DELIVERING LONDON'S ENERGY FUTURE

THE MAYOR'S CLIMATE CHANGE MITIGATION AND ENERGY STRATEGY

OCTOBER 2011

MAYOR OF LONDON

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minicom 020 7983 4458

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Contributing authors
Leah Davis, Peter Daw, Michael Doust, Ross Hudson, and Simon Wyke.

Other contributors
Syed Ahmed, Tom Bailey, Christopher Botten, Abigail Burridge, Jane Carlsen, Claire Cheriyan, Steven Edwards, Nicole Fletcher, GLA environment delivery team, GLA transport and environment teams, Neil Grange, Rhodri Jamieson-Ball, Sue Johnson, Debbie Jackson, Ian Klesmer, Simon Kyte, Alina Lazar, Sumeet Manchanda, Hilary Merrett, Ian Shaw, Doug Simpson, Andrew Stanton, Thomas Sweetman, David Taylor-Valiant, Stefan Trinder, Robert Tudway, William Victor, Helen Woolston, and Jacqui Wordsworth.

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FOREWORD

London was the first city to experience mass urbanisation in the modern era. It was the imagination of our forebears - among them Bazalgette, Brunel, Prince Albert - who pioneered solutions to tackle some of the city's more mundane but critical challenges.

I want now to unleash the same entrepreneurial drive and creative genius to achieve what is now the 21st century's environmental imperative - to cut carbon output and secure the city's energy supply, whilst making services more efficient and better value for money.

My ambition is to put the village back into the city. What I mean by this is that we can improve the quality of life for Londoners by ensuring that we focus our efforts on delivering a cleaner and greener city, with stronger and safer communities, helping to make London more sustainable and prosperous for decades to come.

With nearly eight million people, over three million homes and hundreds of thousands of businesses, London has the scale to deliver financially viable programmes to ensure a sustainable future for our city, whilst also tackling climate change. If we can secure just one per cent of the forecast global market in low carbon goods and services, then London can add a massive £3.7 billion a year to the value of its economy over the next 15 years. The programmes set out in this strategy could contribute 14,000 'green collar' jobs per year by 2025.

With nearly 80 per cent of carbon emissions coming from London's buildings, much of this green growth will stem from retrofitting the capital's homes and workplaces to make them energy efficient. At the same time, this is set to deliver millions off the capital's fuel bills at a time when energy costs are soaring and causing real financial strain.

Retrofitting London is a goal of Victorian size and scale. We have programmes underway to transform the energy efficiency of tens of thousands of homes and public buildings. To go further still and to ensure we can meet our ambitions, we need to build on our record of success in leveraging in unprecedented levels of finance and support from the private sector and others, including central government and Europe.

The policies and actions detailed here put London firmly on course to cut its carbon output by 60 per cent by 2025. This is a target that requires a remarkable response from everyone with a stake in maintaining the city’s pre-eminent position.

My pledge is to ensure this potential is unleashed to secure massive job creation and economic benefits and to forge a cleaner, greener, leaner low carbon capital with a better quality of life for all Londoners.

Boris Johnson
Mayor of London


Putting
the village
back into the city
Retrofitting London
Cleaner air for London
Greening London

PREFACE

A strategic framework for enhancing quality of life in London and protecting the environment

The Climate Change Mitigation and Energy Strategy is part of a series of strategies that together set out actions and policies to make London the best big city in the world. How? By improving the quality of life of Londoners and making the city more sustainable.

The future of the planet lies in cities. In the 1950s just 29 per cent of people lived in towns and cities. By the close of the 20th century that figure had increased to 47 per cent, and by 2050 it will hit 70 per cent. There are clearly benefits to city living. People live longer, have access to better education, extensive public transport, greater healthcare provision, more social, cultural and economic opportunities and a lower carbon footprint. The Mayor is working to ensure that London not only retains its world city status but remains among the best places on the planet to live, whatever your age or background. He also wants to ensure that the city is liveable and its development is sustainable for future generations.

The Mayor's ambition is to put 'the village' back into the city. What this means is improving the quality of life for Londoners by ensuring that we focus our efforts on delivering a cleaner and greener city with stronger and safer communities through our work to make London more sustainable.

The Mayor's environment strategies and programmes are built on three policy pillars. These are retrofitting London, greening London, and cleaner air for London. These pillars aim to improve the quality of life for Londoners and visitors, and to make the capital more attractive. The Mayor's programmes that underpin these pillars are delivering targeted improvements and benefits that Londoners can see and experience around them. They also aim to make public services more efficient and less of a burden on tax payers, whilst delivering wider environmental benefits such as conserving water, saving energy or reducing waste.

The three 'pillars' and example programmes:

- **'Retrofitting London' -** Retrofitting London's existing buildings is not only crucial to tackling London's CO_2 emissions, it also reduces energy and water use, delivers new

jobs and skills, as well as saving London businesses and homes money on energy bills. Almost 80 per cent of the 14,000 low carbon jobs that could be created per year from delivering the Mayor's CO_2 target and two thirds of the £721 million of annual low carbon economic activity would come from retrofitting.

Our homes and workplaces are responsible for nearly 80 per cent of the city's emissions. Fundamentally 80 per cent of these buildings will still be in use by 2050. The RE:NEW programme which installs a range of energy and water efficiency measures in homes, enables Londoners to save money on their energy bills while making their homes more energy efficient. The RE:NEW demonstrations in 2010, have shown that households could save over £150 annually through retrofitting actions.

- **'Greening London' -** The Victorians bestowed on us a city softened by trees and green spaces. Greening London builds on this legacy and aims to improve the look and feel of our city, making it more attractive whilst reducing the impact of noise and air pollution. Greening London also makes the city more resilient to flooding and extreme weather events, and can contribute to a healthy mind and body. The Mayor through his RE:LEAF programme and the London Green Grid has an ambition to increase tree cover by five per cent by 2025, therefore achieving one tree for every Londoner and creating a better network of interlinked, multi-functional and high quality open and green spaces.

- **'Cleaner air for London' -** Air pollution is a serious health issue and the Mayor is determined to reduce its impact. Actions being taken to improve air quality include introducing the first ever age limit for black cabs, tougher standards for the Low Emission Zone, new cleaner hybrid and hydrogen buses and fitting older buses with equipment including filters to curb pollution. The new bus for London, which will be launched in 2012, will use the latest green technology making it 40 per cent more efficient than a conventional double decker. The Mayor is working to introduce more electric vehicles onto London's streets. In May this year, he launched Source London, the UK's first citywide electric vehicle charging network and membership scheme and we are also now investing record amounts to deliver a cycling revolution in London. Additional steps are being taken to tackle pollution levels at some of the busiest roads in central London. This includes utilising dust suppressant technology that prevents PM_{10} from re-circulating, installing green infrastructure to trap pollutants and a no engine idling campaign to reduce engines running unnecessarily when stationary. Eco-

marshalls are also being deployed to help both monitor and reduce the impact of taxis on air quality.

London continues to attract people and businesses and therefore continues to grow. The London Plan forecasts the city's population could increase from 7.6 to 8.8 million by 2031. These strategies show that making London a sustainable city and protecting the environment does not mean we all have to be eco-warriors or make sacrifices to our standard of living. We can work to lessen our impact on the city while at the same time improving the environment and our quality of life.

In a post-Olympic London, we can also grasp the opportunity to make the capital a digital leader, an intelligent city. By harnessing the power of data, we can run our city more efficiently, understand environmental trade-offs, and communicate better with Londoners, enabling them to make better informed and sustainable choices in how they live and work. This is already happening through the explosion of social media and digital applications that encourage behaviour change based on the choices an individual makes. Data visualisation is also allowing us to understand complex data sets, telling us the results of the millions of decisions we make, on us, on our neighbourhoods, on our city and beyond.

Transitioning our city to a sustainable low carbon economy will also bring economic opportunities for London in terms of jobs and investment. Despite the economic downturn, the value of London's low carbon and environment sector is now worth over £23 billion, growing by over four per cent a year. As London and the rest of the world continue to reduce their greenhouse gas emissions over the coming decades, the economic opportunities from that activity will be huge. London must make sure it grabs this opportunity and continues to be a world leader.

Kulveer S Ranger
Mayor's Director of Environment

EXECUTIVE SUMMARY

1 Introduction

The Mayor's Climate Change Mitigation and Energy strategy is one of eight environmental strategies setting out the action the Mayor is taking, and encouraging others to take, to green London, retrofit London, and provide cleaner air for London. This strategy focuses on reducing CO_2 emissions to mitigate climate change, securing a low carbon energy supply for London, and moving London to a thriving low carbon capital. It forms a central part of the Mayor's goal of retrofitting London. The Mayor's activity to achieve this is well underway. His programmes are already making real cuts in CO_2 emissions, improving quality of life for Londoners, and creating economic opportunities for the capital.

2 Objectives of the strategy

The Mayor has set four objectives for this strategy:

- **To reduce London's CO_2 emissions to mitigate climate change -** If global emissions of greenhouse gases (GHGs) are left unchecked, average global temperatures could rise by up to 6°C by the end of the century. This will leave London vulnerable to floods, droughts and heat waves. Scientific evidence suggests that to avoid these impacts on a catastrophic scale, global emissions of GHGs will need to fall to a level that is no more than 50 per cent of 1990 levels by 2050[i]. This strategy sets out how the Mayor is ensuring London is playing its part in tackling this global issue.

- **To maximise economic opportunities from the transition to a low carbon capital -** The global market for low carbon goods and services is around £3 trillion. In addition to this, it is estimated that if global CO_2 emission targets are met, this market could increase by at least £368 billion per year through to 2030[ii]. London is well placed to capitalise on this economic opportunity. Despite the economic downturn, the value of the capital's low carbon and environmental goods and services sector grew by over four per cent per year, with sales to a value of over £23 billion in 2009-10[iii]. The Mayor is using London's inherent strengths and his climate change mitigation programmes to build on this.

- **To ensure a secure and reliable energy supply for London -** Without significant investment in its energy infrastructure (an estimated £200 billion over the next ten years) the UK faces an energy gap in the near future. Although a range of infrastructure is planned, under construction, or in development, the scale of the UK's short-term infrastructure requirement is very significant, with planning and funding hurdles to overcome. If this infrastructure is not delivered, there is potential for a gap

between electricity generation capacity and electricity peak demand by 2016 nationally[iv]. The Mayor is using his energy efficiency and energy supply programmes to reduce London's vulnerability to the risks of an energy gap. These programmes could easily fill London's share of the gap, and significantly contribute towards plugging the national energy gap.

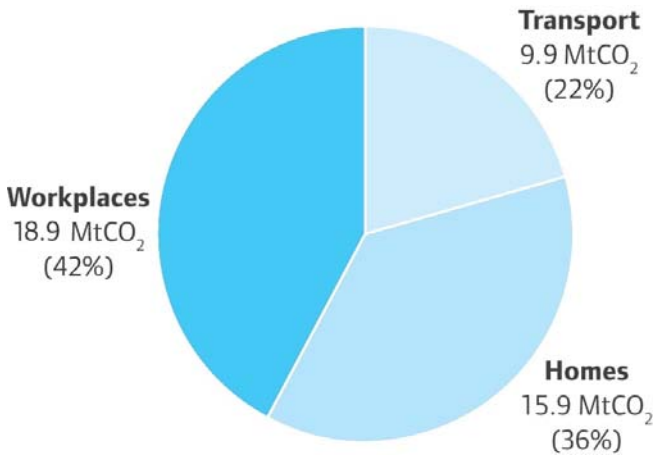
- **To meet, and where possible exceed, national climate change and energy objectives -** Government has set out its priorities for tackling climate change, including the development of the Green Deal (a pay-as-you-save model to retrofit the UK's homes and businesses), reform of the electricity market, and the establishment of a Green Investment Bank to provide funding for investment in environmental infrastructure projects. This strategy has been developed to meet and, where possible, exceed national and international climate change and energy objectives.

3 The challenge

The scale of the challenge London faces in reducing CO_2 emissions is significant, but achievable. The most recent measurement of London's CO_2 emissions shows that in 2008 they were 44.71 million tonnes ($MtCO_2$)[v], which is 8.5 per cent of the UK's total CO_2 emissions. This is approximately level to London's CO_2 emissions in 1990, having fallen from a peak in 2000. Figure 1 breaks down London's CO_2 emissions by sector in 2008, and shows that nearly 80 per cent of CO_2 emissions originate from energy supply to, and energy use in, buildings (homes and workplaces). Transport accounts for 22 per cent of London's CO_2 emissions.

If no further action were to be taken to reduce London's CO_2 emissions beyond that already occurring, it is predicted that CO_2 emissions in London would fall to 11 per cent below 1990 levels by 2025. This would not be enough for London to make its contribution to global CO_2 emissions reduction targets. Further action is therefore required, and although London's relative contribution to global GHGs is small, as a world city, it has an important leadership role to play in reducing emissions and moving to new models of energy generation and consumption.

Figure 1 Breakdown of London's CO_2 emissions by sector (2008)



Source: LEGGI 2008

4 CO_2 emissions reduction targets

The Mayor has set targets to reduce CO_2 emissions in London which aim to drive the scale of activity required to deliver his objectives. These targets are based on what is achievable with further commitment from government and investment from the private sector. Table 1 sets out the Mayor's targets.

Table 1 The Mayor's CO_2 emissions reduction targets in London

Target year	Target CO_2 emissions reduction on 1990 levels
2015 (interim target)	20 per cent
2020 (interim target)	40 per cent
2025	60 per cent
2050	At least 80 per cent

This strategy takes committed government action as a starting point for reducing CO_2 emissions in London. It then looks to understand how London can make the most of this, and where even more can be achieved through Mayoral action. It then sets out where further action is required from government.

5 Minimising London's CO_2 emissions: The Mayor's actions

The Mayor's activities to reduce CO_2 emissions in London are already well underway. His programmes are delivering real results on the ground, and are ready to be scaled-up rapidly.

Given the huge environmental and economic opportunities of reducing London's CO_2 emissions, the pace of delivery of climate change mitigation programmes needs to be much faster. The Mayor's approach is to kick-start action through directly funded programmes to catalyse the scale of activity required. These programmes are focussing on large-scale delivery, investing public money to demonstrate the viability of programmes to attract private sector investment, and enabling and empowering London to make low carbon choices. Working with other cities, London can then roll out these approaches more broadly both within the UK and internationally, through programmes such as RE:FIT and the C40 electric vehicle initiative.

