public transport, walking or cycling:

- **Sustainable travel town pilots.** Evaluation of the Department for Transport (DfT) Sustainable Travel Pilot Towns of Peterborough, Darlington, and Worcester, as well as UKERC research, suggests that the implementation of Smarter Choices may offer significant emissions reduction potential by reducing total distance travelled by car (car driver distance fell by 5-7% in the Sustainable Travel Towns over the five-year period of analysis, Box 3.5).
- **National potential.** We have previously estimated that the successful implementation of Smarter Choices across the UK could reduce transport emissions by 3 MtCO₂ annually (i.e. around 5-7% of car emissions) by 2020.

Box 3.5: Smarter choices in Sustainable Travel Towns

DfT funded three Sustainable Travel Towns in Peterborough, Darlington and Worcester to assess the intensive implementation of packages of Smarter Choices measures. The three towns shared £10 million of DfT funding over the five years of the project (2004/05 – 2008/09).

The implementation packages comprised the following measures:

- Travel plans (workplace and school travel plans)
- Travel awareness promotion (personalised travel planning, public transport information and marketing and travel awareness campaigns)
- Car clubs

Evaluation results indicate that residents’ car driver trips of under 50 km fell by 9% per person, and that car driver distance fell by 5-7%, indicating a greater reduction in shorter car trips than in longer trips. The evaluation estimated a benefit-cost ratio of at least 4.5 (from reduced congestion alone) and possibly much greater if environmental, health and other benefits are also considered.

The evaluation report also notes that targeting of medium and long-distance journeys, and a more intensive focus on travel for work, could deliver further emissions reduction.

Source: Sloman et al (2010), *The Effects of Smarter Choices Programmes in the Sustainable Travel Towns*: Research Report.

Local authorities have the key role in implementing sustainable travel programmes, given their responsibility for local transport planning and the levers that they have to support this, including the requirement under the Transport Act to produce and maintain local travel plans. However, spending on such programmes has historically been very low.

Recently, however, the Government established a Local Sustainable Transport Fund, totalling £560 million and available over the period to 2014-15, which is supporting sustainable travel programmes across England:

- The fund challenges local authorities outside London to develop schemes that promote economic growth and reduce carbon emissions.
- The fund covers both revenue and capital spending, with the revenue funding covering traditional Smarter Choices measures (e.g. workplace and school travel plans and car clubs) and capital funding covering infrastructure and public transport services (such as improvements to bus corridors and stations).
- The first round of funding has been allocated to 39 projects (under £5 million each) which will promote sustainable travel in both rural and urban areas (e.g. support for cycling infrastructure in Birmingham, measures to reduce congestion related to school travel in the Tyne and Wear metro area, and programmes to reduce transport emissions arising from tourism in the Lake District).
- A second round of funding is due to be allocated in June 2012 to the remaining successful small projects and a number of large projects of up to £50 million.
- It will be important that the effects of the Local Sustainable Transport Fund on levels of car travel are fully evaluated to further improve the evidence base on the reduction in car travel delivered by different sustainable travel measures and support future decisions on the roll-out of such measures.

Our analysis suggests that current funding under the Local Sustainable Transport Fund is sufficient to support roll-out of Smarter Choices programmes to around half the country. To meet carbon budgets, this implies the need for additional funding to support full roll-out of Smarter Choices across the country and sustain emissions savings achieved through existing programmes. We return to potential funding sources (i.e. European, national, and local) in Chapter 5.

There are other opportunities for local authorities to reduce transport emissions through sustainable travel measures that can supplement Smarter Choices programmes. These include:

- **Public transport provision.** Providing greater and/or enhanced public transport services may also reduce car travel. The six passenger transport authorities have a particular role here. The two largest ones, Transport for London and Transport for Greater Manchester, operate integrated public transport services throughout the London and Manchester areas and are responsible for improving transport services and linkages. Manchester, for example, is involved in major ongoing extension of its Metrolink and expanding the length of its tram network as part of its climate change strategy. In the case of public buses, which are largely deregulated outside of London, there are examples of local authorities entering into partnerships with private bus operators to impose quality standards and/or requirements to reduce congestion in exchange for public investment in infrastructure to promote bus travel (e.g. stations and real-time travel information).
- **Local parking standards.** Nottingham City Council, for example, has recently introduced a workplace parking levy, which charges employers that provide workplace parking, to encourage modal shift in staff travel patterns.
- **Freight logistics.** Ensuring efficient forms of freight transport and delivery may be important to reduce emissions at the local authority level. Transport for London's London Freight Plan, for example, seeks strategies to reduce unnecessary freight journeys, shorten distance covered, and minimise empty running.

Although we have not looked in detail at the potential contribution of these measures, particularly in the case of public transport provision (which is likely to require significant amounts of capital funding), they are likely to be important in reducing transport emissions.

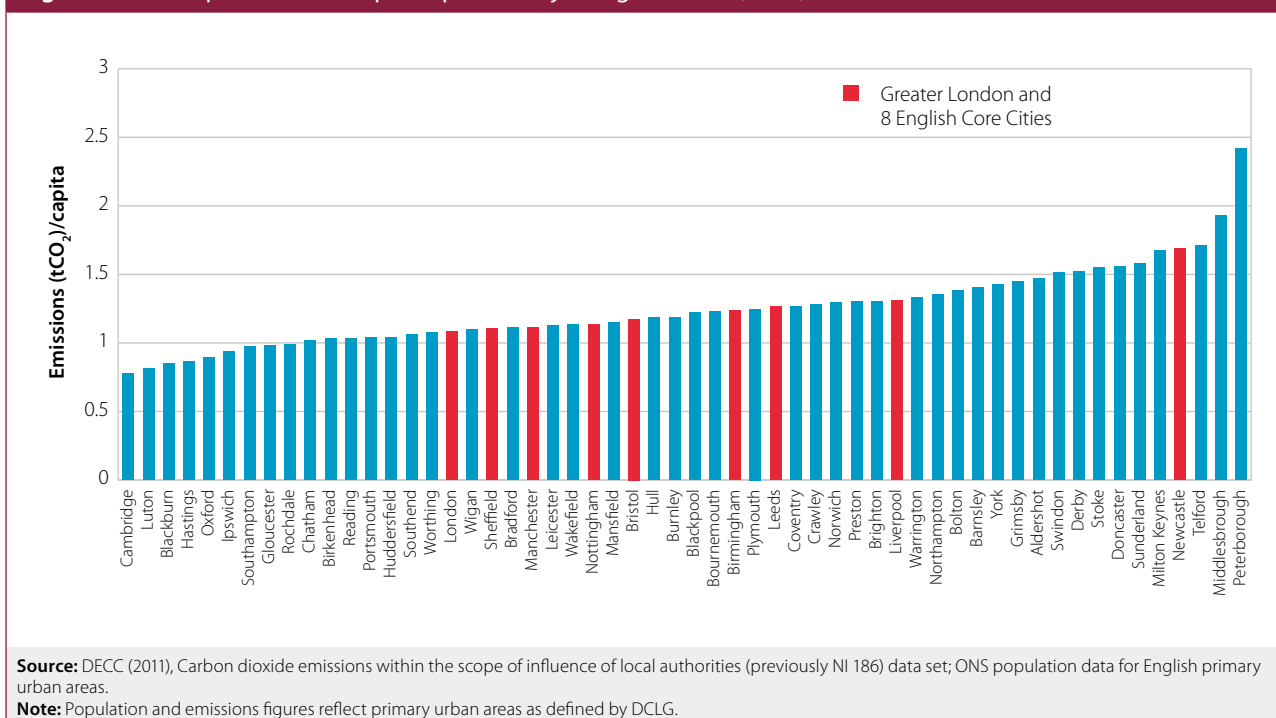
Planning and designing new developments

Land use planning has significant implications for transport emissions. In our 2009 progress report to Parliament we presented evidence suggesting that large and densely populated cities with more frequent bus services and homes in close proximity to bus stops and other amenities were associated with lower levels of car travel. This is apparent in transport emissions data for major English cities, which shows variation in transport emissions per capita (Figure 3.2).

We therefore proposed that planning and transport policy focusing on concentrating new developments within existing cities and large towns, and/or that are well served by public transport could result in significant emissions reductions. These planning provisions could reduce emissions by around 2 MtCO₂ by 2020 relative to a counterfactual where developments are out of town and result in increased car travel¹² (i.e. the emissions reduction opportunity is comparable in size to rolling out Smarter Choices across England).

¹² Committee on Climate Change (2009) *Meeting Carbon Budgets – the need for a step change*, First Progress Report to Parliament, Box 6.18.

Figure 3.2: Transport emissions per capita in major English cities (2009)



The opportunity to limit transport emissions through siting of new development is recognised in the recent National Planning Policy Framework (NPPF), which replaces previous planning policy documents. The NPPF recommends that new developments which generate significant movement should be located where the need to travel will be minimised (e.g. avoiding out of town retail developments) and where the use of sustainable transport modes can be maximised, to be demonstrated through a travel plan.

The new Community Infrastructure Levy, which enables local authorities to raise funds from developers undertaking new buildings projects in their area, could also be used to fund sustainable transport infrastructure.

How these new arrangements will work in practice remains to be seen, and should be closely monitored.

Promoting low-carbon vehicles

Increases in the efficiency of new conventional vehicles are likely to drive emissions reduction in the surface transport sector to 2020. In our scenarios for reducing surface transport emissions, new conventional vehicles contribute 40% of total abatement potential available in 2020.

Over the longer term, it is very likely that there will be a major role for electric vehicles in meeting carbon budgets and the 2050 target. For example, our scenarios for meeting the 2050 target indicate that up to 100% penetration of electric cars and vans could be required in 2050. This implies 100% penetration in new vehicle purchases in the second half of the 2030s, with progress towards this needed over the next two decades.

Local authorities can promote the uptake of more efficient new conventional vehicles and support development of electric vehicle markets in three key ways:

- **Rolling out electric vehicle charging infrastructure.** Analysis of trip patterns suggests that the vast majority of electric vehicle battery charging should occur overnight at home. Initially this is likely to be in houses with off-street parking (around 65% of English households), with new arrangements required over time to allow charging at locations such as workplaces and shopping centres, and at homes without access to off-street parking. To complement this approach, a limited network of fast charging points may be required, particularly to support early adoption by addressing range anxiety. Under the Government's Plugged in Places programme, investment in charging infrastructure is happening in six areas across England, including Greater London, Greater Manchester, and Milton Keynes (Box 3.6). There are also planning requirements for installing charging points in new developments (e.g. under the new NPPF).
- **Providing incentives for drivers of low-carbon vehicles.** There are opportunities to encourage take-up of electric vehicles and other low-emission conventional vehicles through providing priority parking spaces or free/reduced charge parking, use of dedicated lanes or bus lanes, and exemption from congestion charges and road pricing. There has been limited use of such policies by local authorities, although a number have introduced residential parking charges graded by carbon emissions.¹³ In the case of congestion charging, the experience in London with hybrid vehicles suggests that giving discounts for electric vehicles could be a powerful lever.
- **Public buses.** Local authorities can support the purchase of low-carbon buses, as is the case in London, where over 200 hybrid buses are in operation. Outside of London, the Government's Green Bus Fund (£75 million between 2009 and 2012) has provided support to local authorities and private bus companies across England to purchase 1,000 low-carbon buses (mostly diesel-electric hybrid but some battery electric buses), representing 2% of the public bus fleet.¹⁴ The aim of the programme is to demonstrate the financial, technical, and operational viability of hybrid electric and electric buses, with the longer-term goal to fully decarbonise public buses through use of hydrogen and electric buses.

There are also opportunities for local authorities to lead by example, through the use and purchase of electric and other low-carbon vehicles and by requiring external contractors to use low-carbon vehicles. Leeds City Council, for example, has purchased several diesel hybrid and a number of fully electric fleet vehicles (cars and small vans). Other local authorities, such as Middlesbrough, are considering promoting the use of electric vehicles in car clubs. In France, Paris has already gone a step further and launched an electric car rental scheme ('Autolib') in 2011, with 3,000 cars to be available by the end of 2012.

As in other areas where local authorities can play a role, further funding is required if the full potential is to be addressed.

¹³ RAC Foundation (2011) *Going Green: How local authorities can encourage the take-up of lower-carbon vehicles*.

¹⁴ Department for Transport (2011), *Annual Bus Statistics 2010/11*.

Box 3.6: Plugged in Places

The Government's Plugged in Places (PiPs) programme is providing £30 million in match funding between 2009 and 2013 to public-private partnerships to support the installation of battery charging infrastructure. The aim is to support the early market for electric vehicles and inform future infrastructure development by building an evidence base on how drivers use and recharge their electric vehicles.

There are eight PiPs which cover areas in the East of England, Greater Manchester, London, Midlands, Milton Keynes, Northeast, Northern Ireland and Scotland.

Under the various PiPs, approximately 5,000 charging points have been installed in streets, car parks, commercial, retail and leisure facilities as well in homes and workplaces across the UK. Private sector players have emerged and are offering membership schemes to EV owners that include home charging benefits as well as access to national networks of points (e.g. ChargeMaster's POLAR network of 4,000 public charging points).

Source London (operated by the Greater London Authority, Transport for London and approximately 30 partners) is rolling out charge points across London in supermarkets, streets, and car parks. In Milton Keynes, the council is offering parking free of charge to electric vehicle owners in designated spaces.

Although not a direct partner, Manchester City Council is working with the Greater Manchester PiP scheme to integrate recharging infrastructure with public transport.

The Government has also noted promising activity by local authorities and the private sector in areas not covered by PiPs (e.g. Brighton & Hove City Council has funded the installation of several charging points). Local authorities as well as private sector players are also currently exploring options for providing additional services to EV owners (e.g. free parking, discounted membership schemes, and provision of dedicated spaces), as well as promoting uptake of electric vans by businesses.

(iii) Reducing emissions from waste

Waste emissions, mostly methane (CH_4), have fallen by around 70% since 1990. This is mainly due to a reduction in biodegradable waste being sent to landfill in response to the landfill tax, which was introduced in 1996 to meet EU Landfill Directive targets:

- Diversion of waste from landfill accounts for around 95% of the waste emissions reduction between 1990 and 2010.
- Methane emissions arising today mainly reflect the slow decomposition of waste landfilled over the past few decades, as well as waste landfilled more recently.

Local authorities have statutory duties to collect residential waste and if requested, non-residential and commercial waste. The landfill tax imposed on landfill site operators is passed on to local authorities and ultimately to residents through council taxes, which has created incentives for local authorities to divert waste away from landfill:

- Waste has been diverted from landfill towards recycling (e.g. of paper and card), composting and anaerobic digestion (e.g. of food waste), and incineration with or without energy recovery.
- Of these, the majority of local authority collected waste has been diverted through increased recycling and composting.

In line with current and future targets under the EU Landfill Directive, the Government projects that waste emissions will be reduced by a further 20% by 2020 relative to 2010. As before, the key driver will be the further diversion of biodegradable waste from landfill.

Local authorities have an important role in ensuring that waste is reduced, diverted from landfill, and that this diverted waste is used appropriately (i.e. recycled or used to generate energy rather than simply incinerated). Reducing waste, providing for the separate collection for recycling and of food waste and supporting waste-to-energy schemes, can each offer economic benefits for local areas:

- **Waste prevention.** UK households threw away 7.2 million tonnes of food in 2010, of which 4.4 million tonnes (valued at £12 billion) was avoidable food waste (i.e. food that could have been eaten). The national mechanisms for reducing food waste include the Waste Reduction Action Programme (WRAP)'s Love Food Hate Waste campaign. This campaign has been implemented at the local level by more than 300 local authorities across England to help local residents reduce the amount of food they waste.¹⁵ The campaign has proved successful, with the food waste generated by English households falling by over 1 million tonnes between 2007 and 2010.¹⁶ In addition to delivering significant economic and sustainability benefits, evidence from WRAP suggests that food waste prevention can be more cost effective for local authorities than collection for composting or anaerobic digestion (AD).
- **Separate collection of waste for recycling.** Recycling rates for household waste in England have increased from around 10% to 40% over the last decade, with evidence suggesting that higher rates (up to 70%) may be possible.¹⁷ Local authorities have an important role in supporting this by ensuring separate collection of paper, glass, metal, and plastic, which they will be required to do by 2015 under amendments proposed by Defra to the Waste (England and Wales) Regulations 2011. With rising levels of landfill tax, recycling may also provide economic benefits for local authorities depending on the nature of their contracts with waste disposal companies.
- **Separate collection and treatment of food waste.** This is important in order to unlock the potential for composting or AD (e.g. our analysis suggests that there is scope for AD derived biogas to contribute 5% of heat supply in 2030). There is some limited evidence that introducing separate food waste collection also reduces overall food waste generated by households.¹⁸ Currently approximately 25% of English local authorities provide for separate collection of food waste, with a further 25% collecting food mixed in with garden waste. Although there are barriers to separate collection – including the existence of long-term contracts with waste disposal companies, difficulties in collecting food waste in multi-occupancy properties, and a lack of public support – there are examples where these have been successfully overcome (Box 3.7).
- **Waste-to-energy schemes.** These can be based on AD (e.g. converting food waste to biogas), pyrolysis (converting carbon containing wastes to gas and oil) or incineration with energy recovery. Although there is often public resistance to such schemes, which may be regarded as polluting and/or unsightly, some local authorities have supported them given the benefits in terms of low cost and low-carbon sources of energy (Box 3.8).

¹⁵ This includes road shows, cookery demonstrations and recipe competitions, working with community groups, housing associations and businesses.

¹⁶ WRAP (2011), *New estimates for household food and drink waste in the UK*, adjusted for the impacts of the recession.

¹⁷ Many EU countries currently recycle up to 65% of household waste; Scotland's Zero Waste Plan (2010) targets a 70% recycling rate by 2025.

¹⁸ WRAP (2009), *Evaluation of the WRAP Separate Food Waste Collection Trials*.

Although some local authorities have been pro-active in recycling and implementing energy from waste schemes, more is required in order to address the full potential from these activities. In some cases additional funding may be required to support waste prevention campaigns and new collection services. It is important to note that, unlike other sectors, actions taken by local authorities today to divert waste from landfill will impact emissions over the next two decades, due to the lag caused by the long life of rotting materials in landfill (e.g. paper takes 12 to 17 years to fully degrade).

Box 3.7: Barriers to food waste collection

Between 2007 and 2009 WRAP provided funding and technical support to 19 local authorities in England to carry out weekly food waste collection trials for processing at in-vessel composting AD digestion facilities. The trials were based on evidence by Eunomia (2007), which compared different approaches to managing household food and garden waste and concluded that separate food waste collection at kerbside on a weekly basis was the most cost-effective and environmentally-attractive option.

The participating local authorities represented a broad range of socio-demographics in order to determine how food waste collection schemes could work in both urban and rural areas and among different types of housing (including flats) and communities. The key factors impacting participation and collection rates in the trials included the frequency of collection, public perception issues and dwelling type:

- **Collection frequency.** Food waste collection was higher in the weekly trials in areas with fortnightly refuse collections than in areas with weekly refuse collections, suggesting that areas with weekly refuse collections may need to spend more on communication strategies to ensure sufficient participation rates and collection yields.
- **Public perception.** Concerns related to hygiene, odour and/or vermin were the most common reasons for residents not participating in the food waste collection trials. The perception of added 'hassle' (e.g. having to sort items in the kitchen, having an extra bin and needing to wash bins more often) was also cited as a key deterrent in additional surveys. However, only 6% of respondents taking part in the trials indicated that they had experienced any problems related to hygiene, odour or vermin issues. WRAP research suggests these concerns can be addressed through ensuring schemes are well-designed and communicated (e.g. introducing options to reduce hassle such as provision of kitchen caddies and liners to reduce spillage/minimise odour and through engaging in intensive public engagement).
- **Hard to reach properties/residents.** Participation rates were considerably lower in multi-occupancy properties relative to kerbside collection schemes. WRAP attributed this to several factors, including logistical problems in engaging with residents living in flats as well as lifestyles and transient nature of flat residents. The experience in trial local authorities with high proportions of communal flats (Newtownabbey, Royal Borough of Kingston-upon-Thames and the London Borough of Hackney) underscored the importance of establishing good working relationships with landlords and management agents and tailoring collection schemes to individual blocks of flats to increase participation and collection rates.

Other potential motivators for participating in food waste collection schemes include council tax rebates and/or compulsory food waste collection. For example, in Wales local authority recycling targets are statutory. Under the regulations, every council must hit progressively increasing rates of recycling or face a potential fine of up to £200 per tonne. Within this context, Cardiff led the UK in being the first city authority to introduce a weekly kerbside collection of food waste for every household in its aim to divert organic waste from landfill and now has recycling rates well above the UK average. The Coalition Government has committed in its 2011 Waste Policy Review, to explore further the role of incentives in reducing food waste in England.

Sources: WRAP (2009), *Evaluation of the WRAP Separate Food Waste Collection Trials*; WRAP (2009), *Food Waste Collection Guidance*; Brook Lyndhurst (2009), *Enhancing Participation in Kitchen Waste Collections*, Defra Waste & Resources Evidence Programme.

Box 3.8: Energy from waste and AD

Although just under 14% of local authority collected waste in England is currently used for energy recovery, a few local authorities, motivated by the increased landfill tax as well sustainability objectives, have been successful in promoting energy from waste facilities:

- **Leicester City Council** diverts food waste from 126,000 households to an AD plant. Facing difficulties with collecting food waste separately given its urban setting and limited pavement space for kerbside containers, Leicester separates wheelie bin waste into metals, organic waste, plastics/cardboards and unrecyclable waste streams. The organic fraction of waste is sent to a local AD plant. Leicester's collection scheme is funded through a public-private partnership.
- After exploring various waste disposal options, **Newcastle-under-Lyme Borough Council** opted divert its food waste to a newly constructed AD plant located on a nearby farm. The Council funded the new collection system via cost savings (e.g. by purchasing own vehicles instead of contracting them, moving residual waste to fortnightly collections, collecting garden waste and recycling on alternative weeks, and collecting food waste every week) and overall saved £200,000 from its waste collection budget. WRAP provided initial funding to cover the cost of providing households with kitchen caddies and kerbside bins.
- **Shropshire Council** worked in partnership with an energy company, supported with additional public funding, to construct an AD plant to treat kitchen and garden waste. The council consulted extensively with local communities and implemented appropriate management controls to address key concerns (e.g. odour abatement equipment).

Source: Local Government Association, Compare Renewables Case Studies, accessed at <http://www.idea.gov.uk/idk/core/page.do?pagelId=23211031>

(iv) Reducing emissions from power generation

Clearly the main driver of power sector emissions reductions will be national and EU level policies (i.e. Electricity Market Reform and the EU ETS). Within this, there is a supporting role for local authorities in granting planning approval for onshore wind projects, and working with developers to ensure that projects are designed to benefit local communities.