Retrofitting London

London's existing buildings are responsible for nearly 80 per cent of London's CO_2 emissions, and with 80 per cent of them likely to still be standing in 2050, retrofitting these buildings is a priority for London. To maximise CO_2 emissions reductions in the most cost-effective ways, the Mayor's approach is to retrofit these buildings with energy efficiency and energy supply measures through the following programmes tackling major sectors:

- **RE:CONNECT –** This programme, for London's communities, consists of ten low carbon zones in London, each of which has signed-up to deliver a 20.12 per cent reduction in CO_2 emissions by 2012. The zones take a novel approach to community engagement, aiming to significantly increase uptake of energy efficiency and energy supply programmes and measures in homes, workplaces and other community buildings by concentrating activity at a neighbourhood level. If successful, the Mayor will explore how to extend these to other neighbourhoods.

- **RE:NEW –** This programme, for London's homes, is aiming to retrofit 1.2 million homes by 2015, the largest programme of its kind in London. It takes an area-based,

door-to-door, hassle-free approach to home energy efficiency retrofitting and is delivered through and with the London boroughs. Eleven-thousand homes have already been retrofitted, with a total of 55,000 due by end of March 2012. The Mayor is working to integrate RE:NEW with new energy efficiency and energy supply funding streams, such as the Green Deal and the Feed-in Tariff, so retrofitting can be free upfront for all homes through a pay-as-you-save model, offered to all London homes by 2030.

- **RE:FIT -** This programme, for London's workplaces, is retrofitting London's public sector buildings. It has already secured guaranteed energy savings of £1 million per year for the GLA group from 42 pilot buildings. The model is available to every public sector organisation in London. One-hundred-and-forty organisations have already shown interest in the model to date, with 200 buildings committed to be retrofitted, to the combined value of over £35 million.

- **Decentralised energy programme -** This programme is deploying new low carbon energy supply infrastructure in London. The Mayor has already undertaken the first ever decentralised energy masterplanning exercise across London and is now supporting the commercialisation of large-scale decentralised energy projects which can heat and power London's existing and new buildings more carbon-efficiently. An expert team is offering commercial and legal advice, helping to secure the investment needed to deliver these projects on a large scale. The London Waste and Recycling Board is also investing in the development of waste-to-energy infrastructure that can generate renewable heat and power, helping London to reduce the carbon footprint of its waste.

Driving down emissions from transport

Although emissions from transport account for only 22 per cent of London's total CO_2 emissions, switching to more carbon efficient modes of transport and using new ultra-low carbon vehicles can not only minimise CO_2 emissions, but can also improve air quality, and quality of life for Londoners. The Mayor's programmes to deliver this are:

- **Electric vehicle rollout -** London has ambitious plans for electric vehicles and is one of the most advanced cities in the world in delivering those plans. The Mayor wants

London to be the electric vehicle capital of Europe, with new charging infrastructure being rolled out to support the introduction of 100,000 electric vehicles on London's streets.

- **Further use of ultra-low carbon vehicles -** The Mayor is introducing low carbon buses, with 300 hybrid buses coming into service by the end of 2012, including the New Bus for London which has fuel consumption expected to be nearly 40 per cent better than a conventional diesel double decker bus. The Mayor is also working to introduce hydrogen-fuelled vehicles into London and collaborate with the taxi manufacturing industry to develop an affordable taxi capable of zero emission operation by 2020.

- **Moving to more carbon-efficient modes of transport -** Measures in the Mayor's Transport Strategy to reduce London's transport emissions include supporting travel by public transport, unprecedented levels of walking and cycling investment, and energy efficiency measures on the London Underground.

Maximising CO_2 emissions reductions from new development in London
New development provides London with the opportunity to build ever more low carbon infrastructure. The Mayor's new London Plan sets CO_2 emissions reduction targets which are in excess of those in building regulations, making new buildings even more energy efficient and promoting low and zero carbon energy generation.

Making London one of the world's leading low carbon capitals
To maximise the opportunities from switching to a low carbon economy, the Mayor has put in place the following actions:

- **The Green Enterprise District -** Covering six boroughs in east London, this is helping London become a world-leading low carbon capital. It will promote clusters of low carbon businesses and will draw in large-scale investment for innovative low carbon technologies ranging from energy generation to low carbon transport.

- **The Low Carbon Employment and Skills Programme -** A suite of projects, including the Mayor's London Apprenticeship campaign, which are being delivered with partners, such as the Low Carbon Skills Forum. These will help to enable Londoners to access sustainable employment within London's low carbon economy.

6 Taking further action

In addition to his directly funded programmes, the Mayor is also encouraging others to take further action. To maximise CO_2 emissions reductions in London requires action from across society. Individuals and businesses need to be empowered to make low carbon choices, and private sector investment will need to be levered to finance the scale of activity required. This strategy therefore sets out where the Mayor will encourage others to take action.

In particular, the objectives of this strategy can only be achieved if government delivers on its ambitions. This strategy therefore sets out the contribution of national policies towards reducing CO_2 emissions in London, as well as how the Mayor will work to ensure that these objectives are met, and where possible exceeded, in London. It also sets out where government will need to go further to ensure that its own ambitions are met.

7 Funding the strategy

More than anything else, to achieve the ambition in this strategy requires financing. It is estimated that to deliver the Mayor's target of reducing CO_2 emissions by 60 per cent of 1990 levels by 2025 will require £40 billion of investment, and to deliver the Mayor's contribution to this will require £14 billion[vi]. These levels of funding are not something that can, or should, be delivered by the public sector alone. That is why the Mayor is using existing public sector funding streams to attract and unlock private sector investment. This is no different from any other infrastructure investment challenge facing the UK, and London, as one of the world's premier financial centres, should be in an ideal position to grasp this opportunity.

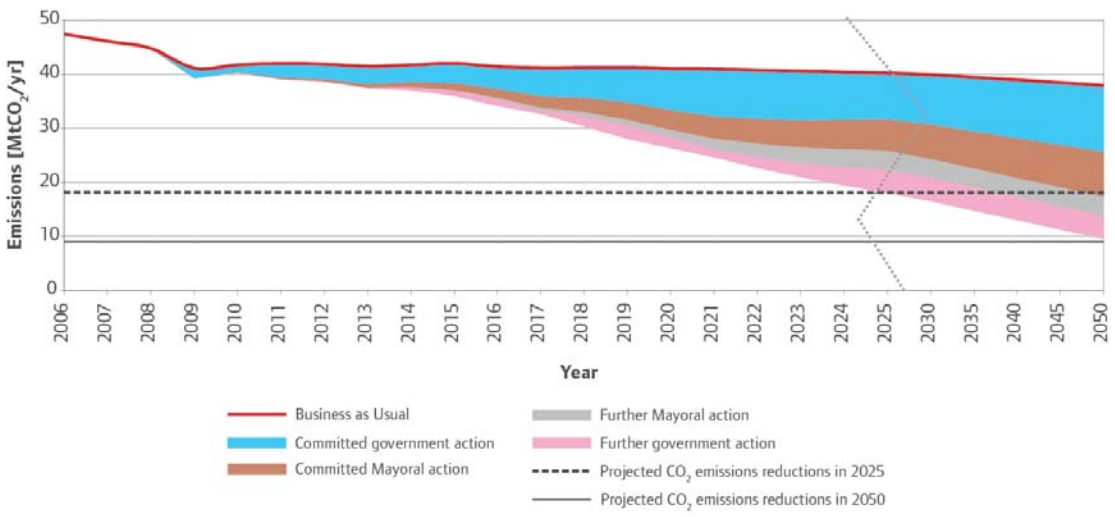
An unprecedented level of investment backs the Mayor's programmes. He is investing over £100 million in climate change programmes, including establishing the London Green Fund to attract further investment. One hundred million pounds of public sector money has been invested in the London Green Fund, initially aiming to attract at least a further £100 million of private sector funding. In the medium-term, the Fund aims to leverage further funding from other government sources, development banks, sovereign funds and infrastructure funds to achieve a fund size upwards of £500 million.

8 Projected CO_2 emissions reductions

If London and the UK can take the actions set out in this strategy, London can ensure that it meets its 2025 targets. Figure 2 breaks down the contribution of government, Mayoral, committed, and further action required to achieve the targets.

There is a window of opportunity to achieve these targets. If government commitment is made now, and further funding is levered and committed by the private sector, London can achieve its aim to be a world leading low carbon capital.

Figure 2 Projected CO_2 emissions reductions in London (2008-2050)



Source: GLA modelling and DECC modelling

Endnotes

[i] The Intergovernmental Panel on Climate Change, Fourth Assessment Report (2007)

[ii] UNEP, Global Trends in Sustainable Energy Investment 2009 – Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency (2009)

[iii] INNOVAS, The London Low Carbon Market Snapshot (2011)

[iv] GLA modelling (2011)

[v] The most recent measurement of London's CO_2 emissions was in 2008.

[vi] Ernst & Young, Prospectus for London, the Low Carbon Capital (2009) (2009 prices)

CHAPTER ONE

INTRODUCTION

1.1 The Mayor's Climate Change Mitigation and Energy Strategy

The Mayor's Climate Change Mitigation and Energy strategy is one of eight environmental strategies setting out the action the Mayor is taking, and encouraging others to take, to green London, retrofit London, and provide cleaner air for London. This strategy focuses on reducing CO_2 emissions to mitigate climate change, securing a low carbon energy supply for London, and moving London to a thriving low carbon capital. It forms a central part of the Mayor's goal of retrofitting London. The Mayor's activity to achieve this is well underway. His programmes are already making real cuts in CO_2 emissions, improving quality of life for Londoners, and creating economic opportunities for the capital.

Already a number of factors are coming together to drive the low carbon transition in London. There are rising concerns about energy security and long-term increases in fuel prices as oil and gas become more costly to extract and use. Climate change is being recognised as a global priority, and cities are growing ever larger, with dense urban development and traffic creating air pollution challenges. Economic pressures mean that people and organisations are more aware than ever of the costs of energy. The global recession has also led to a search for new growth sectors that can create jobs.

Achieving the Mayor's objectives requires activity across society. This strategy focuses on the Mayor's contribution to the transition to a low carbon capital, through his directly funded programmes, as well as how he is encouraging national government, boroughs, the private sector, individuals and local communities to help deliver his programmes. It brings together Mayoral actions that are already underway and further measures.

Action by government is essential to the delivery of this strategy and wider UK climate change targets. If government action is taken at the level encouraged by the Mayor, this strategy and the UK's wider CO_2 emissions reduction targets will be achievable. It is therefore crucial that government implements a robust climate change mitigation programme now.

As the low carbon policy landscape is quickly evolving, this strategy focuses on those actions that will reduce London's CO_2 emissions from 2011 to 2025. It contains 17 policies and supporting actions. To set the context and provide the evidence base for this strategy, chapter 2 outlines London's past, current and projected CO_2 emissions. Chapter 3 sets out the Mayor's policies and actions to make the most of the economic opportunities of moving to a low carbon capital, and chapter 4 sets out the Mayor's policies and actions to ensure London has a secure, low carbon supply of energy. Chapters

5 to 9 set out the Mayor's policies and actions to reduce CO_2 emissions from energy use across London's sectors, including homes, workplaces and transport. Finally, chapter 10 outlines how the effectiveness of the policies and actions set out in this strategy, along with government action, will be measured and monitored.

Each chapter from 3 to 9 includes:

- a summary of the policies, key delivery programmes and expected impact of these in each policy area
- a summary of the projected impact of committed government and international action in each sector
- the opportunities and challenges of implementing further policies and actions in London
- detail on the Mayor's committed policies and proposals to reduce CO_2 emissions, maximise economic opportunities and secure a low carbon energy supply, including:
  - a vision, explaining what the Mayor aims to achieve in a policy area
  - a vision to policy, explaining the Mayor's overarching policy which will achieve the vision
  - a policy to action, listing the specific actions or proposals that the Mayor will take to achieve the policy[i].
- where relevant, further Mayoral action that can be taken and will be deliverable subject to further support, including funding from government and the private sector
- further action that the Mayor encourages government to take to reduce London's CO_2 emissions and support the achievement of the Mayor's CO_2 emissions reduction targets and the objectives of this strategy.

1.2 Objectives of the strategy

This strategy has been developed with four objectives: to reduce CO_2 emissions to mitigate climate change[ii]; to maximise economic opportunities from the transition to a low

carbon capital; to ensure a secure and reliable energy supply for London; and to meet, and where possible exceed, national climate change and energy objectives[iii].

a) Reducing CO_2 emissions to mitigate climate change
Tackling climate change by reducing greenhouse gas emissions (GHGs) is a global priority. There is now a strong scientific consensus that emissions of GHGs as a result of human action are causing the climate to change at an unprecedented scale and speed[iv].

If global emissions of GHGs are left unchecked, average global temperatures could rise by up to 6°C by the end of the century. Regional variations could be even greater. If this happens, the UK will experience progressively warmer and drier summers, wetter and milder winters and more frequent extreme weather. London, in particular, will be vulnerable to floods, droughts and heat waves.

Scientific evidence suggests that to avoid these impacts on a catastrophic scale, global average temperatures will need to rise by no more than 2°C. To achieve this will require global emissions of GHGs to be limited to 450 parts per million (ppm), peaking in 2015 and then falling to no more than 50 per cent of 1990 levels by 2050[v].

Although London's relative contribution to global GHGs is small, as a world city, it has an important leadership role to play in reducing emissions and moving to new models of energy generation and consumption. Cities emit up to 75 per cent of the world's GHGs, whilst accounting for around 50 per cent of global population[vi]. Unlocking the capabilities of cities to reduce emissions of CO_2, the principal GHG, will therefore be critical to tackling climate change.

Box 1.1 provides an overview of the science of the causes of climate change. Chapter 2 of this strategy gives more detail on London's past, current and projected CO_2 emissions, and the expected impact of the policies and actions set out in this strategy.