Onshore wind generation is potentially important in reducing the costs of meeting EU renewable energy targets and power sector decarbonisation. If investment in onshore wind were to be reduced, investment in other more expensive technologies (e.g. offshore wind) would have to be increased to meet these targets.

As noted in Chapter 2 above, it is likely that a significant proportion of additional onshore wind projects required to 2020 to meet renewable targets and carbon budgets will be at a scale requiring local planning approval (i.e. projects of a size below 50 MW).

This is a risk given that the planning approval rate for smaller projects in England has gradually fallen over the last few years, from 70% in 2007 to 63% in 2010 (by capacity), with a significant drop in 2011 (34% by capacity). The fall in local approval rates could be due to a number of factors, including uncertainty in the national planning framework, an increase in the number of applications, local opposition, and/or reductions in planning board capacity at the local level.

Going forward, the new NPPF requires that local planning authorities recognise the responsibility on all communities to contribute to energy generation from renewable or low-carbon sources and seek strategies that promote and maximise renewable energy development, identify areas suitable for renewable energy, and support community-led initiatives. In determining planning applications, this includes:

- not requiring applicants to demonstrate the overall need for renewable or low-carbon energy; and
- approving applications if impacts are (or can be made) acceptable.

Local authorities can further champion renewable energy generation within their communities through direct investment in projects (Box 3.9).

However, it is unclear whether local benefits from onshore wind investment (e.g. energy affordability, sharing of project benefits) will be sufficient to outweigh resistance, for example, from groups campaigning on grounds of visual impacts. Therefore, close monitoring and possible intervention will be required by the national Government to ensure that local level decisions are made in accordance with the NPPF and national priorities.

Box 3.9: Community benefits from local renewable energy generation

In England, community benefits from local renewable energy generation typically involve voluntary cash contributions made by developers to local authorities and/or community groups. There are also examples of communities owning shares of local projects and of local authorities championing projects through direct investment:

- **Section 106 agreements under the planning process.** Under Section 106 of the Town and Country Planning Act (1990), local planning authorities may enter into legally-binding agreements or planning obligations with a landowner in association with granting of planning permission. For example, the Coldham Wind Farm in Cambridgeshire makes Section 106 payments into a fund managed by Fenland District Council which is distributed towards local projects and regeneration.
- **Community funds.** Outside of the planning decision making process, developers can also establish community funds, designed as goodwill payments to benefit and compensate communities for the use of their local resources and the disruption and inconvenience associated with renewable energy development work.
 - Burton Latimer Council in Northamptonshire received a lump sum of £40,000 upon construction of 10 turbines (total capacity of 20 MW) and receives £10,000 each year over the life of the project.
 - Within England, developers have recently signed up to a Community Benefits Protocol to provide at least £1,000 per MW of installed capacity per year.
 - Outside of England, Highland Council in Scotland has established a Community Benefit concordant with developers of on and offshore renewable energy projects, which provides for payments of £5,000 per MW of installed capacity per year.
- **Direct investment.** Bristol City Council is developing wind turbines at Avonmouth with a combined capacity of 6 MW. The turbines will generate an estimated £1 million each year from Renewable Energy Certificates and electricity sales, profits of which will then be used to fund other sustainable energy projects in the area.
- **Community ownership:** A community led organisation raised near £250,000 from 75 individuals to construct a 225 kW wind turbine in Hockerton, Nottinghamshire. The electricity is sold to the grid and profits are reinvested in the local area.

Sources: Local Government Association, Compare Renewables Case Studies, accessed at <http://www.idea.gov.uk/idk/core/page.do?pagelId=23211031>; RenewableUK (2011), *A Community Commitment: The Benefits of Onshore Wind*.

4



4. Reducing emissions from local authorities' own estate and operations

It is important that local authorities act to reduce emissions from their own estate and operations. This is because taken together, local authorities can make a useful contribution to meeting carbon budgets, and there is scope for cost reduction through emissions reduction. In terms of the scale of emissions that local authorities are responsible for, the 153 local authorities captured by the CRC account for 5.8 MtCO₂ (1% of total UK greenhouse gas emissions) from their buildings and street lighting. There are also additional emissions from local authorities not included in the CRC, and from all local authority transport and procurement related activities. In reducing their emissions, local authorities can show leadership in order to legitimise their wider role in supporting local emissions reductions, while motivating residents and businesses in the area.

Own estate emissions come from buildings, street lighting, transport fleet and procurement:

- **Buildings.** As well as corporate offices (e.g. council offices and town halls), the local authority estate comprises a wide range of buildings with varying types of usage and energy demand (e.g. libraries, sports centres, crematoria and care homes). Schools make up a large proportion of buildings emissions, which can exceed 40% for many local authorities. This proportion could increase as higher pupil numbers, increased ICT use and greater use of the building outside of school hours, push up energy use.
- **Street lighting.** Although not required to do so, local authorities provide street lighting to help meet their duties to prevent crime and promote road safety within the local area. Street lighting accounts for a sizeable share of the local authorities own emissions (e.g. 18% of Leicestershire County Council's own estate emissions).
- **Transport.** Emissions arise from local authority staff commuting to work, staff using their own cars for business travel ('grey fleet') and the operation of own fleet to deliver local area services such as waste collection, parks maintenance and meals on wheels. Own fleet also includes non-road vehicles and plant (e.g. lawnmowers and hedge trimmers).
- **Procurement.** Indirect emissions arising from the procurement of products and services (e.g. IT equipment, electricity supply and construction materials) can be important. For example, it has been estimated that emissions associated with procurement for London's local authorities in 2009 reached 2.6 MtCO₂e (on a cradle-to-gate basis) compared to 1.15 MtCO₂e emitted by their own operations.¹⁹
 - On average, embodied emissions of London authorities were 337 tCO₂e for every million pounds of expenditure. Within this, almost 25% was accounted for by purchase of gas, electricity and water.
 - The variation of carbon intensity across different companies providing the same level of services and goods was greatest in catering, building construction materials and facilities and management services sectors.

¹⁹ Capital Ambition (2010) *Carbon footprint of London's local authority procurement*.

There is a set of opportunities for local authorities to reduce these emissions:

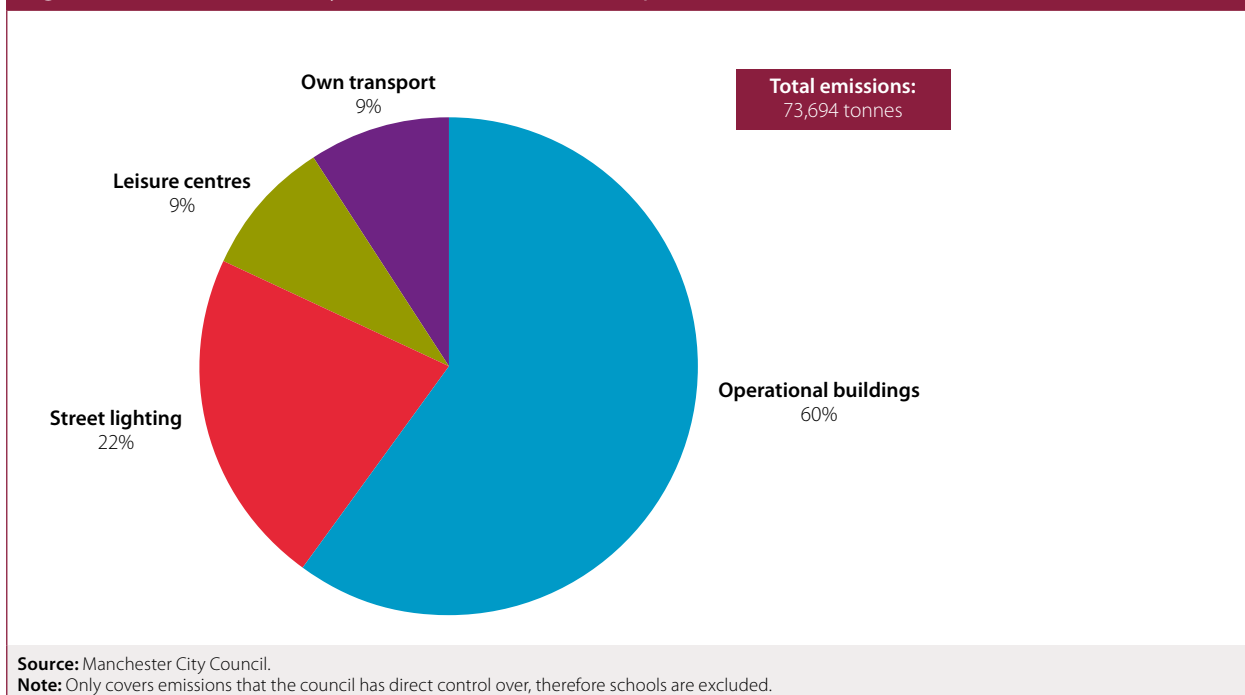
- **Buildings.** Opportunities to reduce emissions from buildings remain, for example through good housekeeping, improved insulation levels, and improved boiler/heating controls:
 - To date, the Carbon Trust Carbon Management Programme has supported 312 local authorities to reduce buildings emissions from their own estate, saving an estimated 3.2 MtCO₂ over the life time of the project with a four year pay-back period. Training and awareness raising programmes yielded the greatest carbon savings.
 - While the local authorities do not have direct control over the energy used in schools, they are responsible for their carbon footprint under the CRC. Therefore, it is in their interests to actively engage with schools to reduce their emissions as Manchester City Council is currently doing through the Sustainable Schools Working Group. For new buildings local authorities can stipulate very high standards that can exceed existing building regulations.
 - There is also potential for local authorities to take advantage of revenue streams arising from the feed-in tariff (FIT) and renewable heat incentive by the fitting of renewable energy and heat technologies to their estate. In Wales, for example, Wrexham Council could earn up to £1 million a year from the FIT for solar PV installed on 3,000 social housing properties and selected non-residential buildings.
- **Street lighting.** Emissions can be reduced through several options including the dimming of lights at night, switching off during certain hours and the use of low energy lighting (e.g. LEDs). Leicestershire County Council has been using some of these measures as part of a four year programme to cut emissions from street lighting by 25% (3,000 tCO₂ a year) by 2014.
- **Transport.** Local authorities can encourage staff to travel to work in a more sustainable manner through the use of pool cars, pool bicycles, installation of bicycle racks, and provision of on-site charging points for electric cars. In addition to reducing emissions, certain measures can also deliver co-benefits attached to having a healthier, more active workforce. For their own fleet, they can procure a low-carbon fleet, and use various measures (e.g. teleconferencing, route optimisation) to cut down mileage driven. For example, in Northumberland, route optimisation of the waste collection fleet is expected to reduce waste fleet emissions by 12% (equivalent to 198 tCO₂) when fully implemented.
- **Procurement.** Given the size of emissions associated with procurement, each local authority should develop a low-carbon procurement strategy that will allow it to identify the carbon footprint of its supply chain. By working with suppliers to understand, disclose and cut emissions this can significantly reduce indirect emissions from the purchase of goods and services.

Some local authorities have already set themselves ambitious emissions reductions. For example, Manchester City Council's 10 year delivery plan commits to a 41% CO₂ reduction by 2020 compared to 2005 levels (Box 4.1).

Box 4.1: Manchester City Council's ten year carbon reduction plan

Manchester City Council (MCC) has a ten year programme to reduce emissions from their own estate and operations by 41% by 2020 against levels in 2005, with an interim target of 20% by 2014. This mirrors the city-wide target. Emissions in 2010/11 totalled under 74,000 tCO₂, with operational buildings the largest contributor accounting for just over 60% of emissions (Figure B4.1). To meet the 2020 target, MCC produces a series of one year carbon reduction plans which focuses on activities where it has direct control or the greatest level of influence. A 6% reduction was achieved in 2010/11. Schools are targeted separately given MCC has less direct control over their emissions, although they are included in the council's footprint under the CRC.

Figure B4.1: Manchester City Council's own estate and operations emissions (2010/11)



Energy use in the council's own buildings has been identified as offering the most significant opportunity for emissions savings. This is to be achieved by:

- **Improvements to the estate.** An energy review of the full estate is underway to identify opportunities for major and minor building refit, which will enable MCC to retrofit groups of buildings at scale. Minor improvements are on-going and include voltage optimisation, new lighting, boiler upgrades, heating controls and smart meters. MCC is also looking to develop a number of renewable energy pilots which focus on solar PV and solar thermal.
- **Asset rationalisation.** Reducing the size of the authority's own estate through interventions including flexible working, co-location with partners and more efficient utilisation of space reduced buildings emissions by 2% and saved £166,214 in energy consumption costs in 2010/11 compared to the previous year.

Box 4.1: Manchester City Council's ten year carbon reduction plan

In terms of reducing emissions elsewhere in the authority:

- **Street lighting and signalling.** During 2010/11, the replacement of halogen bulbs with LEDs as part of junction upgrades will reduce emissions by 1.2%. Going forward, the installation of LEDs in to street lighting, bollard and sign illumination will be extended by Transport for Greater Manchester.
- **Transport.** MCC has introduced a range of interventions to cut emissions from staff travel, both in terms of travel during work time and commuting. For example, the waste collection service has been trialling low emissions vehicles and driver training. MCC-wide schemes includes use of a car club, pool bikes, cycle facilities and cheaper public transport season tickets to encourage modal shift. In terms of its own fleet, emissions during 2010/11, declined by 7% to 5,450 tCO₂.
- **Procurement.** As a significant procurer of goods and services (around £450 million each year), MCC developed a Sustainable Procurement Policy in 2009, which reflects its commitment to low-carbon and sustainable development. Work to calculate the embedded emissions related to procurement is ongoing, but with a large proportion of the procurement budget spent on suppliers within the Manchester area, a strategy to reduce these emissions will impact on wider local area emissions too. Action to date has included training council staff on sustainable procurement and carbon impacts, and the launch earlier this year of 'dCarbon North West', a one off project which worked with the top 1,000 suppliers to MCC and neighbouring North West councils to disclose their energy use and emissions online with free advice on action provided in return.

Drivers for further action here include political commitment to tackle climate change, cost savings from energy efficiency measures, financial and reputational incentives provided by the CRC, reporting requirements to national Government, and possible future EU energy efficiency legislation (Box 4.2). As for other areas discussed above, funding is a potential barrier to action, even for investments with very short pay-back periods, given the current very constrained funding situation. We consider the balance of these incentives and barriers in Chapter 6.

Box 4.2: Policy levers to cut own estate emissions

Local authorities are subject to levers that support emissions reductions on their own estate:

Carbon Reduction Commitment (CRC). The CRC is the biggest driver, particularly for those local authorities that had previously paid little attention to energy management and corresponding emissions. The scheme captures emissions (around 5.8 MtCO₂) from buildings (including state-funded schools and academies) and street lighting¹ from 153 English local authorities. There is a financial incentive to reduce emissions as participants will have to pay a tax on each tonne of CO₂ emitted. In addition, the publication of an annual league table should provide a reputational incentive to perform well.

Reporting requirements. In 2011, DECC requested local authorities to measure and make publicly available on an annual basis emissions data from their own estates and operations. The expectation is that central government and the LGA will further consider how the data can be used to help local authorities reduce their emissions. Despite this requirement, local authorities have noted that the reporting methodology allows significant variation as to what they include, which would make it difficult to compare performance. For example, the reporting of transport emissions from the 'grey fleet' and supply chain procurement emissions is discretionary. We therefore recommend that a consistent approach for reporting emissions is used, and that the requirement to report be made mandatory. This will provide a better understanding of the scale of emissions that occur on own estate and operations, and where the emissions reduction potential lies.

Display Energy Certificates (DECs). Under EU legislation (the Energy Performance of Buildings Directive), all public buildings with a floor space over 1,000 m² are required to display a DEC, which shows the actual energy use of the building and associated CO₂ emissions over a 12 month period. Although there is no requirement to improve the DEC rating, local authorities should look to take action where it is clear that a building has a poor rating.

Proposed EU Energy Efficiency Directive. The European Union (EU) has a target to save 20% of its primary energy consumption (against business as usual projections) by 2020 through improvements in energy efficiency. To ensure the target is met, the proposed Directive under Article 4 deals with Public Bodies. Proposals include:

- The annual renovation of 2.5% of the total floor area of buildings over 250m² owned by public bodies to meet at least the minimum energy performance requirements set in current building regulations.
- To establish and make publicly available an inventory of buildings owned by public bodies detailing the energy performance of each building.

Negotiations with Member States are continuing. We recommend that the Government should support the Directive.

¹ Currently, only street lighting with a dynamic supply is captured by the Carbon Reduction Commitment. The latest consultation (March 2012) on the Carbon Reduction Commitment is proposing to expand coverage to all unmetered supplies to include passive supply from the scheme's second phase.

5



5. Developing a low-carbon plan

We have considered whether local authorities should set (or be set) a carbon budget. We do not believe that this would be appropriate given the multiple drivers of emissions, many of which are beyond the control of local authorities (e.g. even in the non-traded sector, local authorities have only partial influence over drivers to reduce emissions from buildings and surface transport).

Instead, and given the crucial role identified for local authorities in delivering emissions reductions to meet national carbon budgets, we recommend that all areas should be covered by local carbon plans. In particular, we envisage low-carbon plans covering metropolitan and unitary areas, with further debate around whether low-carbon plans for two-tier shire areas would be most appropriate at the county or district level.

Low-carbon plans should include a high level of ambition for emissions reduction, and focus on emissions drivers over which local authorities have control or influence:

- **High-level ambition.** The emissions reduction ambition in a local authority plan should relate to the non-traded sector, and within that, to buildings, surface transport and waste. Our analysis suggests that on average a 20% emissions reduction in 2020 relative to 2010 levels (30% relative to 1990 levels) is both feasible and desirable across these sectors (see Chapter 2 above). This level should be taken as a starting point and then adjusted upwards or downwards according to specific local characteristics (e.g. age and quality of housing stock and action to date, see Box 2.2).
- **Emissions drivers.** The focus of a local authority low-carbon plan should be emissions drivers over which they have significant influence. In particular, the plan should be based on a subset of indicators for residential and non-residential buildings, surface transport, waste and own estate, from our national indicator framework, as well as additional indicators of relevance at the local level (Table 5.1). These indicators should be monitored at the local level to determine underlying progress in reducing emissions.
 - **Buildings indicators.** The relevant indicators for residential buildings are direct emissions, related energy consumption, and insulation of lofts, cavities and solid walls. In the non-residential sector, the relevant indicators are roll-out of EPCs to non-residential buildings, roll-out of DEC's to non-public and non-residential buildings, and a minimum EPC rating of F or higher in all non-residential buildings. To the extent that renewable heat is delivered under the Green Deal – this is yet to be determined – a renewable heat indicator (e.g. relating to installation of heat pumps, biomass boilers) would be appropriate.

- **Transport indicators.** The relevant indicators are surface transport emissions (in total and disaggregated to cars, vans and HGVs), car kilometres travelled, rolling out of Smarter Choices measures, and evidence of planning decisions being integrated with sustainable travel strategies (e.g. proportion of new retail floor space in town centre/edge of centre locations and ratio of parking spaces to new dwellings on an annual basis). Additional indicators (i.e. those not monitored in our national framework but of relevance to local authorities) could include public transport passenger miles and the number of electric vehicle battery charging points installed.
- **Waste indicators.** We will be formalising a national indicator framework for the waste sector in our 2012 progress report to Parliament. Potential indicators of relevance for local authorities to monitor are total waste collected and if possible, a breakdown of the composition of waste collected, the amount of waste diverted from landfill, recycling rates (and composition of recycled waste), the amount of food and garden waste collected, and the amount of waste diverted to energy from waste production.
- **Power indicators.** The relevant indicators are capacity entering planning and construction and planning approval rates. Other indicators of relevance could include community renewable energy projects.
- **Own estate indicators.** The relevant indicator for public sector buildings is a minimum EPC rating of F or higher. Local authorities' obligation to report to DECC their own emissions under the Single Data List requirement, and their obligation under the CRC, should aid data collection for their own buildings.

The LGA's forthcoming Climate Local initiative, which will include a step-by-step guide on reducing emissions and adapting to climate change, will also set out relevant indicators that local authorities can use to prioritise programmes and monitor progress (Box 6.1).

Operationalising these sets of indicators at the local level will require local analysis (e.g. of the housing stock and car trip patterns), building on existing data sets (e.g. the DECC local emissions data sets). Some large local authorities are already in a strong position to do this, having previously developed low-carbon plans (Box 5.1). For others, securing funding to collect data and monitor progress may prove challenging. Where possible, local emissions and energy use data should be improved such that local authorities can use them to monitor underlying progress and target areas for additional programmes (e.g. energy efficiency schemes for commercial buildings).

Given a set of indicators, the plan should include policy approaches and programmes to deliver emissions reductions (e.g. through the Green Deal and local sustainable travel programmes). A funding strategy for the various programmes in the low-carbon plan should be developed in parallel to the plan, including funding for project development (e.g. feasibility studies and business cases). Box 5.2 provides some examples of possible funding sources.

Finally, just as we monitor progress in reducing emissions and report back on this annually to Parliament, it will be important that local authorities put in place arrangements for closely monitoring the implementation of their low-carbon plans, with scope to change approaches as appropriate depending on progress made.