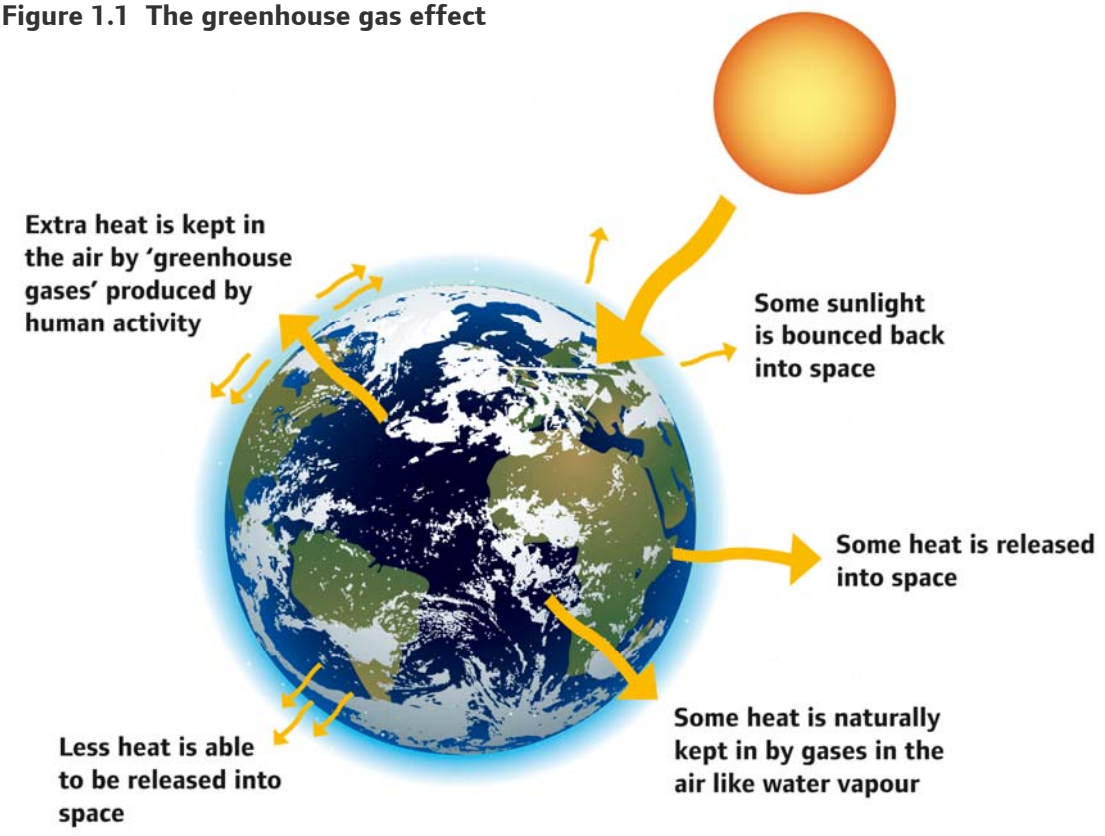
Box 1.1 The science of the causes of climate change

The temperature of the Earth is controlled by a balance between energy coming in from the sun and energy emitted from the Earth to space. Naturally occurring GHGs in the atmosphere, including water vapour, CO_2 and methane absorb some of the outgoing radiation. This causes the Earth to warm and sustains life on the planet. However, we are

currently producing too much of these GHGs, causing the Earth's atmosphere to warm too much.

For more information on the science of the causes of climate change, please see the Intergovernmental Panel on Climate Change website at www.ipcc.ch.

Figure 1.1 The greenhouse gas effect



Source: GLA

The Mayor has committed to an overall target of reducing London's CO_2 emissions by 60 per cent of 1990 levels by 2025 and at least 80 per cent by 2050. To ensure progress against this target, the Mayor has set interim targets to 2025. Table 1.1 sets out these targets.

The Mayor's targets are based on the contribution that the UK and London will need to make to stabilise atmosphere concentrations of CO_2 at 450ppm.

Table 1.1 The Mayor's CO_2 emissions reduction targets in London

Target year	Target CO_2 emissions reduction on 1990 levels
2015 (interim target)	20 per cent
2020 (interim target)	40 per cent
2025	60 per cent
2050	At least 80 per cent

The policies and actions set out in this strategy focus on reaching the 2025 target, but will also set out a path towards the target in 2050. Progress against these targets will be monitored and reported annually (please see chapter 10 for more detail).

b) Maximising the economic opportunities of the transition to a low carbon London
Aside from the compelling environmental case to mitigate climate change, the economic case is also clear. The Mayor wants London to be one of the world's leading low carbon capitals, and this strategy aims to maximise the economic opportunities of London's low carbon transition.

In 2006, the Stern Review estimated the costs of uncontrolled climate change could be between five and 20 per cent of global gross domestic product (GDP) per year. However, the costs of acting now and avoiding the most dangerous risks of climate change were estimated at between one and two per cent of global GDP by 2050[vii].

There are also significant early-mover opportunities for economies that are pro-active in making a rapid transition to a low carbon economy. For example, the global market for low carbon goods and services is around £3 trillion and it is estimated that if global CO_2 emission targets for 2030 are met, the low carbon market could increase by at least £368 billion per year through to 2030[viii].

London is well placed to capitalise on this opportunity. A recent report[ix] has found that, despite the economic downturn, the value of London's low carbon and environmental goods and services sector has grown by over four per cent each year, with sales to a value of over £23 billion in 2009-10. The sector is already employing 160,000 people in London.

The Mayor's approach to stimulating, and making the most of, the global low carbon economy is set out in chapter 3 of this strategy.

c) Securing London's energy supply

Many of the actions needed to mitigate climate change will help to address another pressing policy challenge: ensuring a secure, low carbon energy supply for London. Globally, demand for oil and gas is reaching unprecedented heights, due in large part to the growing energy appetite of developing economies around the world. The costs and challenges of extracting these fuels are also increasing. Domestically, the UK's own oil and gas production from the North Sea has peaked and is falling steadily. This is leading to increased oil and gas prices, which are pushing up prices for all forms of transport, food, general retail goods, heat and power domestically.

In addition, although a range of energy infrastructure is planned, under construction, or in development, the scale of this infrastructure requirement is very significant, over a short timeframe, with planning and funding hurdles to overcome. If this infrastructure is not delivered, there is a potential for an energy gap between electricity generation capacity and electricity peak demand by 2016 nationally[x]. Ofgem estimates that a staggering level of investment (up to £200 billion over the next ten years, more than twice the amount spent over the last ten years) will be needed to replace the UK's ageing infrastructure to meet the UK's energy needs[xi].

Chapter 4 of this strategy sets out the Mayor's policies and actions to ensure that London has a secure and low carbon energy supply.

d) Meeting national and international climate change and energy objectives

In addition to environmental, economic and energy security aims, this strategy has been developed to meet, and where possible exceed, national and international climate change and energy objectives. To ensure London makes the low carbon transition will require government to go further than current objectives, and this strategy will set out where the Mayor believes more can be done.

Nationally, the context for climate change and energy policy is rapidly developing at all levels of government. In the past three years the UK has seen the Department of Energy and Climate Change (DECC) created, the Climate Change Act passed by Parliament, and challenging CO_2 reduction targets enshrined in law. The Climate Change Act 2008 commits the UK to GHG reductions of 34 per cent by 2020 and 80 per cent by 2050. In addition the UK is required to meet five-yearly carbon budgets; successively tightening emissions caps that ensure the UK stays on course to meet its 2020 and 2050 targets. In July 2009, government produced the UK Low Carbon Transition Plan - its action plan, required by the Climate Change Act, for meeting the first three carbon budgets.

The government has supplemented the UK Low Carbon Transition Plan with the Carbon Plan, which sets out its intended actions to 2022. This Plan takes account of the first three UK carbon budgets, and includes the development of the Green Deal (a pay-as-you-save model to retrofit the UK's homes and businesses), reform of the electricity market, and the establishment of a Green Investment Bank to provide funding for investments in environmental infrastructure projects. Parliament also passed the Energy Act in 2011.

Internationally, the EU has committed to a series of 2020 targets that pledge to reduce CO_2 emissions by 20 per cent of 1990 levels, to reduce primary energy use by 20 per cent and to generate 20 per cent of its energy from renewable resources (the so-called 20:20:20 target). The EU has made a commitment to increase this target to 30 per cent for the period beyond 2012 if there are comparable targets from other developed countries and adequate action by developing countries. In working to achieve these targets, the EU has founded the world's largest emissions trading system (ETS). Now in its second phase, the EU ETS aims to play a key part in securing cost effective emissions reductions across Europe. At the same time it aims to lay the foundations for a global trading system that directs funds to cutting emissions most cost effectively. The UK government supports an increase in the EU emissions reduction target to 30 per cent by 2020.

The objectives and targets in this strategy can only be achieved if government starts to deliver on its ambitions now. The strategy therefore sets out the contribution of national policies towards reducing CO_2 emissions in London, as well as how the Mayor will work to ensure that these objectives are met and where possible, exceeded. It also sets out where government will need to go further to ensure that its own ambitions are met.

1.3 Delivering the strategy

To deliver this strategy requires action from across society. Individuals and businesses will need to be empowered to make low carbon choices, and private sector investment will need to be levered to finance the scale of activity required.

It is estimated that to deliver the Mayor's target of reducing CO_2 emissions by 60 per cent of 1990 levels by 2025 will require £40 billion of investment, and to deliver the Mayor's contribution to this will require £14 billion. These levels of funding are not something that can, or should, be delivered by the public sector alone. London will need to attract investment from the private sector.

In recognition of this, the Mayor is kick-starting action through directly-funded programmes which are designed to attract private sector investment in the longer-term and catalyse the scale of activity required. The programmes have been developed under the following principles:

- **Large-scale delivery -** To achieve the Mayor's targets requires the scale and pace of delivery on the ground to be increased rapidly. The Mayor therefore believes that large-scale programmes are required if London is to tackle climate change and remain competitive. London needs to be ambitious, and ensure that action is taken now.

- **Investing public money to demonstrate the viability of programmes and stimulate private sector investment -** The Mayor believes the role of the public sector is to demonstrate the commercial viability of climate change programmes and de-risk them in order to unlock private sector investment. This can drive London's low carbon future, creating new jobs and skills, and generating wealth.

- **Enabling and empowering London to make low carbon choices -** To achieve the Mayor's targets will require individuals, businesses and other organisations to make low carbon choices and adopt low carbon behaviours. The Mayor's policies and actions aim to inform and enable these low carbon choices.

- **Using large-scale programmes to bring multiple benefits -** The Mayor seeks, where possible, to implement the policies and actions set out in this strategy to achieve multiple benefits for London, including reducing fuel poverty, tackling inequalities and stimulating job creation[xii]

- **Working with boroughs -** The Mayor is working with boroughs on large-scale programmes on the ground, reflecting their role in local delivery.

- **Sharing best practice internationally -** Internationally, the Mayor is continuing to demonstrate his leadership through his role as honorary Deputy Chair of the C40 and will continue to lead activities within the C40, including sharing best practice on minimising CO_2 emissions with other cities.

The Mayor is investing over £100 million in climate change programmes in London, including establishing the London Green Fund to attract further investment. One hundred million pounds of public sector money has been invested in the London Green Fund, initially aiming to attract at least a further £100 million of private sector funding. In the medium term, the aim is that as the Fund demonstrates to investors its ability to make a return on its investments, it will leverage further funding from other government sources, development banks, sovereign funds and infrastructure funds to achieve a fund size upwards of £500 million.

Annex B sets out a detailed implementation plan and the full range of actions needed by key actors to deliver the policies and actions set out in this strategy.

1.4 Requirements of the Greater London Authority Act

The Greater London Authority Act 1999 (as amended) requires the Mayor to publish a London Climate Change Mitigation and Energy Strategy with his policies and proposals with respect to the contribution to be made in Greater London towards the mitigation of climate change, and the achievement of any objectives specified or described in national policies relating to energy. The Act lays out a number of areas the strategy must cover including minimising emissions of CO_2 from the use of energy in Greater London, supporting innovation and encouraging investment in energy technologies, and promoting the efficient production and use of energy in London. The 'actions' described in this strategy set out the Mayor's formal proposals, and his policies are set out in the 'vision to action' sections in the 17 policies throughout this strategy. Government has also produced additional guidance for this strategy. A full list of these requirements and how the Mayor has addressed them are laid out in annexes C and D. The strategy is also consistent with the Mayor's duties under the GLA Act to address climate change and to take action with a view to its mitigation.

1.5 Other Mayoral strategies

Since 2008, the Mayor has published final strategies including the Transport Strategy, the Economic Development Strategy, the London Plan, the Air Quality Strategy, the Municipal Waste Management Strategy, the Climate Change Adaptation Strategy, and the Water Strategy. The Mayor's Climate Change Mitigation and Energy Strategy is consistent with relevant policies and proposals in these documents, and likewise, any future iteration of these documents will be updated as appropriate to reflect the policies and actions set out in this strategy. In addition, when the Localism Bill (2011) becomes law, a new London Environment Strategy will replace this strategy and amalgamate it with the other statutory strategies and plans concerning the environment that the Mayor is required to publish under the GLA Act 1999.

Endnotes

[i] This includes actions the Mayor encourages other bodies or persons to take.

[ii] The GLA Act 1999 (as amended in 2007) defines 'climate change' as "changes in climate which are, or which might reasonably be thought to be, the result of human activity altering the composition of the global atmosphere and which are in addition to natural climate variability." It defines changes in climate to include "a reference to changes in climate which are reasonably expected, or might reasonably be expected, to happen or which are reasonably thought to be happening or to have recently happened." These statutory definitions are followed in this strategy.

[iii] These objectives align with, and supplement, those set out in the GLA Act 1999 (as amended in 2007) that "the London climate change mitigation and energy strategy shall contain the Mayor's proposals and policies with respect to the contribution to be made in Greater London towards each of the following: (a) the mitigation of climate change, and (b) the achievement of any objectives specified or described in national policies relating to energy."

[iv] The Intergovernmental Panel on Climate Change is a body of scientists from over 130 countries including over 2,500 scientific expert reviewers, 800 contributing authors, and 450 lead authors. In November 2007 it published its Fourth Assessment Report. The 'Summary for Policymakers' report

states that global atmospheric concentrations of CO_2, methane and nitrous oxide now far exceed pre-industrial values, and that CO_2 is the most important anthropogenic GHG. It also states that most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations.

[v] The Intergovernmental Panel on Climate Change, Fourth Assessment Report (2007)

[vi] C40, http://www.c40cities.org/climatechange.jsp (2010)

[vii] Stern Review on the Economic of Climate Change (2006)

[viii] UNEP, Global Trends in Sustainable Energy Investment 2009 – Analysis of trends and issues in the financing of renewable energy and energy efficiency (2009)

[ix] INNOVAS, The London Low Carbon Market Snapshot (2011)

[x] GLA modelling (2011)

[xi] Ofgem, Project Discovery Energy Market Scenarios (2009)

[xii] The GLA Act 1999 (as amended in 2007), requires that where the Mayor prepares or revises the London climate change mitigation and energy strategy, "he shall include such of the available policies and proposals relating to the subject matter of the strategy as he considers best calculated (a) to promote improvements in the health of persons in Greater London, (aa) to promote the reduction of health inequalities between persons living in Greater London, and (b) to contribute towards the achievement of sustainable development in the United Kingdom, and (c) to contribute towards the mitigation of, or adaptation to, climate change, in the United Kingdom."

CHAPTER TWO

LONDON'S CO_2 EMISSIONS

2.1 Introduction

This chapter gives the context and evidence base for this strategy. It sets outs London's past, current and projected CO_2 emissions, and summarises the expected impact of policies and actions set out in later chapters of this strategy.

2.2 The scope of CO_2 emissions in this strategy

In defining the scope of London's CO_2 emissions, and therefore the scope of this strategy, the Mayor has adopted a number of principles which have been applied to ensure consistency and alignment with national and international measurement and targets:

a) Geographic scope

The strategy applies to the geographic boundary of Greater London. This is consistent with the scope of measurement applied by government, and reflects the area across which the Mayor's administrative powers extend. This means that only CO_2 emissions from the use of energy in buildings, infrastructure, and transport that occur within Greater London (including aeroplanes taxiing, taking off, and landing up to an altitude of 1,000 metres at London's airports) are included.

b) Source of CO_2 emissions

The strategy applies to scope 1 and scope 2 emissions of CO_2, measured in line with international reporting guidelines and Defra's Guidance on Measuring and Reporting Greenhouse Gas Emissions[i]. Scope 1 emissions refer to CO_2 emissions from the combustion of energy sources within London. Scope 2 emissions refer to CO_2 emissions associated with London's consumption of purchased electricity, irrespective of whether this electricity is generated inside or outside of Greater London's geographic boundaries. CO_2 emissions are therefore accounted for at the point of energy use. This avoids double counting of emissions, and savings achieved on them.

Scope 3 emissions are not included. Scope 3 emissions refer to all other indirect emissions not covered by scope 2. Examples of scope 3 emissions include those associated with London's consumption of goods and services, its production of waste, and travel to and from the capital.

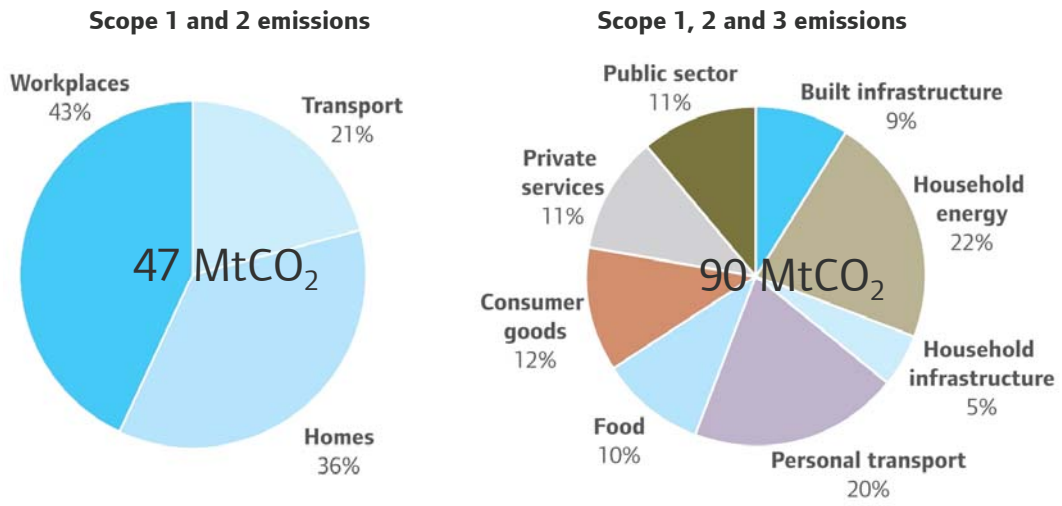
There have been a number of estimates of London's indirect CO_2 emissions. In 2009, a Bioregional and London Sustainable Development Commission report, Capital Consumption, estimated London's combined Scope 1, 2 and 3 emissions to be 90 million tonnes of CO_2 ($MtCO_2$) per year based on 2004 data[ii]. This compares to 47 $MtCO_2$ per year in 2004 for London's scope 1 and 2 emissions (please see figure 2.1).

The Capital Consumption report identified the consumption of consumer goods (particularly clothing, newspapers and audio-visual and computer equipment) and food (particularly meat, fruit and vegetables) as well as air travel and foreign holidays as significant sources of Scope 3 emissions.

The Mayor recognises that scope 3 emissions contribute significantly to London's overall carbon footprint and is committed to measuring them in order to inform how best to include these in future updates of this strategy. For further information on this please see chapter 10.

In addition, the Mayor has already begun to address Scope 3 emissions across GLA strategies and programmes. For example, the Mayor's Municipal Waste Management Strategy seeks to reduce emissions from activities associated with the collection, treatment, recovery and disposal of waste; the Mayor's Food Strategy seeks to reduce emissions associated with the production, transportation, packaging and disposal of food; and through the planning process, the Mayor requires developers to procure sustainable materials and minimise the generation of waste. For more information on these activities please see the relevant strategies at www.london.gov.uk.

Figure 2.1 Comparison of direct and indirect CO_2 emissions for London (2004)



Source: LEGGI 2004 and Capital Consumption

c) Attributing CO_2 emissions to sectors
The third principle applied to the scope of this strategy is that CO_2 emissions are attributed to different sectors (homes, workplaces, and transport) based on the point of use of energy. For instance, the CO_2 emissions produced in generating electricity used by electric transport systems, such as the London Underground, are allocated to the transport sector.

When setting out policies and actions to reduce CO_2 emissions in London, this strategy differentiates between those that relate to the supply of energy and those that relate to the use of energy. Chapter 4 identifies CO_2 savings through the supply of energy and attributes these to each sector based on its relative energy use. Chapters 5 to 8 focus on reducing CO_2 emissions from the use of energy.

d) Inclusion of greenhouse gases
Finally, this strategy only considers CO_2 emissions, rather than all GHGs, and outlines an action plan to reduce these. CO_2 emissions are by far the most significant source of GHG emissions in London, accounting for 99.3 per cent of London's CO_2 equivalent (CO_2e)[iii] emissions. Methane, nitrous oxide and other GHGs account for only 0.7 per cent of total CO_2e. This strategy therefore concentrates on CO_2 emissions[iv].

2.3 London's historical CO_2 emissions

London's CO_2 emissions are measured from a 1990 baseline. This is consistent with national and international measurement of CO_2 emissions and targets. Under the Kyoto Protocol, to which the UK is a signatory, the UK set CO_2 reduction targets in 1997. All reductions in the Kyoto Protocol are expressed as a percentage reduction relative to 1990 levels.

This strategy uses the 1990 baseline value of 45.05 $MtCO_2$ for London's CO_2 emissions, which previous Mayoral CO_2 emissions targets have been baselined against. Since 2002, London's GHG emissions have been measured through the London Energy and Greenhouse Gas Inventory (LEGGI). For more information on the LEGGI, please see box 2.1.

Box 2.1 The London Energy and Greenhouse Gas Inventory (LEGGI)

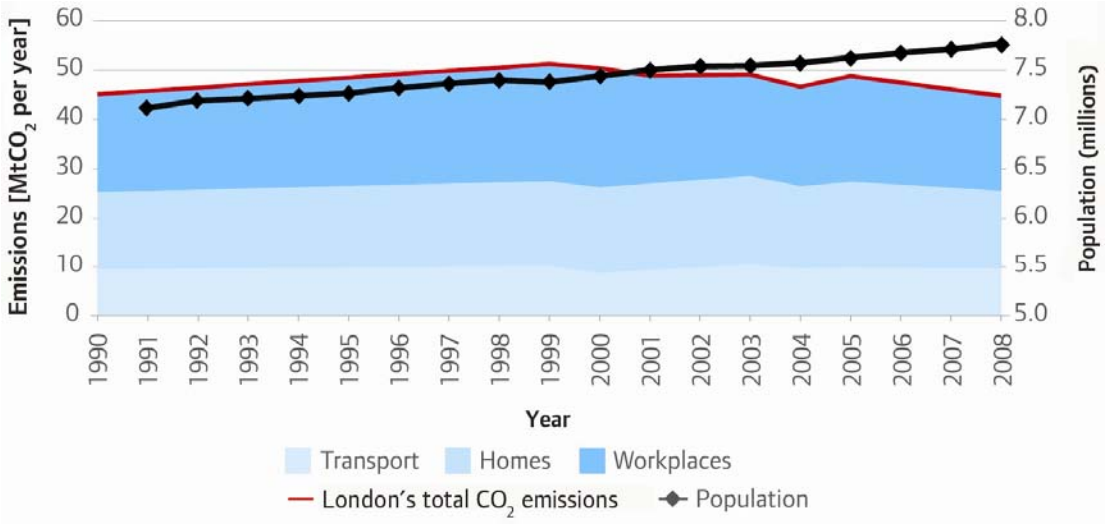
The LEGGI is a database of geographically referenced datasets of energy consumption within the Greater London area. It estimates the quantity of resulting GHGs - CO_2, methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6) - emitted into the air. The LEGGI shows energy use and

GHG emissions by source (coal, electricity, gas, oil, wastes and renewables, aviation, rail, road, transport, and shipping) allocated on an end-user basis by sector (domestic, transport, and industrial & commercial) and geographical location. The general principle is that energy use and GHG emissions are distributed according to the point of energy consumption.

The LEGGI collates data derived from national, regional and local data sources. This includes data from DECC, DEFRA, BIS, TfL and the London boroughs. The LEGGI is published online at the London Datastore at data.london.gov.uk.

As figure 2.2 shows, between 1990 and 2000 London's CO_2 emissions increased by 12 per cent to 50.31 $MtCO_2$. Most of this growth was in the workplaces sector as a result of a decade of steady growth in economic activity. Emissions from the homes sector also increased due to the growing population of London and an increase in single-occupancy living.

Figure 2.2 London's total CO_2 emissions by sector (1990-2008)



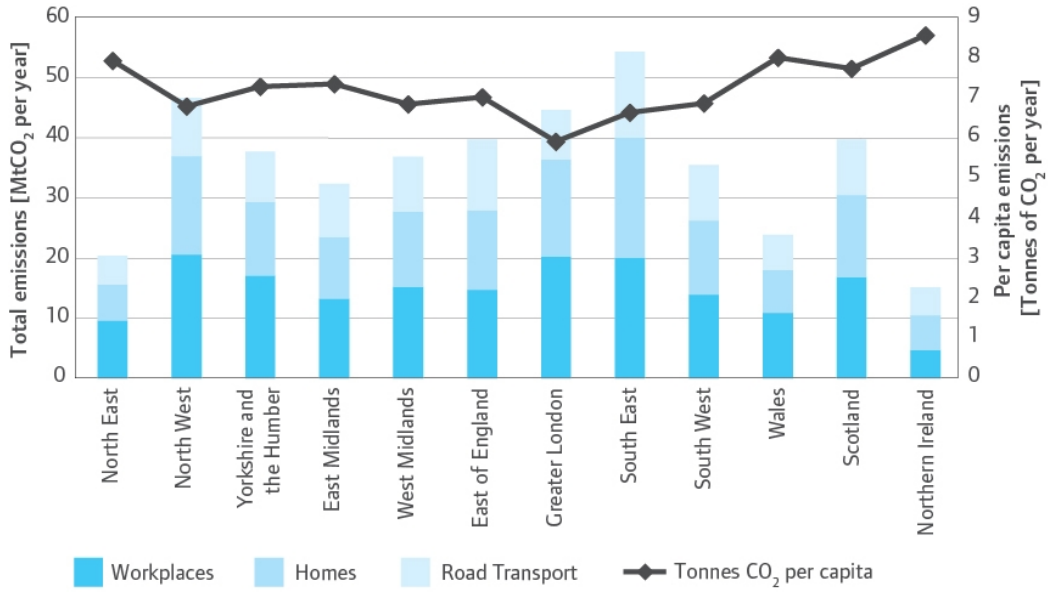
Source: LEGGI 2008 and Office for National Statistics

However, from 2000 to 2008 the capital's annual emissions dropped by 11 per cent to 44.71 $MtCO_2$ despite continued economic growth and population increase. This is due to a number of factors, primarily the lower carbon intensity of the national electricity supply over that period, and the growing proportion of London's economy accounted for by the service industry.

2.4 London's current CO_2 emissions

The most recent measurement of London's CO_2 emissions is the LEGGI 2008. It shows that in 2008 London's CO_2 emissions were 44.71 $MtCO_2$, or 8.5 per cent of the UK's total CO_2 emissions[v]. This represents a drop below the 1990 level (45.05 $MtCO_2$) for the first time since the LEGGI was set up in 2002. As figure 2.3 illustrates, on a regional basis London has the lowest per capita Scope 1 and 2 CO_2 emissions in the country at 5.9 tonnes CO_2 per person per year, well below the UK average of 7.0 tonnes[vi]. This is in part due to the capital's heavily-used public transport network and the greater reliance on private cars for transport outside of London.

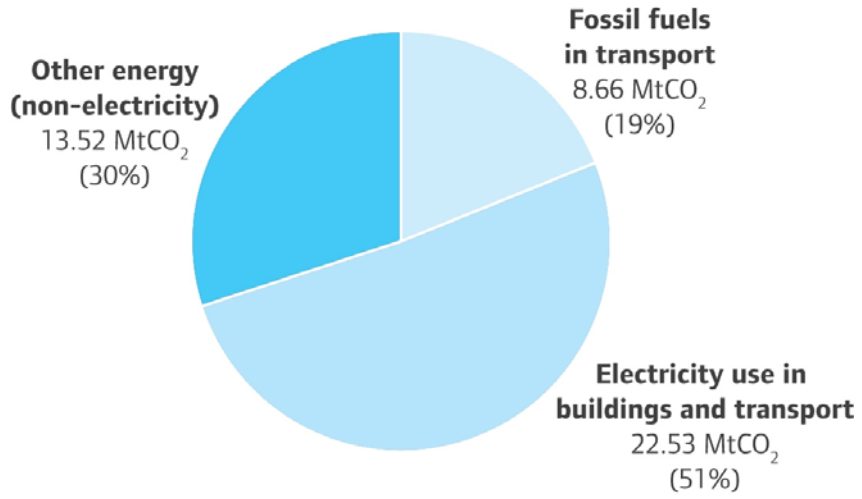
Figure 2.3 Regional CO_2 emissions by sector (2008)



Source: NI 186: Local and regional CO_2 emissions estimates for 2005-2008, DECC

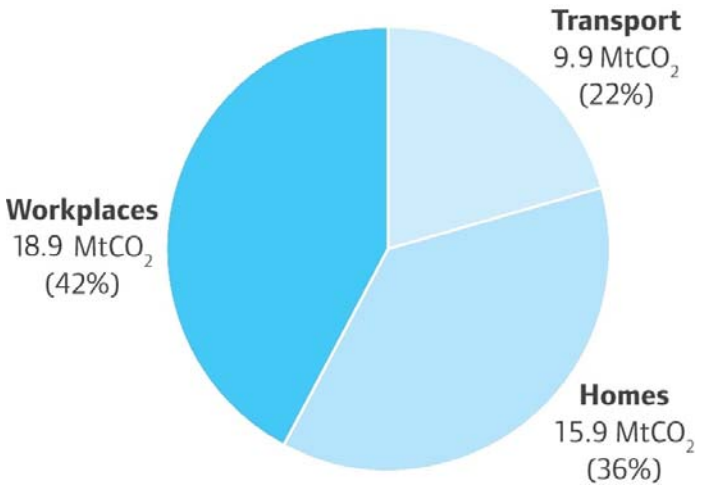
When looking at the source of CO_2 emissions in London, figure 2.4 shows that the supply and use of electricity and other fossil fuels in buildings is the primary source. Figure 2.5 shows that the highest CO_2 emitting sector in London is workplaces, at 18.9 $MtCO_2$ in 2008. The homes sector accounts for 15.9 $MtCO_2$ and the transport sector 9.9 $MtCO_2$[vii]. The Mayor is tackling emissions by reducing energy demand on a sector-by-sector basis whilst at the same time decarbonising the supply of energy.