Table 5.1: The Committee's national indicators of relevance to monitor at the local authority level

	Budget 1	Budget 2	Budget 3	2010 trajectory	2010 outturn
Buildings indicators					
Residential buildings – supporting indicators					
Solid wall insulation (cumulative, million homes)	0.5	1.2	2.3	0.21	0.04
Loft insulation (<=100 mm) (cumulative, million homes)	2.3	5.6	5.6	1.6	All lofts: 2.9/1.6 (CERT)
Loft insulation (>100 mm) (cumulative, million homes)	2.0	4.9	4.9		
Cavity wall insulation (cumulative, million homes)	3.9	8.1	8.1	1.8	1.6
EE boilers (cumulative, million homes)	4.9	9.3	12.6	3.0	3.6
Uptake of EE appliances – Cold A++ rated (% of stock)	3%	18%	45%	0.9%	0.1%
Uptake of EE appliances – Wet A+ Rated (% of stock)	16%	40%	58%	9.5%	8.3%
Every house offered whole-house energy audit		by 2017		n/a	n/a
Non-residential buildings – supporting indicators					
Accelerate introduction of minimum standards for privately rented non-residential properties		By 2016			
Roll-out of DEC and EPCs to all non-residential buildings		By 2017			
Minimum EPC rating of F for all non-residential buildings			By 2020		
Surface transport indicators					
Headline indicators					
Emissions (% change on 2007)	-10%	-18%	-27%	-7%	-7%
Road Transport					
Car	-13%	-23%	-35%	-9%	-9%
Van	3%	4%	-2%	+3%	-5%
HGV	-4%	-13%	-17%	-3%	-6%
gCO ₂ /km (carbon intensity of a vehicle kilometre)					
Car	154	127	102	168	168
Van	216	192	164	236	219
HGV	761	678	619	795	837
Vehicle kilometres with impact of Smarter Choices (billion vehicle-km)	420	450	478	412	402

Table 5.1: The Committee's national indicators of relevance to monitor at the local authority level

	Budget 1	Budget 2	Budget 3	2010 trajectory	2010 outturn
Supporting indicators					
Vehicle technology					
New car gCO ₂ /km		146	116	95 (by 2020)	155.5
New electric cars registered each year (value at end of carbon budget period)	Car	12,000	240,000	600,000	4,866
Stock of battery electric and plug-in hybrid cars in vehicle fleet		24,000	650,000 (240,000 delivered through pilot projects in 2015)	2.7 million	4,720
Demand side measures					
Proportion of car drivers exceeding 70mph			0%	0%	n/a (2009: 51%)
Car drivers who have undergone eco driving training		1.2 million	2.8 million	4.5 million	590,000
Smarter Choices – demonstration in a city and development plan for roll-out if successful, demonstration in rural areas and demonstration targeting longer journeys		2010		n/a	n/a
Smarter Choices – phased roll-out to towns		2010		Complete	n/a
Development of integrated planning and transport strategy		2011		n/a	n/a
Other drivers for wider monitoring, including those of relevance to local authorities					
Fuel pump prices, fuel duty, proportion of small/medium/large cars, van and HGV kms (vehicle/tonne), Petrol/diesel consumption, surface transport modal split, average speed of car drivers exceeding 70mph					
Number of households and car ownership by household, cost of car travel vs. cost of public transport, funding allocated to and percentage of population covered by Smarter Choices initiatives, proportion of new retail floor space in town centre/edge of centre locations, Proportion of new dwellings in settlements >100,000 (% within boundary, on edge), Ratio of parking spaces to new dwellings on annual basis.					
Public transport passenger miles, number of electric vehicle charging points installed					

Table 5.1: The Committee's national indicators of relevance to monitor at the local authority level						
	Budget 1	Budget 2	Budget 3	2010 trajectory	2010 outturn	
Waste sector indicators						
Drivers, including those of relevance to local authorities						
Food waste thrown away (tonnes)						
Waste diverted from landfill (tonnes)						
Recycling rates						
Organic waste collected separately (tonnes)						
Waste diverted to energy from waste production (tonnes)						
Power sector indicators						
Supporting indicators						
Capacity entering planning (GW)	Onshore	New planning applications will be required from the end of the second budget period at the latest to maintain flow into construction			No trajectory	1.8
	Offshore	New planning applications will be expected in line with site leasing			No trajectory	0.0
Capacity entering construction (GW)	Onshore	0.9	1.3	1.5	0.8	Data not yet available
	Offshore	0.9	1.6	2.6	0.7	Data not yet available
Average planning period (months)		<12	<12	<12	< 12	18
Other drivers, including those of relevance to local authorities						
Total demand (TWh)						
Planning approval rates and frequency of public inquiries to decisions of Infrastructure Planning Commission						

Box 5.1: Progress to date with developing low-carbon plans

Many local authorities across England have already developed low-carbon plans which include emissions reductions targets. A recent report by Oxford Brookes University found that 65% of 52 of the largest 60 city authorities in the UK have developed climate change action plans that include mitigation and adaptation strategies and carbon reduction targets¹. Approximately 25% of these cities have developed specific low-carbon plans which identify emissions reductions in key areas of activities:

- Many of these plans include carbon reduction targets that cover emissions arising in their localities. Overall targets across all economic activities are more common than sector-specific targets, and these targets tend to vary in level of ambition.
- In cities where a plan and target were both present, the overall reduction in carbon emissions between 2005 and 2009 was higher than in cities without plans and targets.

Our own survey evidence found that progress has been made with developing and implementing low-carbon plans. However, the robustness of these plans varies greatly depending on the evidence base, as well as local authority resources and monitoring arrangements in place. The following are some examples of local authorities taking steps to develop evidence and indicator based low-carbon plans:

- 33 UK city authorities have signed up to the European Commission's Covenant of Mayors initiative and 20 of these have produced a sustainable energy plan. Signatory cities undertake a baseline emissions inventory to quantify and identify principal sources of emissions. They then produce a sustainable energy plan setting out how the authority will meet a minimum of 20% CO₂ reductions by 2020. The plan quantifies the measures needed in specific areas (e.g. the number of loft and cavity wall insulations in residential buildings) where the local authority has a specific role to play, and sets out timeframes, responsibilities and funding opportunities. Progress against the plan is reported every two years.
- Northumberland County Council (one of 12 local authorities in the North East of England to have signed the Covenant of Mayor) has quantified the measures that will need to be installed in housing and transport by 2020 to achieve its 20.5% reduction target based on a 2005 baseline (e.g. 3,200 solar thermal installation on housing in 2020 compared to 200 installed in 2010). The Council's climate change strategy 'The Heat is On' outlines mitigation and adaptation ambitions in a comprehensive county wide strategy which the Council are in the process of delivering (e.g. £50,000 has been secured in set-up costs for a cross-authority Green Deal delivery project).
- London Borough of Merton undertook a housing stock survey to define what national insulation targets (all lofts and cavities and 2 million solid walls to be insulated by 2020) mean for Merton. The survey found that in order for Merton to fulfil its share of the national target, the borough would have to fill 12,000 cavities, 26,000 loft top ups, 6,000 virgin lofts and 11,000 solid wall insulations by 2020. To date, only one house in the borough has had solid wall insulation installed.
- London Borough of Haringey's review of its transport strategy found that 19% reduction in transport emissions is achievable by 2020 – 14% could be delivered by EU, national policy and Transport for London, and 5% through local action (e.g. travel demand management and behaviour change, controlled parking zones, car clubs, charging point infrastructure and cycling measures). An additional 10% cut could potentially be achieved through measures including borough-wide personalised travel planning, Transport for London's hydrogen/hybrid low-carbon bus corridors, and efficient driver training.

These low-carbon plans show both the size of opportunity and the challenge local authorities face.

¹ Dixon, Tim (2011) *Hotting Up? An Analysis of Low carbon Plans and Strategies for UK Cities*, Volume 1: Main Findings.

Box 5.2: Funding sources/mechanisms local authorities can access to support low-carbon plans

Local authorities can access a range of funding sources for both developing and implementing low-carbon programmes, and fostering low-carbon economic growth. Examples include:

European:

- **Joint European Support for Sustainable Investment in City Areas (JESSICA).** Member States have the option of using structural funds to make repayable investments in projects such as urban infrastructure (transport, water/waste, energy) and energy efficiency improvements. These investments, which may take the form of equity, loans and/or guarantees, are delivered to projects via Urban Development Funds and, if required, Holding Funds.
- **European Local Energy Assistance (ELENA)** covers a share of the cost for technical support that is necessary to prepare, implement and finance an investment programme.

National:

- **Energy Company Obligation (ECO) and Green Deal.** The ECO requires energy companies to provide around £1.3 billion a year of support for energy efficiency in homes, with at least £540 million going to worst off homes. £200 million is being made available by Treasury to incentivise take-up of Green Deal in the first year.
- **Salix** is a not-for-profit company funded by DECC to provide funding for energy efficiency measures in public sector buildings. To date, through loans and grants, it has funded 8,400 projects, valued at £178 million, which will save the public sector £53 million annually and £700 million over the various project lifetimes.
- **Feed-in tariffs** provide payment per unit of renewable/low-carbon electricity generated and a further payment for each unit exported to the grid. Feed-in tariffs for some UK installations have recently been reduced, and will be regularly reviewed.

Regional:

- Local Enterprise Partnerships can bid to the **Regional Growth Fund (RGF)**, a £2.4 billion fund operating across England from 2011-12 to 2014-15. It supports projects and programmes that lever private sector investment to create economic growth and sustainable employment.

Local:

- **Revenue accounts** include income from local taxes (e.g. council tax), planning revenue streams (e.g. Community Infrastructure Levy) and central government grants. Recent reforms in council housing finance means local authorities can retain housing rent they collect and directly use it to maintain social homes.
- **Capital accounts** for acquisition or construction of physical assets. Many local authorities are currently considering asset sales as an additional source of funding.
- **Local authority borrowing.** Local authorities are able to finance capital spending by borrowing within set limits of affordability, for example through prudential borrowing. Local authorities are now also able to borrow against future growth in business rates to fund infrastructure.
- **Commercial and private sector funding**, including public-private partnerships and Energy Performance Contracts.

6



6. Incentives for local authority action and the role for national Government

There is an important question over whether incentives for local authority action to reduce emissions are sufficiently strong, given that a significant part of the benefit (in terms of reduced risk of climate change) occurs at national and international levels and in the longer term, and is therefore not visible at the local level in the near term. In answering this question, it is useful to distinguish between action which can be justified on the basis of near term local benefits, and action which relies on wider and longer-term benefits for its justification.

Action which can be justified in terms of near-term local benefit includes energy efficiency improvement, promotion of sustainable travel, and waste prevention and diversion from landfill; in each case there is a positive net benefit from action at the local level. Action where near-term local benefit is less likely to ensue is in supporting roll-out of electric vehicles and approval of onshore wind generation projects.

Therefore there are incentives to act in some but not all of the areas where we have identified an important role for local authority action. Some local authorities already intend to act in order to secure economic and social benefits. For example, the Core Cities (the Councils of England's eight largest city economies outside London), and the Greater London Authority appear to be strongly committed to low-carbon initiatives.

However, the Core Cities and London only account for 19% of emissions identified as under the influence of local authorities within England by DECC,²⁰ whereas to achieve carbon budgets action by all local authorities is needed.

Action planned in many of these authorities is limited given the current fiscal situation and the lack of a statutory obligation to act:

- Findings from a 2011 survey by the Green Alliance²¹ suggest that local efforts and actions on climate change have reduced significantly since the abolition of the national indicators, and are now very weak or absent in 65% of local authorities:
 - In 28% of local authorities the level of ambition has narrowed, for example with officers still working on areas like energy efficiency but not on wider climate change issues.
 - In the remaining 37%, climate change activity has either been de-prioritised or it was never a priority in the first place.

²⁰ DECC (2011), *Carbon dioxide emissions within the scope of influence of local authorities* (previously NI 186).

²¹ Green Alliance (2011) *Is localism delivering for climate change? Emerging responses from local authorities, local enterprise partnerships and neighbourhood plans*.

- Our own interviews with officers in a wide range of local authorities found that many have de-prioritised climate change and cut programmes and/or staff. The deepest cuts have happened where there is no strong political will, no strong community lobby and authorities are struggling to provide front line services. Those authorities that are still active have often narrowed their programmes (e.g. focusing on opportunities related to regeneration where funding is easier to access).

New initiatives such as the new Home Energy Conservation Act (HECA) guidance and the LGA's 'Climate Local' Initiative are useful but unlikely to fundamentally change this situation (Box 6.1):

- These initiatives are unfunded and provide only weak incentives for action.
- It is unlikely that they will change the situation for budget constrained local authorities who currently plan low or no action, and who instead will focus limited resources on providing core services.
- In the case of HECA guidance, this relates only to residential buildings and even here may provide only weak incentives to act.