Figure 2.4 Breakdown of London's CO_2 emissions by source (2008)



Source: LEGGI 2008

Figure 2.5 Breakdown of London's CO_2 emissions by sector (2008)



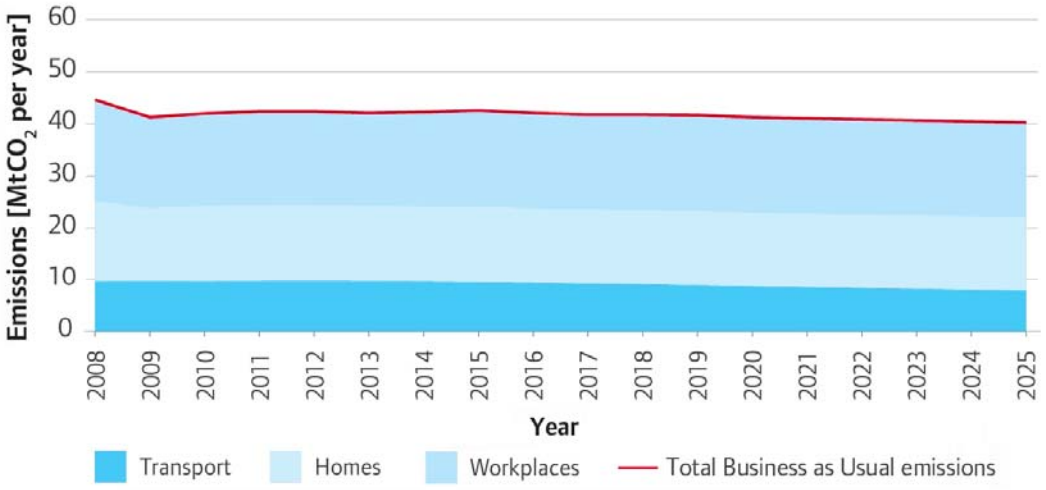
Source: LEGGI 2008

2.5 London's projected CO_2 emissions: Business as Usual

As figure 2.6 shows, if no further action were taken to reduce London's CO_2 emissions beyond that already occurring, a Business as Usual (BaU) scenario, it is projected that CO_2

emissions in the capital would fall to 40.17 $MtCO_2$ by 2025. This is an 11 per cent reduction on 1990 levels.

Figure 2.6 Projected Business as Usual CO_2 emissions in London (2008-2025)



Source: GLA modelling and DECC modelling

The BaU scenario is based on the Updated Energy Projections Base Case projected emissions scenario outlined in government's Low Carbon Transition Plan, and includes CO_2 emissions reductions from programmes which were announced prior to the publication of the UK Low Carbon Transition Plan in 2009[viii]. These include decarbonisation of the national grid through the renewables obligation, climate change agreements, building regulations and energy efficiency obligations on energy suppliers.

A dip in overall CO_2 emissions is projected between 2008 and 2010[ix]. This is a result of the global economic downturn, and mainly affects emissions from the workplaces sector. This is followed by a small projected increase in emissions as the economy emerges from recession.

By 2025, if no action were taken, homes would experience an eight per cent reduction in CO_2 emissions relative to 1990. Transport sector emissions would be expected to reduce by 15 per cent, mainly as a result of market-driven improvements in vehicle efficiency.

The corresponding BaU reduction for workplaces is projected to be 11 per cent below 1990 levels.

BaU projections are important because it is against these that future CO_2 savings are made. If BaU projections indicate that CO_2 emissions will grow considerably, this increases the relative savings required to achieve the Mayor's target to reduce CO_2 emissions by 60 per cent of 1990 levels by 2025.

2.6 Reaching the Mayor's CO_2 reduction target

To meet the Mayor's CO_2 emissions reduction targets, five sources of emissions savings are considered in this strategy:

- **BaU reductions -** These CO_2 emissions reductions are those that will occur without additional policies or intervention from the Mayor or government. It is projected that by 2025, under a BaU scenario, London's CO_2 emissions will fall to 40.17 $MtCO_2$.

- **Reductions through committed government and international action -** Government's 2009 UK Low Carbon Transition Plan sets out a range of policies to reduce the UK's CO_2 emissions. This strategy includes the CO_2 emissions reductions that are projected to result from this Plan in London, as well as updated grid electricity emissions factors using the Inter-departmental Analysts' Group (IAG) toolkit figures from the DECC Energy Model (2010). This results in a total reduction of 8.49 $MtCO_2$ per year by 2025. This includes the impact of the Energy Performance of Buildings Directive, the CRC Energy Efficiency Scheme and product policies.

- **Reductions through committed Mayoral action -** This strategy sets out a range of policies and actions that the Mayor will implement to reduce CO_2 emissions in London. This includes where the Mayor is working through the GLA group and where he is encouraging others to take action (including London boroughs and the private sector.) By 2025 it is expected these actions will reduce London's emissions by 5.84 $MtCO_2$ per year.

- **Reductions through further Mayoral action -** To meet the Mayor's targets will require further action. This strategy therefore sets out opportunities that the Mayor has identified to capture additional CO_2 savings in areas such as workplaces and transport. These proposals and the potential savings are only deliverable if there is strong support, including funding, from government. It is projected that potential

opportunities for further Mayoral action will reduce London's emissions by 3.51 $MtCO_2$ per year by 2025.

- **Reductions through further government action –** In October 2009, the Committee on Climate Change published its report Meeting Carbon Budgets - The Need for a Step Change which set out a range of additional policies to meet government's target to reduce CO_2 emissions by 80 per cent on 1990 levels by 2050. The report recommended that government adopt an Extended Ambition Scenario which includes further reductions in the carbon intensity of national electricity supply to below 200g CO_2/kWh by 2025, and an increase in the uptake of electric vehicles. If adopted this would reduce London's CO_2 emissions by a further 4.33 $MtCO_2$ per year by 2025, achieving a 60 per cent reduction in CO_2 emissions on 1990 levels[x].

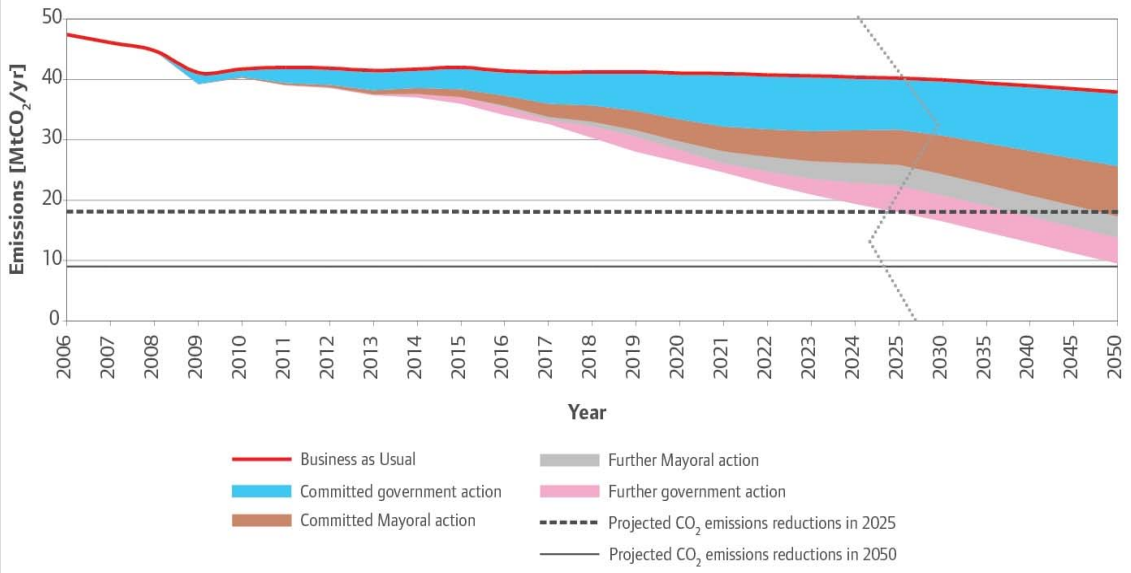
Table 2.1 sets out how the projected CO_2 emissions reductions achieved through each of the above five areas will contribute towards meeting the Mayor's CO_2 emissions reduction target. It shows that nearly 35 per cent of the projected reductions come through committed and further Mayoral action. Government action will contribute a projected 31 per cent to the 2025 target. The BaU is projected to deliver 18 per cent, and a further 16 per cent can be delivered through further government action.

Table 2.1 Projected CO_2 emissions reductions in London

Source		Total savings by 2025 ($MtCO_2$ per year)	Proportion of total savings (per cent)	Contribution to 60 per cent reduction target by 2025
BaU		4.88	18.0 per cent	10.8 per cent
Committed government action		8.49	31.4 per cent	18.8 per cent
Mayoral	Committed action	5.84	21.6 per cent	13.0 per cent
	Further action	3.51	13.0 per cent	7.8 per cent
Further government action		4.33	16.0 per cent	9.6 per cent
Total		**27.05**	**100 per cent**	**60 per cent**

Figure 2.7 shows the projected trajectory for reducing London's emissions by 60 per cent by 2025 and 80 per cent by 2050[xi].

Figure 2.7 Projected CO_2 emissions reductions in London (2006-2050)



For definitions of each category of CO_2 emissions reductions, please see pages 21-22

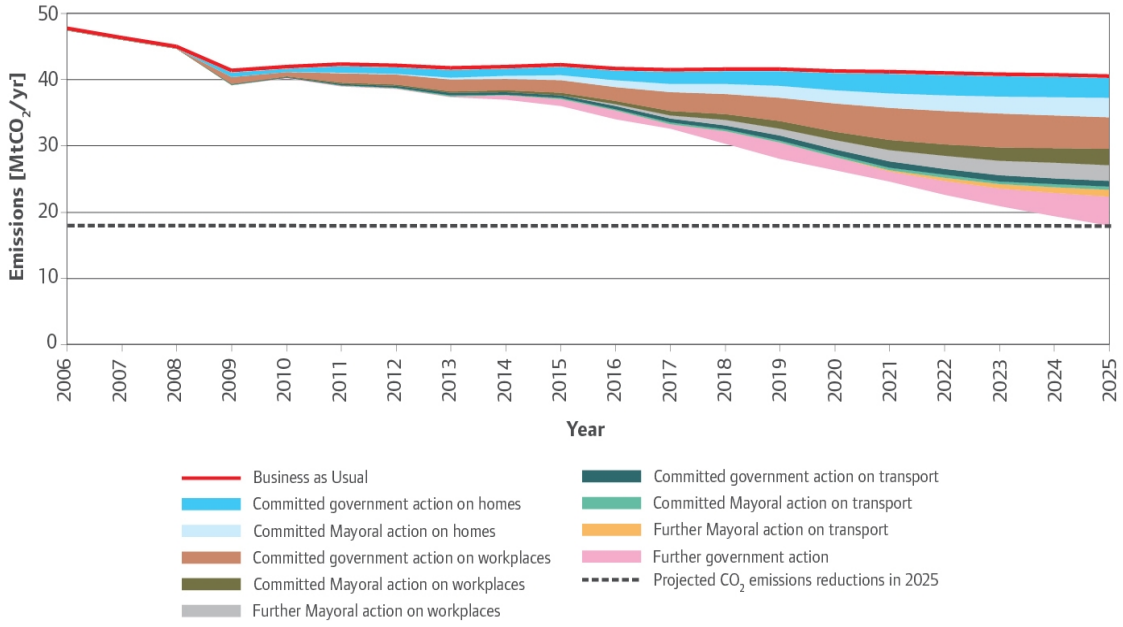
Source: GLA modelling and DECC modelling

Beyond 2025, the Mayor will seek to put in place policies and actions to reduce CO_2 emissions to 80 per cent of 1990 levels by 2050. This will bring London's CO_2 emissions down to 9 $MtCO_2$ per year, contributing 7.6 per cent to the UK's overall CO_2 reduction target for 2050, as it was in 1990. High-level analysis suggests that with a moderate increase in the scope of government and Mayoral activity this can be achieved[xii]. However, the low carbon agenda is quickly evolving due to changes in international and national policy and the availability of emerging technologies. Therefore, given the long timescales involved, this strategy will focus on policies and actions to 2025, and outline the framework for 2050.

Figure 2.8 looks at projected CO_2 emissions reductions to 2025, and breaks them down by sector. The workplaces sector sees the greatest total reductions, and percentage reductions, against 1990 levels (including BaU savings), with a reduction of 14.07 $MtCO_2$

by 2025, (a 71 per cent reduction on 1990 levels). This is due to committed government action, combined with significant savings from committed and further Mayoral action in this sector. The homes sector is projected to deliver a reduction of 8.45 $MtCO_2$ by 2025 (a 53 per cent reduction on 1990 levels), of which committed Mayoral programmes contribute over a third. Emissions from the transport sector are projected to reduce by 4.52 $MtCO_2$ by 2025 (a 48 per cent reduction on 1990 levels). This is within the context of a projected increase in the use of public transport within London. Reductions from transport could be even greater if significant action by the EU and government is taken.