Box 6.1 New climate change resources for local authorities

A number of new initiatives could encourage further action on carbon emissions and adaptation:

- **Home Energy Conservation Act (HECA) guidance**

Forthcoming revised guidance to HECA is expected to emphasise the useful role local authorities can play to drive and support delivery of energy efficiency programmes such as the Green Deal.

HECA came into force in 1995 and placed a statutory duty on local authorities to consider and report on energy efficiency in housing. However, progress under the Act was mixed due to the absence of enforcement powers and a standard methodology to report on improvements. Given its perceived failings, HECA was almost repealed but finally kept, with the decision to revise the guidance announced in 2011.

- **Local Government Association (LGA) 'Climate Local' initiative**

Climate Local is a new initiative designed to drive, inspire and support council action on climate change. It succeeds the Nottingham Declaration on Climate Change (signed by over 90% of local authorities) by offering a framework that reflects local priorities and opportunities for action. It will focus on councils' efforts to reduce carbon emissions and improve their resilience to the anticipated changes in the climate and will consist of:

- A Climate Local Commitment – a suite of commitments and actions for councils to voluntarily choose and sign up to in order to demonstrate their commitment to addressing climate change and challenge themselves to build on their existing achievements.
- A Council Framework on Climate Change – step-by-step guide on reducing emissions and adapting to climate change, including indicators local authorities can use to prioritise their programmes and monitor progress.
- Additional resources and support – new web-based resources, a new online community and opportunities for peer learning.
- A Climate Local Steering Group and Network – bringing together councils and national partners to help shape and drive the on-going development of Climate Local.

Two options to provide more confidence that local authorities will act are to increase national funding available for low-carbon activity at the local level and/or introduce a new statutory duty for local authorities to agree and implement climate change strategies:

- **Funding.** Additional funding could be provided at the national level to support local authorities to become Green Deal partners or providers; and for a comprehensive roll-out of sustainable travel programmes and electric vehicle charging networks.
- **Statutory duty.** A statutory duty to develop an area-wide low-carbon plan and report on its implementation would require prioritisation of low-carbon actions within existing local authority budgets, and ensure a more uniform approach to the contribution of local authorities to national carbon budgets across England. A similar statutory duty has been introduced in Scotland (covering all public bodies, not just local authorities) and evidence suggests that this is having a positive impact on climate change action in local authorities (Box 6.2).

Given the current situation where there is a high degree of risk around the delivery of local authority action on climate change, together with the key role for local authorities in delivering emissions reductions required to meet carbon budgets, we recommend that the Government reviews levels of support for local authorities, recognising their crucial role in delivering emission reductions, and examines the option of introducing a statutory obligation to develop area-wide low-carbon plans.

Box 6.2: Scotland's public bodies climate change duties

Scotland's Climate Change Act came in to force in August 2009, committing Scotland to a 42% reduction in GHG emissions by 2020 (from a 1990 baseline), annual reductions in emissions each year from 2010 – 2050, and to the development of a statutory programme on adaptation.

Part 4 of the Act places duties on public bodies relating to climate change. The duties (section 44) require that a public body must, in exercising its functions, act:

- in the way best calculated to contribute to delivery of the Act's emissions reduction targets;
- in the way best calculated to deliver any statutory adaptation programme; and
- in a way that it considers most sustainable.

The duties came in to force on 1 January 2011, and cover all 'public bodies', including all 32 of Scotland's local authorities. Guidance on how to put the duties in to practice was issued by the Scottish Government in February 2011.

In practice, there is evidence that the duties are helping to drive action in local authorities. It has helped to keep the momentum of the Act going, with many local authorities aligning their targets with the targets in the Act, and using the Scottish Government's strategy for meeting targets (Report on Proposals and Policies) as the basis for what action is required, and determining the council's potential contribution.

All 32 local authorities in Scotland are signatories to Scotland's Climate Change Declaration and for the reporting year 2010/11 for the first time all submitted an annual report under the Declaration. Additionally, all 32 local authorities also now have carbon management plans in place and all 32 have reported their corporate carbon baseline in the 2010/11 SCCD report.

The duty has also been helpful in encouraging action in wider public bodies. For example, South Ayrshire Council has successfully signed all 12 partners in its Community Planning Partnerships to the Climate Change Declaration, with commitments to prepare and publish low-carbon plans that set out targets, timescales and measures for reducing emissions, and work with local communities to take action to adapt to the impact of climate change.

Source: Scottish Government (2011), *Public bodies climate change duties: Putting them in to practice*

7



7. Local approaches to adapting to climate change

Opportunities for increasing local climate resilience

Even with strong action on mitigation, past and present emissions mean that some degree of climate change is inevitable. Climate change will have a range of impacts across the UK, from increases in summer temperatures to increased risks of flooding and drought. The 2012 UK Climate Change Risk Assessment (CCRA) provides the first comprehensive national-level assessment of potential risks and opportunities for the UK arising from climate change.

Adaptation to these impacts is context specific. Effective adaptation depends on who is adapting, where they are, their attitude to risk, and how they weigh up other factors in their decisions. Given their statutory duties and powers, local authorities have a crucial role in enabling their communities to manage risks from climate change effectively and harness any benefits. The strategic approaches they adopt will be strongly influenced by national policy.

This section of the report outlines some of the main opportunities local authorities have to increase resilience to climate change in their localities. It provides an overview of progress and some of the challenges local authorities face. This section reflects the Adaptation Sub-Committee (ASC)'s work to date in this area but is not a comprehensive review of local authorities' role in adaptation. The ASC will continue to build on this evidence base in forthcoming reports as it applies its assessment toolkit to different risks from the CCRA.

We have considered the roles that local authorities can play in each of the five areas identified by the ASC as priority sectors for adaptation effort (summarised in Table 7.1).

Table 7.1: Summary of how local authorities can increase climate resilience in their localities		
ASC priority area	Duties/Powers	Adaptation impact
Land use planning	<ul style="list-style-type: none"> Local Development Plans Development management Building control 	<ul style="list-style-type: none"> Steer developments to areas of lowest climate risk Increase green infrastructure Increase sustainable urban drainage
Designing and renovating building	<ul style="list-style-type: none"> Planning functions Strategic role in housing provision Owners of social housing (in some cases) 	<ul style="list-style-type: none"> Require resilience measures in new developments Retrofit own estates (including schools) and social housing Encourage others (private sector housing and businesses) to retrofit
Managing natural resources	<ul style="list-style-type: none"> Manage parks, public gardens, nature reserves, allotments, commons and ponds Duty to protect biodiversity 	<ul style="list-style-type: none"> Expand and improve ecological resilience of green spaces Make space for water along rivers and coasts
Providing infrastructure	<ul style="list-style-type: none"> Build and maintain non-trunk roads Provide bus shelters, street lighting, parking spaces Carry out works to manage flood risk from surface runoff and smaller water courses 	<ul style="list-style-type: none"> Resilient roads and road-related infrastructure Minimise damage to buildings and infrastructure from floods
Emergency planning	<ul style="list-style-type: none"> Emergency planning Flood risk management strategies Education and awareness Social and health care 	<ul style="list-style-type: none"> Prevent and respond to the impacts of extreme weather events Ensure business continuity and continuity of key public services Ensure most vulnerable sections of population are protected

Land use planning

From an adaptation perspective, land use planning is one of the most important functions delivered by local government. Planning decisions can directly help to increase resilience to climate risks, but can also lock future generations into a development pathway that increases vulnerability or one that will be very costly to maintain or reverse. By taking a strategic approach to land use planning local authorities can:

- **Minimise flood risk.** In line with the NPPF local authorities should avoid inappropriate development in areas at risk of flooding by directing it away from areas of highest risk. Where development is necessary, it should be made safe without increasing flood risk elsewhere. Local authorities should also reduce the risk from coastal change by avoiding inappropriate development in vulnerable areas.
- **Plan and deliver green infrastructure.** Green infrastructure is important because it can help to keep cities cool in the summer, provide drainage routes for surface water and provide pathways through the urban environment for biodiversity to migrate as the climate changes. According to the NPPF local authorities should take a strategic approach to planning for the creation, protection, enhancement and management of networks of biodiversity and green infrastructure.
- **Plan and deliver Sustainable Urban Drainage Systems (SuDS).** SuDS such as permeable surfaces, swales, wetlands and ponds can play an important role in managing local flood risk in urban areas since they replicate natural surface water drainage systems. The Flood and Water Management Act 2010 encourages the use of SuDS in new developments by making drainage system approval conditional on national standards for sustainable drainage. County and unitary local authorities are responsible for approving drainage systems, as well adopting and maintaining SuDS serving more than one property.

Providing infrastructure

Local authorities can ensure that infrastructure they are responsible for is resilient to changing climatic conditions and extreme weather. Examples include:

- **Resilient roads.** Local authorities are responsible for the construction and maintenance of non-trunk roads (representing 98% of all roads), street lighting and bus shelter. They can therefore include increased resilience to extreme weather events in their capital and maintenance programmes where it is cost effective to do so.
- **Flood defense infrastructure.** District, unitary authorities or internal drainage boards have powers to carry out works to prevent flooding from ordinary watercourses. The Flood and Water Management Act 2010 gives lead local flood authorities (unitary and county councils) powers to carry out works to manage flood risk from surface runoff and groundwater.

Designing and renovating buildings

Local authorities have a key role through their planning functions in ensuring new buildings are resilient to climate change. They can also promote the retrofit of resilience measures (e.g. door-guards, water efficient fittings and window shading) in existing buildings. Examples include:

- **New buildings.**

- Local authorities are responsible for enforcing national building regulations which require water consumption in new homes to be less than 125 litres per person per day. Local authorities can set policies in Local Development Plans for water efficiency targets in excess of building regulations, provided there is local need.
- Overheating can be addressed through requirements in Local Development Plans, for example to reduce the amount of heat entering a building in summer through orientation, shading, fenestration and passive/mechanical cooling systems.
- Property level measures to increase resilience to flooding should be required for new developments in flood risk locations in local plans (see above).

- **Existing buildings.**

- **Own estate.** Local authorities can lead by example to increase the resilience of their own offices and civic buildings. This is particularly important for schools whose vulnerability can cause widespread disruption, as was the case in 2007 in Hull where flooding led to the closure of 91 schools.
- **Housing.** Local authorities in England own approximately 2 million dwellings and generally have close relationships with Registered Social Landlords. As such, they can consider including resilience measures in their regular housing renewal programmes. In private sector housing, local authorities can include resilience measures in energy efficiency schemes they either run directly or in partnership with energy suppliers. In London, the Mayor's retrofit scheme RE: NEW provides free, easy to install energy efficiency and water saving measures, as well as energy and water saving advice, to all housing types in eligible areas.
- **Businesses.** Local authorities can produce guidance for businesses in their areas on the risks they face from climate change and the measures they can take (e.g. retrofitting their premises). The West Midlands Climate Change Partnership's practical guide for small businesses provides advice, case studies and checklists to help businesses adapt and save money.