Figure 2.8 Projected reductions in London's CO_2 emissions by sector and source (2006-2025)



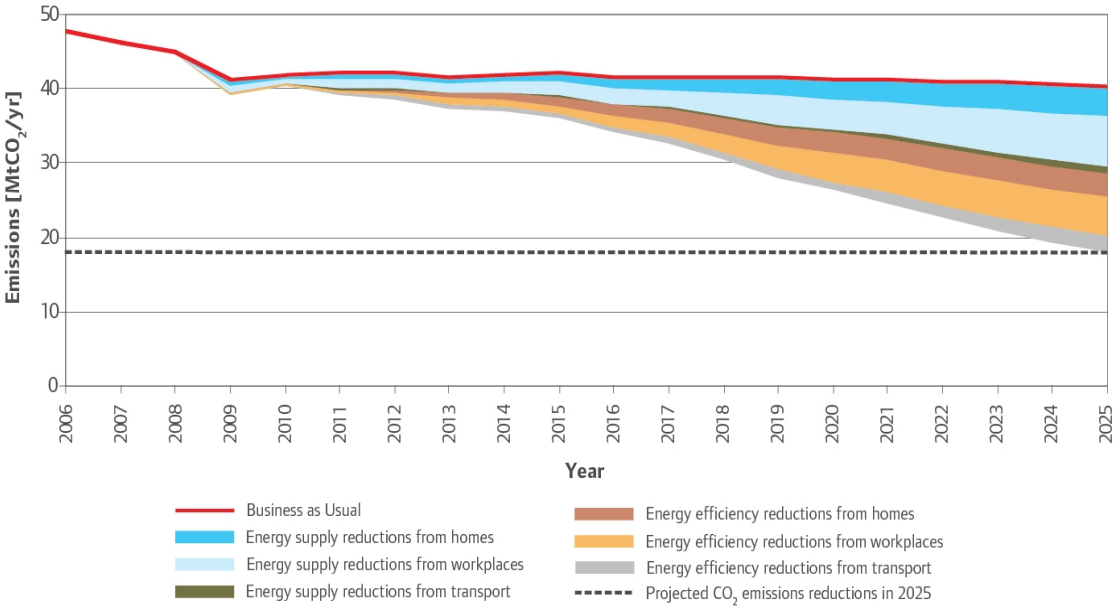
For definitions of each category of CO_2 emissions reductions, please see pages 21-22

Source: GLA modelling and DECC modelling

Figure 2.9 compares the reductions achieved through decarbonisation of energy supply to those achieved through energy efficiency measures in each sector. Overall, energy supply reductions are projected to be slightly higher than those for energy efficiency at 11.62 $MtCO_2$ and 10.54 $MtCO_2$ per year by 2025 respectively. Excluding BaU savings, the homes and workplaces sectors are projected to have a roughly even split between energy supply

and energy efficiency reductions. Energy efficiency reductions from homes are projected to be 45 per cent of total reductions in the sector, and energy supply reductions are projected to be 55 per cent. In the workplaces sector, energy efficiency reductions are projected to be 43 per cent of total reductions, and energy supply reductions 57 per cent. In the transport sector the difference is greater with energy efficiency reductions projected to be 73 per cent of total reductions, largely due to the switch from conventional vehicles to electric vehicles.

Figure 2.9 Breakdown of projected reductions in London's CO_2 emissions by energy efficiency and energy supply (2006-2025)



For definitions of each category of CO_2 emissions reductions, please see pages 21-22

Source: GLA modelling and DECC modelling

2.7 Taking action to reduce London's CO_2 emissions

Based on the evidence and modelling set out in this chapter, the remaining chapters of this strategy set out the policies and actions that will reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025, secure a low carbon energy supply for London, maximise the economic opportunities these activities create, and meet, and where possible exceed, national targets for climate change mitigation and energy.

Endnotes

[i] Defra, Guidance on How to Measure and Report Your Greenhouse Gas Emissions (2009)

[ii] Bioregional and the London Sustainable Development Commission, Capital Consumption: the transition to sustainable consumption and production in London (2009)

[iii] CO_2 equivalent is used to compare GHGs, based upon their global warming potential.

[iv] The GLA Act 1999 (as amended in 2007) requires the Mayor to include in this strategy proposals and policies relating to minimising carbon dioxide emissions and 'other significant greenhouse gases'. These GHGs are defined as those "which contribute to climate change, and which the Mayor considers it appropriate to deal with in the strategy." Given the overwhelming contribution CO_2 emissions make to GHGs in the Greater London context (99.3 per cent of London's GHG emissions in 2008) the Mayor considers that it is not appropriate for this strategy to address other GHG emissions.

[v] DECC, 2009 final UK greenhouse gas emissions: data tables (2011)

[vi] DECC Statistics, Local and regional CO_2 emissions estimates for 2005-2008 (2010)

[vii] The LEGGI attributes CO_2 emissions associated with the use of electricity for transport purposes, such as for powering the London Underground and electric vehicles, to the workplaces sector. To reflect the end use of this energy, for the purposes of this strategy, this has been re-allocated to the transport sector.

[viii] This is the most recent modelling for the impact of government CO_2 emissions reduction programmes.

[ix] DECC, Low Carbon Transition Plan (2009)

[x] Updated grid electricity emissions factors were applied using the Medium Investment Scenario figures of the Committee on Climate Change's Fourth Carbon Report (2010)

[xi] On average, from 2026-2050, Mayoral action in this strategy, combined with government action, is projected to reduce London's emissions by a further 0.25 $MtCO_2$ year-on-year.

[xii] To achieve the 80 per cent target by 2050 shown in figure 2.7, government is expected to deliver an additional reduction in CO_2 emissions of 0.15 $MtCO_2$ each year between 2025 and 2050, whilst the

Mayor is expected to deliver an additional 0.1 $MtCO_2$ reduction each year. Reductions from further government action are predicted to remain constant and will deliver no additional savings beyond that achieved in 2025.

CHAPTER THREE

MAKING LONDON ONE OF THE WORLD'S LEADING LOW CARBON CAPITALS

SUMMARY

Vision

By 2025, London is one of the world's leading low carbon capitals. It is driving demand in its growing low carbon sectors and the wider economy, and is maximising low carbon investment into London using its strengths, leadership and size. Londoners have the skills and knowledge to access the significantly expanded number of jobs in low carbon sectors, as well as those jobs in value chains supporting the global low carbon economy.

The Mayor will contribute towards this through the following policies:

- **Policy 1 - Combining London's existing economic strengths with its influence and capacity to drive demand for, and attract inward investment in, the low carbon economy -** The Mayor will work with partners to grow the low carbon economy in London by creating real market demand for low carbon goods and services, and by using London's leadership, size and existing strengths to attract inward investment into, and jobs in, the low carbon economy and its value chains.

- **Policy 2 - Helping Londoners to gain the skills and experience needed to participate in the low carbon economy -** The Mayor will work with partners to understand the skills needed to support the low carbon sector in London, create appropriate training opportunities through the Mayor's programmes, and coordinate the requirements for low carbon skills training and employment support. This will aim to ensure that Londoners can develop the skills and knowledge required by businesses in the emerging low carbon economy, in order to compete effectively for the jobs created within it.

The Mayor's main actions to deliver this are:

- **The London Green Fund -** This is a £100 million revolving fund set up to invest in environmental infrastructure projects and market development in the areas of waste management, decentralised energy and energy efficiency. It aims to leverage further funding to create a fund of £500 million.

- **The Green Enterprise District -** Covering six boroughs in east London, this project will help London become a world-leading low carbon capital. It will promote clusters of low carbon businesses and will draw in large-scale investment for innovative low carbon technologies ranging from energy generation to low carbon transport.

- **The Low Carbon Employment and Skills Programme –** A suite of projects, including the Mayor's London Apprenticeship campaign, delivered with partners such as the Low Carbon Skills Forum, that will help enable Londoners to access sustainable employment within London's low carbon economy.

3.1 Introduction

This chapter builds on the evidence set out in chapter 2 on the scale of CO_2 emissions reductions required to achieve the Mayor's targets. A cost effective transition to a low carbon society is vital from an economic perspective as well as an environmental one. London stands to capture huge economic benefits from establishing itself as a global leader of the low carbon transition.

The Mayor believes that this transition is achievable and indeed, is already happening. London is already realising benefits thanks to a suite of strategic actions that the Mayor is taking to maximise London's competitive advantages in the global low carbon market.

The drive for low carbon economic growth cuts across the entire economy, not just the environmental and clean technology sectors. Chapters 4-9 of this strategy set out how the Mayor is reducing the carbon intensity of London's activity. This chapter therefore explains the economic developments that will deliver reductions in carbon intensity, the opportunities for London within the global low carbon economy, and the key policies and actions the Mayor will pursue to realise these opportunities.

3.2 London's current position in the global low carbon economy

Before setting out how London will make the transition to a low carbon capital, it is important to understand London's current position. The global low carbon and environmental goods and services sector is made up of specialised companies (over 80 per cent of their sales into this sector) and supply chain companies (between 20 per cent and 80 per cent of their sales into this sector) and then divided into three distinct sub-sectors: the environmental sector, the renewable energy sector and the emerging low carbon sector[i]. These sectors were estimated to be worth over £3 trillion in 2007-08[ii], of which the UK market was estimated to be worth £106 billion. London made up just under £21 billion of this.

In 2011, the Mayor commissioned the London Low Carbon Market Snapshot[iii]. This report assessed global markets for low carbon and environmental goods and services, and the value of London's share of this. It found that over 9,000 companies are active in this

sector in London, and together they are employing 160,000 people. In addition, despite the economic downturn, the value of London's low carbon and environmental goods and services sector has grown by over four per cent a year, with sales to a value of over £23 billion in 2009-10.

The Snapshot found that in 2009-10 London's market was made up as follows: £4 billion in the environment sector, £7.1 billion in the renewable energy sector, and £12 billion in the emerging low carbon sector. The largest overall sub-sectors in London were carbon finance, geothermal, wind, building technologies, and alternative fuels. London's strengths compared to other UK regions were in carbon finance, geothermal, photovoltaics and waste management.

These figures illustrate the potential for growth in these sectors, representing a real opportunity for London's businesses if they are able to capture a share of this market.

3.3 Committed government action on the low carbon economy

Government has begun to define the national landscape of the low carbon economy. The 2009 UK Low Carbon Transition Plan and Low Carbon Industrial Strategy identified specific sectors and sub-sectors in a global low carbon marketplace where the UK has, or could develop, a competitive or commercial advantage. These include offshore wind, ultra-low carbon vehicles and low carbon buildings and construction.

Government's flagship initiative to provide investment in infrastructure required over the next 40 years to meet the UK target to reduce carbon emissions by 80 per cent of 1990 levels by 2050 is the Green Investment Bank (GIB) (please see box 3.1 for more information). In addition, government has committed to a floor to the carbon price for electricity generation from April 2013 to provide a stronger, more stable carbon price to give confidence to energy investors. The price will start at around £16 per tonne of CO_2 and move to a target price of £30 per tonne in 2020.

Although this activity in government is beginning to set the framework for the development of a low carbon economy, the Mayor believes that more can and should be done in London.

Box 3.1 The Green Investment Bank

Government has announced its intention to establish the independent GIB in 2012-13 to address market failures and investment barriers that have prevented financing of low carbon infrastructure at the speed and scale required in the UK. Government will initially capitalise it with £3 billion (an initial £1 billion and a further £2 billion from the sale of government assets) to catalyse activity until 2015-16 from when it will have borrowing powers, once the target for debt to be falling as a percentage of GDP has been met.

In 2010 an independent commission proposed that the GIB could help catalyse low carbon investment by: unlocking project finance by equity co-investment or risk mitigation products; creating green bonds to access capital markets; and developing green ISAs.

In May 2011 government announced that the GIB will tailor and target financial investments that can help to overcome risk aversion, high transaction costs and the resulting lack of capital, and complement other policies. A wide range of sectors are likely to be eligible for intervention, likely starting with offshore wind, non-domestic energy efficiency, and waste. These priority sectors are likely to change over time as the low carbon economy develops.

Implementation will consist of three phases:

- **Incubation -** From April 2012 to the establishment of the GIB, government will make direct financial investments to accelerate investment in the green economy.

- **Establishment -** Following state aid approval, the GIB will be established as a stand-alone institution.

- **Full borrowing -** From 2015-16 the GIB will be given powers to borrow (subject to public sector net debt falling as a percentage of GDP). This will enable the upscaling of the GIB's activity.

3.4 Opportunities for, and challenges to, becoming one of the world's leading low carbon capitals

To transform London into a world-leading low carbon capital a number of challenges will need to be overcome, along with a number of opportunities that it will need to be maximised, including:

a) Opportunity: Seizing the low carbon market opportunity for London
New Energy Finance estimated that the existing £3 trillion global market for low carbon environmental goods and services could increase by at least an additional £368 billion per year through to 2030 if global CO_2 emission targets are to be met[iv]. If London were to secure even one per cent of the forecast global spend on these additional low carbon products and services, the equivalent to its global market share of GDP, then it could realise an additional £3.7 billion of economic opportunities annually through to 2025[v].

In part this is driven by the growing recognition that the use of fossil fuels will become increasingly expensive due to a combination of increasing costs of extraction and processing, along with increasing demand for them. This is fundamentally changing the status quo, making energy efficiency and clean energy technologies increasingly attractive sectors for investment. The United Nations Environment Programme estimated that investment in alternative energy technologies exceeded that in traditional fossil fuel sources for the first time in 2008.

b) Opportunity: Economic stimulus packages creating market opportunities for London
As a result of the Kyoto Protocol, and more recently the United Nations Climate Change Conferences in Copenhagen and Cancun, a number of countries have started providing detail on their position on CO_2 reductions. For example, the EU has set a target of a 20 per cent reduction in CO_2 emissions by 2020, and China has set a binding goal to cut CO_2 per unit of GDP by 40-45 per cent below 2005 levels by 2020.

In addition, a number of the economic stimulus packages announced in response to the global recession of 2008-09 have committed significant resources to delivering low carbon growth. For example:

- China allocated more to green investment than any other country; approximately 38 per cent of China's ¥4,000 billion (£368 billion) economic stimulus package was allocated to green themes[vi].

- The US administration passed America's Reinvestment and Recovery Act (ARRA), which included US$94 billion (£58 billion) in green stimulus funding. Activities included support for electric vehicles and their supply chains.

- In South Korea, the Green New Deal expanded to a five-year growth plan with total planned expenditures of ₩107 trillion (£57.2 billion), about two per cent of the country's GDP. It aimed to create 1.5 to 1.8 million jobs by 2013 and economic value of ₩182 trillion (£97.3 billion) to ₩206 trillion (£110 billion).

- The French government dedicated €400 million (£348 million) in state support for the development of electric and plug-in hybrid charging infrastructure. Working with 100 large enterprises to aggregate demand for electric vehicles, they have created a committed order for 100,000 vehicles.

- Germany instituted two economic stimulus packages. The first package, in November 2008, was worth approximately €25 billion (£21.8 billion) and the second package, in February 2009, was worth €50 billion (£43.6 billion).

Looking forward, the low carbon market opportunity is likely to grow as more countries set ambitious CO_2 reduction targets and fund programmes that will drive demand and create market opportunities.

These programmes will not all be delivered and supplied exclusively by local contractors; the resulting supply and value chains will create market opportunities for international organisations operating in these sectors. Consequently national, regional and city governments around the world are looking to see how they can support their businesses to be competitive in this market.

c) Opportunity: Building on London's strengths - promoting the right initiatives
London is uniquely positioned to realise the full benefits of this market opportunity. The following five areas of existing strengths can be built on and combined to provide London with a competitive advantage:

- **Scale -** London has nearly eight million people, over three million homes, over 300,000 businesses and enterprises, and employs nearly five million people. In addition, 24 million transport trips are taken every day. The city's size and complexity means that it is uniquely placed to stimulate demand for low carbon goods and

services. London can deliver low carbon programmes at a sufficiently large scale to attract investment opportunities, for example building energy-from-waste facilities or decentralised energy networks.

- **Financing -** London is one of the world's leading financing centres[vii] and is well placed to enable innovation in the financing of low carbon investment opportunities. For example, it has a leading position in the provision of finance for clean technology companies and projects: 90 per cent of the 34 private venture capital-backed clean technology companies are located in London. In addition London is trading around two thirds of all global transactions in emissions permits, with around 39 per cent of the Clean Development Mechanism market being traded in London. London is the location for over 75 per cent of all carbon market trading desks and it hosts 80 per cent of all carbon market brokering firms.

- **Research and development -** London is favourably positioned to reap the rewards of its innovative world-class research institutions. There are 17 universities and 80 departments focusing on various areas of the low carbon economy, especially climate change, renewable technologies and electric vehicles. These include the London Colleges of Imperial College, King's College and University College and the London School of Economics. London is a world leading research centre in areas including: carbon capture and storage (CCS); advanced concepts of photovoltaics such as organic and nano-structured solar cells; and the development of specific biofuels. London is also the UK's centre for innovation, with London-based companies estimated to be responsible for more than half of the total UK research and development (R&D) annual spend.

- **Business services -** London is already a world leader in many business services. For example it is the global centre for the legal profession, housing four of the world's top five law firms. It is also well represented in consultancy, including environmental and engineering consultancy. London is ranked first in Europe and second overall to Hong Kong in the Mastercard Centres of Commerce Business Centre ranking. In the Global Financial Centres Index, London is ranked first globally[viii].

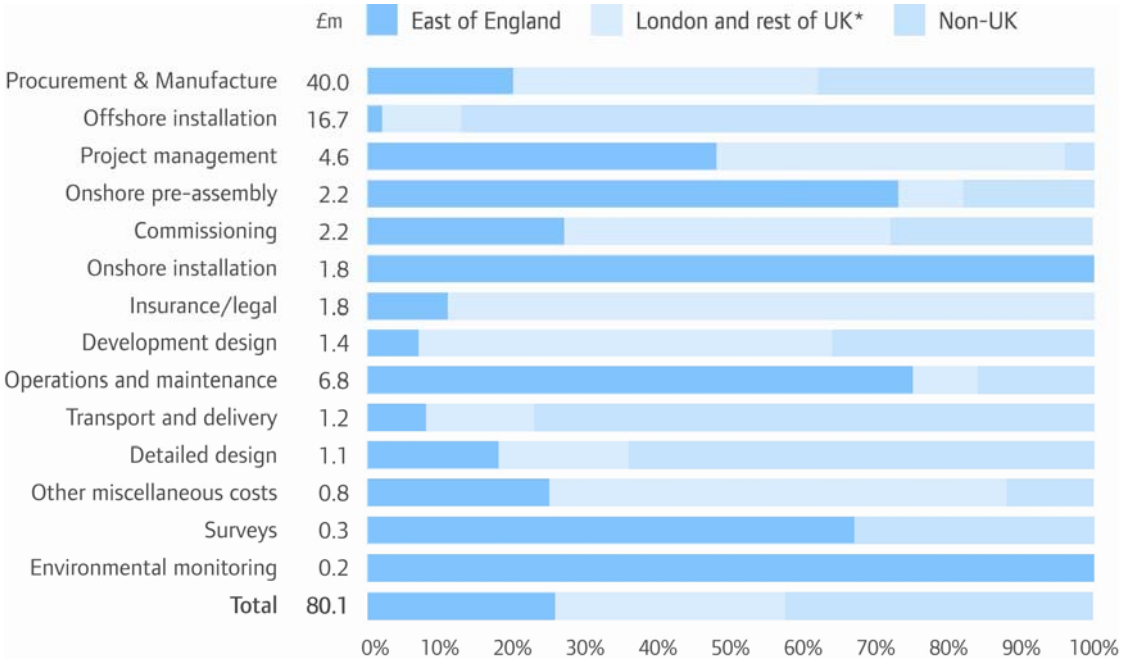
- **Leadership -** London has committed to ambitious targets for CO_2 emissions reduction and is devoting significant resources to establishing itself as a leader in the global transition to a low carbon economy. To maximise this, the Mayor is focusing support and resources to help London's existing economy to maintain and increase its competitiveness in the low carbon economy, as well as building further on its existing strengths.

The Scroby Sands case study in box 3.2 and figure 3.1 illustrates how London is already using its strengths to generate economic activity. Table 3.1 gives an indication of London's strengths versus other cities to attract inward investment.

Box 3.2 Case study - Scroby Sands: Creating economic opportunities across the value chain

Scroby Sands is one of the world's largest marine renewable technology projects, located 3km off Caister in the East of England. It required £80 million to finance and build the project which has 7 gigawatt (GW) of capacity. London was able to win a share of the market opportunity represented by this project by leveraging its strengths across the value chain. Figure 3.1 below demonstrates where London and the rest of the UK's businesses contributed significantly to the project. The areas where London was the primary provider of services were procurement, project management, commissioning (financing), insurance and legal.

Figure 3.1 Contribution to Scroby Sands project by region and project stage



Source: Ernst & Young

* London is the primary provider with the exception of manufacturing, onshore pre-assembly and other miscellaneous costs

Table 3.1 London's strengths versus other cities to attract inward investment

Overall city/ ranking	**Green credential**	**Size of local economy**	**Global brand**	**Infrastructure**	**Skills** (Workforce)	**R & D**	**Commercialisation**	**Finance**	**Business services**	**Manufacturing**
	Carbon footprint per capita, emission target	GDP per capita, population	No. of global firms, global city brand power	Internet and broadband access per 1,000 population, length of motorway per vehicle, airfreight disembarked and embarked per 1,000 population	Labour productivity, gross monthly earnings, managers per 1,000 employees	Per capita spend on HEI, per capital spend on R&D by public sector, per capita spend on R&D by private sector, employment in R&D per 1,000 population	No. of patents registered per million population, private equity $ per capita	World's best financial cities index ranking, Global Financial Centres Index	Employment in business services sector per 1,000 employees	Employment per 1000 in automotive industries, hi-tech manufacturing and machinery and equipment manufacturing
London (1)	=2	=1	1	2	1	3	=3	1	1	4
Paris (2)	=2	=1	2	3	2	1	=3	2	2	3
Stockholm (3)	1	2	4	1	3	2	1	=3	5	2
Munich (4)	=2	=3	5	5	4	4	2	=3	4	1
Madrid (5)	3	=3	3	4	5	5	4	4	3	5

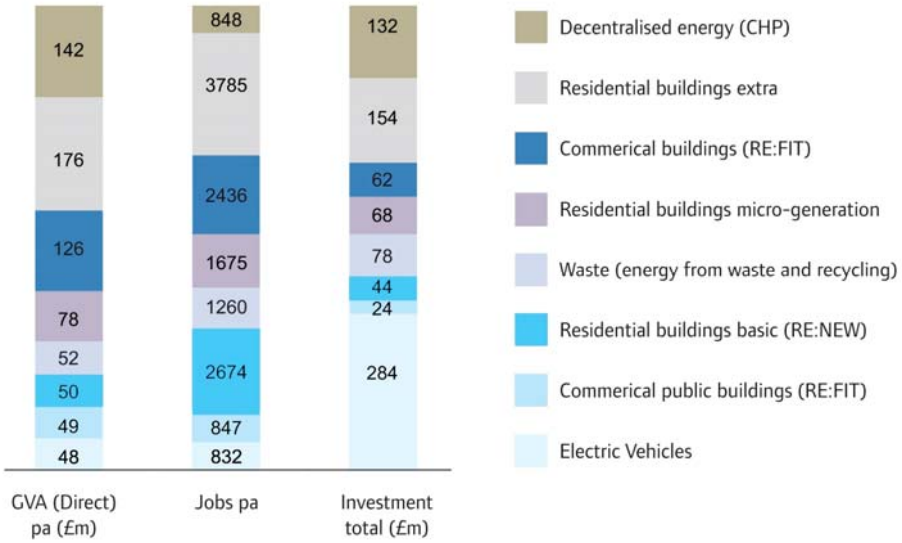
Source: Ernst & Young, Prospectus for London, the Low Carbon Capital, 2009

d) Opportunity: The Mayor's climate change mitigation programmes

The Mayor's climate change mitigation programmes, as set out in this strategy, are helping London build on these strengths. Implementation of the Mayor's climate change mitigation programmes is stimulating further private sector investment in London: a type of green new deal for London. This will be even more important following recent reductions in public sector funding. Under a most likely scenario, the Mayor's programmes alone will attract an average of £845 million investment per annum through to 2025. This investment would not only result in an estimated average of 14,000 (gross) jobs per annum and £720 million per annum in gross value added (GVA) to the UK economy, but would at the same time deliver part of the activity and infrastructure needed to meet London's target to reduce CO_2 emissions by 60 per cent of 1990 levels by 2025.

Figure 3.2 illustrates the estimated economic benefits that London could generate from delivering the Mayor's climate change mitigation programmes along with the estimated level of investment required to deliver them. As can be seen from the graph, there are real economic benefits from pursuing large-scale retrofitting activity in London's building stock. Only 41 per cent of the investment is estimated to create over 80 per cent of the jobs and 66 per cent of the GVA. More details of the homes and public sector building retrofit programmes can be found in chapters 5 and 6 of this strategy.

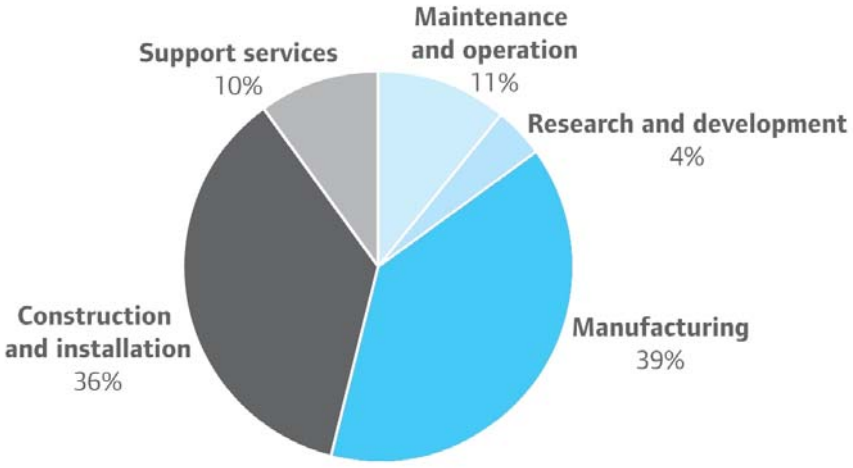
Figure 3.2 Projected GVA, investment and jobs through the Mayor's climate change mitigation programmes by 2025



Source: Ernst & Young, Prospectus for London, the Low Carbon Capital, 2009

Figure 3.3 breaks down the economic opportunities that will be generated through delivery of the Mayor's climate change mitigation programmes across the value chain. This shows that the majority of the opportunity in the value chain lies in the manufacturing and the construction and installation sectors. This activity will take place in London and consequently represents a considerable opportunity for London's businesses. There are also a range of opportunities for London in light of the strengths identified in this chapter especially in the areas of R&D, financial services and business services.

Figure 3.3 Potential GVA by source from the Mayor's climate change mitigation programmes



Source: Ernst & Young, Prospectus for London, the Low Carbon Capital, 2009

Retrofitting of London's buildings creates a significant proportion of the economic opportunities set out in figure 3.2. For example, the following proportions of GVA by source are anticipated to come through Mayoral retrofitting programmes alone: 27 per cent of R&D GVA, 46 per cent of support services GVA, 91 per cent of the manufacturing GVA, 63 per cent of the construction and installation GVA and 55 per cent of the maintenance and operation GVA. This underlines the economic value of rolling out large-scale retrofitting as well as its important contribution to the Mayor's target to reduce CO_2 emissions by 60 per cent CO_2 of 1990 levels by 2025.

e) Challenge: Global markets mean global competition

Whilst London has genuine opportunities to become a leading low carbon capital there are also challenges to overcome. London will not be the only city developing its economic

base to access the low carbon market place. A significant number of countries and major cities around the world are positioning themselves to win a share of the emerging low carbon market and attract inward investment.

For example, Toronto has set up an innovative carbon mitigation fund, Singapore is actively attracting clean technology funds through a series of financial incentives, and Tokyo is in the process of setting up an emissions trading scheme and supporting trading exchange. Competition is stiff and London will need to act swiftly and decisively to ensure it develops a position of pre-eminence in this emerging marketplace. This includes understanding what more can be done to create the conditions and brand to attract the leading international companies to invest in London rather than in other global cities.

f) Challenge: Lack of investment in low carbon technologies
In addition to global competition, there is currently a lack of available investment funds to research, commercialise and develop low carbon technologies and solutions. Research into global clean technology investment has found that the UK is ahead of Europe but behind the USA[ix].

The main barriers to unlocking investment in the low carbon economy are:

- a lack of investor understanding around low carbon technologies and the level of risk associated with using unproven technology and innovations
- unwillingness of both private and public sector procurers to purchase unproven or new technologies at scale
- the fragmentation of demand that prevents large-scale investments
- a shortage of skills.

To overcome this, public sector demand and investment must be effectively directed to stimulate private sector investment in clean technologies at scale, as well as ensuring clean technology innovations generated by London's world renowned research institutions can be more effectively commercialised.

3.5 Mayoral action to position London as a world-leading low carbon capital

The previous sections of this chapter have set out the current status of the low carbon economy in London and the opportunities for, and challenges to, developing it. This section sets out the Mayor's approach to the low carbon economy in London and the policies and actions to achieve this.

To realise London's ambition of becoming a world-leading low carbon capital, it must deliver on a number of fronts. It will need to:

- Position itself, where appropriate, at the forefront of the UK's priority low carbon sectors, by identifying where London's strengths lie in the value chain of each of those sectors. Government has identified sectors where the UK can take a global lead such as energy efficiency, CCS, wave and tidal energy, offshore wind, nuclear, and low carbon vehicles.

- Identify and develop its existing strengths, skills, knowledge and expertise in the low carbon sector so that it is able to compete in a growing global low carbon marketplace.

- Create the conditions that drive low carbon growth and stimulate demand for, and market opportunities in, the low carbon economy.

In 2010 the Mayor commissioned research across the public, private and third sectors to explore the barriers, enablers and opportunities to meet these objectives. From this research, core work areas have been prioritised to accelerate London's transition to a world leading low carbon capital[x]. These areas are closely inter-related, aligned to the Mayor's ambitions for London, and are working alongside existing programmes to drive inward investment and the transition to a low carbon economy. The work areas are:

- **Securing London's low carbon prosperity -** Retaining and promoting growth in London's existing areas of economic and market strength within the low carbon economy. For example the Mayor is continuing to work with the London Stock Exchange and FTSE, following the re-launch of the Environmental Opportunities Indices in March 2011, to promote the Indices to pension funds and institutional investors.