Managing natural resources

Local authorities have duties to further the conservation and enhancement of Sites of Specific Scientific Interest, have regard to the conservation of biodiversity in exercising their functions and report introduced species. They also have responsibilities for managing parks, public gardens and other green spaces. They can use these existing functions to:

- **Improve and extend ecological networks.** Local authorities can identify opportunities to extend and increase the connectivity of ecological networks so that species can adapt and move as the climate changes. Local authorities can also improve the ecological resilience of green spaces they manage by planting trees and plants suitable to a changing climate.
- **Make space for water in urban areas and along rivers and coasts.** Local authorities can play a role in alleviating flooding and increasing biodiversity through the way they manage parks, countryside and other green spaces under their control. For example, North Yorkshire County Council and Selby District Council identified a low lying areas of woodland as suitable for water storage to attenuate flooding from nearby watercourses, and proceeded with engineering works, including creating ponds and blocking drains, to restore 30 hectares to wet woodland habitat with benefits for biodiversity and flood attenuation.

Emergency planning

Under the Civil Contingencies Act 2004, local authorities have a number of duties regarding civil protection such as putting in place emergency plans and business continuity management arrangements, informing and advising the public in the event of an emergency, and co-operating with other local responders.

The Health and Social Care Act 2012 introduced new public health functions for local authorities. Every upper tier and unitary local authority in England has a new duty to take such steps as it considers appropriate for improving the health of the people in its area. Local authorities will be responsible for commissioning a range of services and initiatives, including ones to reduce excess deaths as a result of seasonal mortality, deal with health protection incidents, outbreaks and emergencies, and reduce public health impacts of environmental risks.

Progress and challenges in preparing for climate change

Adaptation to climate change builds on action local authorities and other public agencies are already undertaking to deal with current-day climate risks. Local authorities have made some progress on adapting to climate change, receiving support in some cases from national bodies such as UK Climate Impacts Programme (UKCIP), the Environment Agency and Natural England as well as the Regional Climate Change Partnerships.

Many local authorities have undertaken assessments to understand their localities' vulnerabilities to current climate. Over 100 local authorities for example have used a Local Climate Impacts Profile (LCLIP), a tool developed by UKCIP to collect information on severe past weather events and how these have affected local communities, local authority assets, infrastructure and capacity to deliver services (over half of these LCLIPs were undertaken at district level). Some local authorities have gone beyond LCLIPs to carry out comprehensive climate change risk assessments.

In terms of adaptation strategies and plans, 65% of 52 of the UK's 60 largest cities recently surveyed²² have a climate change plan covering both mitigation and adaptation at the city level, with adaptation measures fairly evenly split with mitigation measures.

The Environment Agency, UKCIP, Regional Climate Change Partnerships and LGA have published case studies of local authorities who have successfully integrated climate risk into the design of services, raised awareness of climate change impacts among local communities and businesses, secured green infrastructure and SuDS through the planning process and upgraded flood defences among other activities. Box 7.1 provides some examples of local authority action on adaptation.

²² Dixon, Tim (2011) *Hotting Up? An Analysis of Low carbon Plans and Strategies for UK Cities*, Volume 1: Main Findings.

Box 7.1: Examples of local authority action on adaptation

The following are some examples of local authorities' approaches, policies and projects that build their areas' resilience to climate change:

Assessing and addressing vulnerability in public services

- Kent County Council and partners have developed a Severe Weather Impacts Monitoring System (SWIMS). This online system allows the County Council, the police, district and borough councils and Environment Agency to record how their services have been affected by severe weather events and their response, both immediate and longer-term. The system is intended to help partners assess vulnerability, develop business cases and identify opportunities for joint working.

Managing flood risk

- Sheffield City Council combined developer contributions with Council-owned open space land to regenerate the Manor Fields Park areas and provide a sustainable drainage system for an adjacent new housing development of 300 dwellings. The system manages the development's runoff as well as reducing flood risk, performing well during 2007 storms. The project also led to improved landscaping, the creation of recreational space and enhanced ecosystem.¹
- West Sussex County Council is addressing its flood risk management responsibilities in the following ways:
 - providing support and some funding for coastal protection works by the district and borough councils, and partly fund the Environment Agency's flood risk management works on the county's rivers and coastlines.
 - developing a Local Flood Risk Assessment Strategy – drawing on a preliminary assessment of flooding risk from ordinary water courses, surface water and groundwater – to appraise all sites at risk of flooding, develop an action plan and divide responsibility for implementation between the district, borough councils and other relevant bodies. At an operational level, the county's highway department has been identifying sites at risk from surface water flooding and improving land drainage as part of its highways maintenance programme.

Resilient new buildings

- South Wiltshire Council requires in the Core Strategy of its Local Development Framework that all new residential developments in the River Avon Special Area of Conservation incorporate water efficiency measures to a minimum standard equivalent to Level 3 of the Code for Sustainable Homes. This translates to 105 litres per person per day.
- London Borough of Islington's green roof planning policy – supported by a good practice guide on green roofs and walls – has resulted in 88% of major applications approved in 2010/11 incorporating extensive green roofs, equating to approximately 8,000 m². The borough conditions green roof specifications to ensure they maximises benefits for biodiversity and water runoff. The borough also analyses all major planning application for risk of overheating, and is consulting on a policy requiring major development to incorporate SuDS designed to reduce flows to a 'greenfield rate' of run-off (8 litres/second/hectare) where feasible.

Improving and extending ecological networks

- Red Rose Forest is a partnership between six local authorities (Manchester, Trafford, Salford, Wigan, Bolton and Bury) and two national agencies (Natural England and Forestry Commission) that since 1992 has planted over 1,500 hectares of new woodland and approximately 4,000 street trees. Woodland planting mixes are being modified to include more climate resilient species such as beech, while street trees are targeted where they can bring the greatest benefits for reducing maximum summer temperatures and helping reduce flooding. This green infrastructure planning is being informed by the Greater Manchester tree audit, the most comprehensive canopy survey in the UK.

Coping with extreme weather events

- Flooding in Cumbria in 2009 caused damage and destruction to homes, businesses, bridges, roads, farms and the rural landscape. The response of the emergency services to the floods was considered effective and efficient. One of the reasons for this was the significant effort by public bodies to build community resilience across the county. Research just prior to the floods showed that the county council's publicity campaign had seen the proportion of people who felt informed about what to do in the event of an emergency rise from 22% to 38% in less than a year.

¹ Local Government Association (2011), *Winning solutions for adapting to severe weather*.

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The ASC has highlighted the need for further progress in its first two reports on preparing for climate change. At the local level, local authorities may have limited capacity and insufficient information to fulfil their role, and may not be attaching appropriate weight to climate change risk in their decision making processes:

- **Capacity.** The ASC's first report (2010) found that local authorities had started to work on adaptation in part due to the reporting requirements under the national indicators framework (see Chapter 1). Some examples of good practice had emerged but overall capacity remained low.²³ Since 2010, the loss of NI188 on adapting to climate change, as well as local authority funding cuts may have further reduced local authority capacity to act on adaptation.²⁴
- **Information.** Information on climate change risks across a range of sectors is now available at the national level in the UK CCRA. The nine Climate Change Partnerships have produced regional summaries of risks from the CCRA that are of greatest significance to local authorities. Further work to ascertain how the national-scale data in the CCRA can be translated robustly into local climate information would be valuable, given the difficulties of downscaling climate projections to the local authority level.
- **Decision-making.** Evidence from the ASC's second report (2011) suggested local authorities were not giving climate risk sufficient weight in their long-term decision-making compared to other priorities, particularly with regards to land use planning decisions. Our work found little evidence that the social and economic benefits from development in climate risk areas were being explicitly and openly weighed up against the long-term costs of climate impacts and the legacy of maintaining defences.
- **Cooperation.** Some adaptation measures (e.g. catchment shoreline management plans) need to be implemented across local authorities' administrative boundaries. Public bodies have a duty to co-operate on planning issues, particularly those that relate to the strategic priorities for Local Development Plans set out in the NPPF, including mitigation and adaptation. It will be important that as local authorities begin to exercise this duty as part of their plan making function, they apply it to address climate change risks that cross administrative boundaries. The Flood and Water Management Act 2010 already requires relevant authorities to co-operate with each other in exercising functions under the Act.

²³ In 2008-2009 (the first year of reporting on National Indicator 188) just over half of authorities were at level Zero (Getting Started) with 6% of authorities at Level 2 (Comprehensive Risk Assessment). Capacity had grown by 2010, with 45% of authorities at Level 2. However, only 7% reported that they have a plan to reduce climate risk (level 3), and none had started to implement their plans (Level 4). Committee on Climate Change (2010), *How well prepared is the UK for climate change?*

²⁴ UKCIP's 2010 survey 'Adapting to the new policy landscape' found that out of 100 local authority respondents, almost 40% expected that their authorities would do less, or no, work on adaptation in the absence of the requirement to report against NI188.

In the future, the LGA's Climate Local initiative (Box 6.1) will provide local authorities with useful guidance on both mitigation and adaptation, including a set of local level adaptation indicators (based on the ASC's national indicator framework) which local authorities can use to monitor programmes.

In addition, the Environment Agency's enhanced role as the delivery body for climate change adaptation in England will directly support local authorities build their capacity to manage climate risks, establish business cases for action and provide them with practical advice and guidance. Specific ways in which the Environment Agency could support local authorities include for example: providing evidence of local climate impacts in formats useful to local authorities, increasing their capacity for risk assessment of these impacts, and giving more guidance to local authorities on embedding adaptation into current plans.

The ASC will continue to consider these questions and provide advice to the Government in its annual reports on progress in preparing for climate change, and on specific issues for the National Adaptation Programme. For example, the next progress report of the ASC will consider adaption to flood risk and water supply risk in detail, including potential roles for local authorities in managing these risks. In the future the ASC will also provide advice on the second round of adaptation reporting powers, including scope and focus.



8. Conclusions and recommendations

Low-carbon opportunities and benefits

In this report we have identified important roles for local authorities to reduce emissions from buildings, transport, waste, power and from their own estate, and in adapting to climate change impacts:

- **Buildings.** There is scope for local authorities to contribute to residential and non-residential sector emissions reductions through programmes to improve energy efficiency and investment in district heating. The key lever will be the Green Deal. The national potential for emissions reduction from buildings is 30% in 2020 relative to 2010.
- **Transport.** Local authorities can help reduce surface transport emissions through promoting sustainable travel and ensuring that new developments are designed to reduce transport emissions. Local authorities can also play an important role in facilitating uptake of low-carbon vehicles, for example through installing charging infrastructure. Transport emissions can be reduced 20% relative to 2010 levels by 2020.
- **Waste.** Strong national policies in the form of the landfill tax have driven waste emissions down 70% relative to 1990 levels. Local authorities have an important role to play in contributing to further emissions reductions through providing for increased recycling and separate collection of food waste, as well as promoting waste to energy schemes. Waste emissions could be reduced to a level in 2020 that is 20% below 2010 levels.
- **Power.** There is an opportunity for local authorities to support power sector decarbonisation through the granting of planning approval to onshore wind generation projects. A significant proportion of onshore wind projects required to meet 2020 renewable energy targets and carbon budgets are likely to go through local planning processes. It will be important that future planning decisions at the local level objectively balance national priorities with local impacts.
- **Own estate.** Reducing local authority own estate emissions is important in the context of carbon budgets, both directly and to underpin the wider leadership role of local authorities reducing emissions. Opportunities exist in the councils' own buildings, street lighting, transport and procurement.
- **Adaptation.** Local authorities have a role in preparing for climate change, using planning and other policy levers to ensure that buildings and infrastructure are resilient to increased risk of flooding and heat stress, natural resources are managed to increase ecological resilience, and emergency plans are in place.

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We have highlighted the benefits of action, including carbon reduction, energy and fuel poverty mitigation, reduced congestion, improved air quality, urban regeneration, unlocking the value associated with recycling and energy from waste, as well as increased resilience. Recognising these benefits, some local authorities are acting to reduce emissions, but there is a need for a consistent approach across all local authorities.

Risks of inaction

We have set out at a high level how to design and implement a low-carbon plan (e.g. through identifying indicators, setting ambition, introducing new policies, and closely monitoring progress against ambition).

However, a recurring theme has been the need for funding if local authorities are to fulfil their potential and influence emissions reductions. For example, supporting the Green Deal requires that a local authority commits significant upfront resources, particularly if it is to be a provider or partner. There are also significant funding requirements for roll-out of sustainable travel programmes and electric vehicle charging networks.

We have set out evidence to suggest that a combination of budget constraints and the abolition of the national indicator framework have resulted in a low level of action planned by local authorities in general.

The role for national Government in strengthening incentives

Given this low level of action, the current budget situation at the local level, and the need for additional funding, there is significant risk that local authorities will not play the role that we have identified, thus failing to make their contribution to meeting carbon budgets, as well as failing to unlock wider social and economic benefits.

We have suggested that two options which could mitigate this risk are for the (national) Government to provide additional funding to support local authority action, and/or to introduce a new statutory duty to plan to reduce emissions.

- **Funding.** Additional funding could be provided at the national level for local authorities to become Green Deal partners or providers, and for comprehensive roll out of sustainable travel programmes and electric vehicle charging networks.
- **Statutory duty.** A statutory duty to develop an area-wide low-carbon plan and report on its implementation would require prioritisation of low-carbon activity within existing local authority funds, and ensure a uniform approach to local authorities' contribution to national carbon budgets across England.

Such a duty and/or funding would provide more confidence that there will be comprehensive action by local authorities resulting in local economic benefit and emissions reductions required to meet carbon budgets.

Glossary

Abatement potential

The potential for reducing greenhouse gas emissions.

Adaptation

Adjustment of behaviour to limit harm, or exploit beneficial opportunities, arising from climate change.

Anaerobic Digestion (AD)

A treatment process breaking down biodegradable (particularly waste) material in the absence of oxygen. Produces a methane-rich biogas that can substitute for fossil fuels.

Behaviour change

Generic and specific interventions to support a change in attitude and behaviour at the individual and population level. In the context of climate change, a change in the patterns of consumption of resources.

Biofuel

A fuel (liquid or gas) derived from biological material and used to power vehicles. Biofuels are commonly derived from cereal crops but can also be derived from woody material or algae. Biofuels can be blended with petrol and diesel and used in conventional vehicles.

Biomass

Biological material that can be used as fuel or for industrial production.

Carbon Capture and Storage (CCS)

Technological solution which involves capturing the carbon dioxide emitted from burning fossil fuels, transporting it and storing it in secure spaces such as geological formations, old oil and gas fields and aquifers under the seabed.

Carbon Reduction Commitment (CRC)

A mandatory carbon reduction and energy efficiency scheme for large non-energy intensive public and private sector organisations. The CRC captures CO₂ emissions not already covered by Climate Change Agreements and the EU Emissions Trading System.

Carbon budgets

A 'carbon budget' is a cap on the total quantity of Kyoto greenhouse gas emissions emitted in the UK. Each carbon budget covers a five-year period, with budgets set at least three periods in advance. The first four carbon budgets for the UK have been legislated and cover the periods, 2008-2012, 2013-2017, 2018-2022 and 2023-2027.

Carbon Emissions Reduction Target (CESP)

CERT is an obligation placed by Government on gas and electricity suppliers to deliver a reduction in household carbon savings across England, Scotland and Wales. The scheme will cease to exist at the end of 2012.

Charging infrastructure

Battery charging points for electric vehicles which can be installed in streets, car parks, commercial, retail and leisure facilities as well as on private properties.

Climate change

Climate change refers to a change in the state of the climate that can be identified (e.g. by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere, ocean or in land use.

Community Energy Saving Programme (CESP)

CESP targets households across Great Britain, in areas of low income, to improve energy efficiency standards, and reduce fuel bills. The programme is delivered through the development of community-based partnerships between Local Authorities, community groups and energy companies, via a house-by-house, street-by-street approach. The scheme will cease to exist at the end of 2012.

Community Infrastructure Levy

The Community Infrastructure Levy is a new levy that local authorities in England and Wales can choose to charge on new developments in their area. The money can be used to support development by funding infrastructure that the council, local community and neighbourhoods want – for example new or safer road schemes, park improvements or a new health centre.

Combined Heat and Power (CHP)

A CHP unit simultaneously produces heat and power, and puts to use the heat that would normally be wasted. This results in a highly efficient way to use both fossil and renewable fuels. Technologies range from small units similar to domestic gas boilers to large scale CCGT or biomass plants which supply heat for major industrial processes.

Congestion charging

Payment for the right to drive into a city centre (as e.g. applied in central London), introduced as a way of reducing road congestion.

Cost-benefit ratio

A comparison of the present value of installing a measure (or package of measures) with the present value of its benefits (or loss averted). A ratio of less than one indicates that the option is a cost-beneficial measure.

Decentralised energy

Decentralised or distributed energy refers to a wide range of technologies that do not rely on the high-voltage electricity transmission network or the gas grid (e.g. solar PV).

Devolved administrations

The national authorities of Scotland, Wales and Northern Ireland.

Direct and indirect GHG emissions

Direct GHG emissions from sources that are owned or controlled by the entity reporting its emissions. Indirect GHG emissions are emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity (e.g. emissions from electricity generation).

Display Energy Certificate (DEC)

The certificate shows the actual energy usage of a building and must be produced every year for public buildings larger than 1,000 square metres.

Economy-wide greenhouse gas emissions

All greenhouse gas emissions emitted in the UK.

Energy Company Obligation (ECO)

A new obligation placed on energy suppliers that will replace existing obligations (the Carbon Emissions Reduction Target (CERT) and the Community Energy Saving Programme (CESP)) from 2012.

Eco-driving

Eco-driving involves driving in a more efficient way in order to improve fuel economy. Examples of eco-driving techniques include driving at an appropriate speed, not over-revving, ensuring tyres are correctly inflated, removing roof racks and reducing unnecessary weight.

Electric vehicle

A vehicle which is driven by an electric motor. These include battery electric (BEV), plug-in hybrid electric (PHEV) and hydrogen fuel-cell vehicles.

Energy Performance Certificate (EPC)

The certificate provides a rating for residential and commercial buildings, showing their energy efficiency based on the performance of the building itself and its services (such as heating and lighting). EPCs are required whenever a building is built, sold or rented out.

Extreme weather event

An event that is rare at a particular place and time of year. By definition, the characteristics of what is called extreme weather may vary from place to place in an absolute sense. Single extreme events cannot be simply and directly attributed to anthropogenic climate change, as there is always a finite chance the event in question might have occurred naturally. When a pattern of extreme weather persists for some time, such as a season, it may be classed as an extreme climate event, especially if it yields an average or total that is itself extreme (e.g., drought or heavy rainfall over a season).

European Union Emissions Trading Scheme (EU ETS)

Cap and trade system covering the power sector and energy-intensive industry in the EU.

Feed-in-tariffs

A type of support scheme for electricity generators, whereby generators obtain a long-term guaranteed price for the output they deliver to the grid.

Fuel poverty

A household is said to be in fuel poverty if it needs to spend more than 10 per cent of its income on fuel to maintain an adequate level of warmth.

Gasification

Process in which solid materials are partially combusted to produce a 'synthesis gas', which typically contains a mixture of hydrogen, carbon monoxide, carbon dioxide and various other hydrocarbons. This mixture can be used to generate electricity and/or heat or to produce other fuels such as methane, biodiesel or pure hydrogen.

Green Deal

The Green Deal is the Coalition Government's initiative to support the implementation of energy efficiency measures to households and businesses without needing to meet any upfront costs. The Green Deal will start in the autumn of 2012.

Greenhouse gases (GHGs)

Any atmospheric gas (either natural or anthropogenic in origin) which absorbs thermal radiation emitted by the Earth's surface. This traps heat in the atmosphere and keeps the surface at a warmer temperature than would otherwise be possible.

Hybrid Vehicle

A vehicle powered by an internal combustion engine and electric motor that can provide drive train power individually or together (e.g. Toyota Prius).

Landfill tax

Methane (CH_4) is GHG with a global warming potential of 20 (one tonne of methane corresponds to 20 tonnes of CO_2e). Methane arises in the agriculture sector as a result of enteric fermentation in the digestive systems of ruminant animals (e.g. cattle and sheep) as well as in manures, and from the breakdown of organic waste.

Marginal Abatement Cost Curve (MACC)

Graph showing costs and potential for emissions reduction from different measures or technologies, ranking these from the cheapest to most expensive to represent the costs of achieving incremental levels of emissions reduction.

Mitigation

Action to reduce the emissions of greenhouse gases.

Modal shift

Modal shift in the context of surface transport refers to car travellers changing to rail, bus, cycling or walking.

MtCO₂

Million tonnes of carbon dioxide (CO_2).

Power sector decarbonisation

Increasing the percentage of total electricity production generated from low-carbon energy sources rather than fossil fuels.

Pyrolysis

Similar to gasification, pyrolysis is the thermal decomposition of organic material at high temperatures, in the absence of oxygen. It produces gas and liquid products and leaves a solid residue richer in carbon content; the liquid products can be potentially used directly in ships or upgraded for a variety of transport applications.

Renewable Heat Incentive (RHI)

Implemented in 2011, the RHI provides financial assistance to producers (householders and businesses) of renewable heat.

Renewables

Energy resources, where energy is derived from natural processes that are replenished constantly. They include geothermal, solar, wind, tide, wave, hydropower, biomass and biofuels.

Risk

Climate change risk combines the likelihood an event will occur with the magnitude of its consequences. Consequences may be defined according to a variety of metrics including economic, social and environmental. Risks can be either adverse costs and damages (true costs including non-monetary costs) or beneficial opportunities.

Smarter Choices

Measures that influence people's travel behaviour towards less carbon intensive alternatives to the car such as public transport, cycling and walking by providing targeted information and opportunities to consider alternative modes.

Smart meters

Advanced metering technology that allows suppliers to remotely record customers' gas and electricity use. Customers can be provided with real-time information that could encourage them use less energy, (e.g. through display units).

Surface transport

The movement of people and goods by road or rail rather than by ship or aeroplane.

Traded sectors/non-traded sectors

Traded sectors are covered by the EU Emission Trading System (EU ETS) which covers CO₂ emissions from installations such as power stations, combustion plants, oil refineries and iron and steel works, as well as factories making cement, glass, lime, bricks, ceramics, pulp, paper and board. Non-traded sectors are outside this system and include CO₂ emissions from buildings, surface transport and waste.

Traffic flow

The total number of vehicles passing a given point in a given amount of time. Traffic flow is expressed as vehicles per hour.

Vulnerability

Degree to which a system is susceptible to, and unable to cope with adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of a system's exposure, its sensitivity, and its adaptive capacity:

- Exposure – the degree to which an exposure unit (e.g. a person or place) comes into contact with a hazard such as a heatwave event, a flooding event or other significant climatic variations.
- Sensitivity – the degree to which an exposure unit has the propensity to be affected (adversely or beneficially) by this exposure.
- Adaptive capacity – the ability of an exposure unit to adjust and therefore to avoid negative impacts (and conversely to benefit from positive impacts).



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