- **London showing the way and setting the standard -** Capitalising on London's position as a leading global city by combining a coherent range of economic,

environmental and social policies with pioneering low carbon programmes. For example, working with public and private sector partners, including the National Physical Laboratory and the London Sustainable Development Commission, to develop London's expertise in carbon measurement, reporting, and standards monitoring. This will help to promote London's leadership position in technical verification to support carbon trading.

- **Making London's size count -** Using the demand created by London's climate change mitigation programmes to develop financing mechanisms that will help fund the retrofitting of London's existing building stock and the delivery of supporting environmental infrastructure. For example, working closely with London's financial institutions to make the London Green Fund attractive to private sector investment.

- **Establishing London as a low carbon innovator and exporter of low carbon solutions -** Optimising London's existing low carbon R&D strengths by improving knowledge transfer, increasing awareness of existing sources of funding, and creating a clearer connection between private sector demand and low carbon R&D. For example, identifying opportunities for utilising public sector programmes to support innovation in low carbon technologies.

- **Attracting the green pound to London -** Driving low carbon inward investment in London by better targeting and communicating London's existing centres of excellence, its points of differentiation, and the availability of targeted incentives. For example, working with inward investment agencies, including London and Partners, to proactively target inward investment that implements proposals for the Green Enterprise District in east London, and supports development of the low carbon economy.

- **London government leading by example -** Driving and aggregating demand for low carbon goods and services through London's public sector organisations working together through their procurement activities. For example, identifying priority areas and strategic goals for public sector low carbon procurement.

The Mayor has developed two policies and a number of supporting actions to implement this approach.

POLICY 1: COMBINING LONDON'S EXISTING ECONOMIC STRENGTHS WITH ITS INFLUENCE AND CAPACITY TO DRIVE DEMAND FOR, AND ATTRACT INWARD INVESTMENT IN, THE LOW CARBON ECONOMY

Vision

By 2025, London is one of the world's leading low carbon capitals. It is driving demand in its growing low carbon sectors and the wider economy, and is maximising low carbon investment into London using its strengths, leadership and size.

Vision to policy

The Mayor will work with partners to grow the low carbon economy in London by creating real market demand for low carbon goods and services, and by using London's leadership, size and existing strengths to attract inward investment into, and jobs in, the low carbon economy and its value chains.

Policy to action

a) Securing London's low carbon prosperity

- **Action 1.1 -** The Mayor will work with partners in the financial sector, including the London Stock Exchange and the FTSE, to actively promote the existing Environmental Technology and Opportunities Indices and identify wider opportunities for attracting private sector finance into London's low carbon economy.

- **Action 1.2 -** The Mayor will use London's designation as a Low Carbon Economic Area for energy efficient buildings to establish itself as a market leader in this sector by working with national, regional and local partners from the public, private and third sectors.

- **Action 1.3 -** The Mayor will continue to identify London's existing strengths in the low carbon economy and this will inform his approach to developing focussed business support programmes to help London capitalise on its sectoral strengths.

b) Showing the way and setting the standard

- **Action 1.4 -** The Mayor will provide political leadership by ensuring all his strategies provide London with a consistent and coherent policy framework for making the transition to a low carbon economy, whilst actively encouraging both government and London boroughs to do the same.

- **Action 1.5 -** The Mayor will continue to work with the National Physical Laboratory and National Measurement Office to pursue their goal of establishing a London-based Centre for Carbon Measurement.

c) Making London's size count

- **Action 1.6 -** The Mayor will use London's climate change mitigation programmes to stimulate and aggregate demand for low carbon products and services and will promote the market opportunities created by them for London's businesses.

- **Action 1.7 -** The Mayor will support the development of financing mechanisms, such as the London Green Fund, that will lever investment into large-scale, pan-London programmes to tackle climate change, such as retrofitting buildings, and developing London's capacity to generate low and zero carbon energy supply.

- **Action 1.8 -** The Mayor will actively encourage government to ensure that the Green Investment Bank is established quickly, and that it supports and complements the activities of the London Green Fund.

d) Establishing London as a low carbon innovator and exporter of low carbon solutions

- **Action 1.9 -** Working with partner organisations, such as universities, the Mayor will run a low carbon technology competition for London's students with a prize for the best new ideas.

- **Action 1.10 -** The Mayor will work with the public and private sector to explore opportunities for securing additional sources of funding, such as European funds, for businesses to develop low carbon innovation, research and business activity.

e) Attracting the green pound – Investing in London

- **Action 1.11 -** The Mayor will work with London and Partners and other inward investment agencies to use the Low Carbon Capital and Green Enterprise District programmes to promote London's initial low carbon investment priorities internationally and coordinate activity aimed at attracting inward investment for the low carbon economy.

- **Action 1.12 -** The Mayor will implement proposals for the Green Enterprise District in east London, and will work with public and private sector partners to identify and develop its existing geographical and sectoral strengths in the low carbon economy.

f) London government leading by example

- **Action 1.13 -** The Mayor will continue to promote the procurement of low carbon goods through the Mayor's Green Procurement Code, and work with partners from the public sector to investigate further how London can use joint procurement to stimulate demand for low carbon goods and services.

a) Securing London's low carbon prosperity

As set out in the previous sections of this chapter, London's strengths in the low carbon economy lie in its financial and business services, creative industries, R&D, and in its ability to offer venture capital and clean technology funding. The Mayor is providing political leadership to help London build on these strengths and attract investment to help establish it as a world-leading low carbon capital.

Low carbon finance

London leads the world in carbon trading and, furthermore, houses the London Stock Exchange (LSE). The LSE is one of the world's leading stock exchanges and hosts the Alternative Investment Market (AIM) for smaller growing companies. Since its launch in 1995, over 3,000 global companies have joined the AIM. The LSE has found that every £1 in listing revenues generates £1,000 in revenue for business services such as professional fees, so growth in this market will provide real economic benefit to London and the UK.

In June 2009, the FTSE Environmental Opportunities Index was launched to complement the existing Environmental Technology Index series and help investors identify investment opportunities in the environmental and renewable energy sectors.

London's carbon trading strength, the LSE, the FTSE Environmental Indices and the AIM combine together to position London as a leading destination for low carbon finance. Maintaining London's leading position in the low carbon finance sector will:

- drive investment into the low carbon economy by providing a route to national and international finance for new and fast-growing low carbon enterprises
- enable the development of new technologies
- provide a platform for leadership in carbon management
- help to provide an exit route for early-stage venture capital investors.

To maintain London's leading position in low carbon finance the Mayor is working with the LSE to promote the Environmental Indices. The FTSE Environmental Opportunities UK Indices have 90 London listed stocks, with a market capitalisation of £55 billion, 73 of which are London listed and based in the UK. In March 2011, the Mayor re-launched the Indices at the LSE. In addition, the Mayor will support FTSE in promoting the Indices to pension funds and institutional investors and raise awareness of the Environmental Indices as an investment and exit route with venture capital firms.

London as a Low Carbon Economic Area for energy efficient buildings

London and the Thames Gateway have been designated as a Low Carbon Economic Area (LCEA) for energy efficient buildings. This recognises London and the Thames Gateway as the UK region that is leading the way in the energy efficient buildings sector. The programme will enable London to harness the scale of the market opportunity in the region with London's existing strength in this sector, by developing world-leading skills, knowledge and expertise in this rapidly expanding sector of the low carbon economy.

The LCEA programme brings together a range of projects that are being undertaken in London to improve the energy efficiency of the existing building stock, the key ones being RE:NEW, RE:FIT and RE:CONNECT. It aims to aggregate demand created by these programmes, identify the innovation opportunities within the sector, and identify the skills required to capitalise on the job opportunities that will be created by a growing market demand for retrofitting buildings. The Mayor is working to share expertise with other regions of the UK to support them in delivering leading-edge retrofitting programmes. For example, the Mayor has already invested in the development of the Centre for Efficient and Renewable Energy in Buildings (CEREB) at London South Bank University (LSBU). Opened in 2010, this is the UK's first inner-city green technology research centre, and is sharing low carbon building solutions in London. Box 3.3 provides more information on CEREB.

An important element of the LCEA programme is the FLASH project being led by the Institute for Sustainability and partly funded by London's European Regional Development Fund (ERDF). The project is capturing the learning from an extensive range of research and demonstration projects, such as the Technology Strategy Board's Low Impact Building Programme, along with existing knowledge about improving the environmental performance of existing buildings. It will then use this as a platform to work with trade bodies such as the Federation of Master Builders to assist London-based SMEs that wish to develop their knowledge, skills and expertise in the energy efficient building sector.

Box 3.3 Case study - Centre for Efficient and Renewable Energy in Buildings

The Centre for Efficient and Renewable Energy in Buildings (CEREB) is a unique teaching, research and demonstration resource for the built environment. It showcases different renewable and low carbon energy solutions for which performance data is captured for research and teaching.

Located at roof level of the London South Bank University K2 teaching facility, CEREB brings together innovative technologies built into the centre itself. It has the ability to showcase developing technologies and to trial new products in a real life setting where the results can be closely monitored. This makes CEREB a unique resource for understanding how to design, operate and manage technologies for future low carbon buildings - both for new build and retrofit.

CEREB has been developed in partnership between London South Bank, City and Kingston Universities, and students are exposed to a range of technologies that the built environment needs to embrace in order to provide sustainable buildings for the future.

Capturing and analysing the data from the building systems will enable the centre to provide detailed information and knowledge to industry on the best use of low carbon technologies in buildings. The data from the monitoring systems will be available via web interfaces that will allow it to be used for collaborative research worldwide, giving the centre an important international dimension.

Teaching room at CEREB

Identifying further strengths

In addition to building on London's existing strengths, the Mayor is also identifying further strengths in the low carbon and environmental goods and services sector. In 2010, the Skills for a Low Carbon London research[xi] was published. It identified five sub-sectors

of the low carbon environmental goods and services sector as being significant in terms of employment numbers, market value and growth potential to London. These are carbon finance, geothermal, wind, alternative fuels, and building technologies.

The London Low Carbon Market Snapshot[xii], published in 2011, updated this. It highlighted total sales and employment in low carbon and environmental goods and services in London by sub-sector, and broke this down by location to each London borough. It also highlighted which sub-sectors have grown or declined over the past three years and identified sub-sectors with potential for further growth.

The Mayor is disseminating this information to London boroughs and other partners, including inward investment partners, to help inform their policies and programmes to drive the low carbon and environmental goods and services sector in London. The Mayor will continue to use this, and other appropriate sources of information and data, to continue to identify London's existing strengths in the low carbon economy and inform the approach that the Mayor takes to developing focused business support programmes to help London capitalise on its sectoral strengths.

b) Showing the way and setting the standard
In addition to building on London's strengths, the Mayor is also committed to demonstrating London's leadership in the transition to a low carbon economy by aligning and co-ordinating his strategies, for example through the London Plan and Economic Development Strategy as well as this strategy. The Mayor will act to promote London as a leader in the low carbon economy by presenting the best of London's innovative low carbon policies to government and businesses. In a number of areas the Mayor will actively encourage government to better align and improve existing policy and legislation to support the growth of the low carbon capital. The Mayor will also work with the London boroughs towards the more joined-up implementation of low carbon policy across London and the development of large-scale Londonwide programmes. This will provide the level of certainty that the private sector needs to encourage investment. Specific recommendations are set out in chapters 4-9 of this strategy.

However, London cannot achieve its full potential in isolation. The Mayor will therefore encourage government to develop the policy, regulatory and fiscal framework that stimulates both the supply and demand sides of the low carbon economy and its related supply chains. This includes lobbying for tax breaks for green industries and incentivising low carbon investment.

Finally, the Mayor is working with the National Physical Laboratory and National Measurement Office to pursue the goal of establishing a world-leading, London-based Centre for Carbon Measurement. This is evidence of London's leadership in an area fundamental to supporting the development of carbon trading activity. It will work to develop a standardised approach to carbon accounting. This can then be promoted to global partners in an attempt to encourage the development of an internationally recognised and standardised approach.

c) Making London's size count

The investment required to meet the Mayor's target to reduce CO_2 emissions by 60 per cent of 1990 levels by 2025 has been estimated to cost in the region of £40 billion. As stated in chapter 1 of this strategy, the Mayor is increasingly using public sector money to make investments in climate change mitigation and energy programmes that are capable of being rolled out at scale across London. The aim is to catalyse the market by sharing the risk associated with these projects, illustrate their commercial viability and then attract greater levels of private sector investment to fund their large-scale rollout.

The Mayor is therefore working to stimulate and aggregate demand for large-scale climate change mitigation programmes through RE:NEW, RE:FIT, RE:CONNECT, and decentralised energy programmes. These programmes, if rolled out and financed as proposed, will create investment opportunities in excess of £14 billion[xiii]. This creates a major low carbon investment opportunity for the private sector.

The London Green Fund

The Mayor is already putting unprecedented levels of funding into climate change programmes, and the Mayor's key mechanism for attracting significant amounts of private sector investment is the London Green Fund. One hundred million pounds of public sector money has been invested in the London Green Fund, with an aim to attract at least a further £100 million of private sector funding. The medium-term aim is that as the Fund demonstrates to investors its ability to make a return on its investments, it will leverage further funding from other government sources, development banks, sovereign funds and infrastructure funds to achieve a fund size upwards of £500 million. The aim is for the Fund to invest at least £100 million in environmental projects by December 2015.

The London Green Fund has been established by using the Joint European Support for Sustainable Investment in City Areas (JESSICA) mechanism for delivering the ERDF. JESSICA allows member states of the European Union (EU) to invest a proportion of their

EU grant funding to make repayable investments in projects, thereby creating a revolving investment fund for the regeneration of urban areas.

The London Green Fund has been established as a Holding Fund, managed by the European Investment Bank and is made up of £50 million from the ERDF and £50 million in match funding from the Mayor and London Waste and Recycling Board (LWaRB).

The London Green Fund is aimed at creating commercial templates that will act to spur on markets in new financial asset classes. It will do so by providing equity, loans or guarantees to projects at an early stage of their development or construction phase where project risks are higher, to encourage further commercial investments in environmental projects of this nature.

The London Green Fund is in a position to take a longer-term view of the scale and timing of financial returns expected from their investments than the commercial markets, particularly in the current economic environment. Once projects have demonstrated a track record and financial return, the London Green Fund will be able to realise its original investments, in part or in full, for re-investment in similar activity.

The Fund consists of two Urban Development Funds (UDFs). The waste UDF opened in March 2011 and will make equity investments in waste projects in London. Thirty-five million pounds has been allocated from the London Green Fund, and the fund manager Foresight Group is seeking to raise up to £200 million, including a further £35 million from local authority pension funds and a range of other investors.

The second UDF, the London Energy Efficiency Fund (LEEF), opened in Autumn 2011 and is managed by Amber Infrastructure Group Ltd. It will invest in projects to retrofit London's buildings, particularly public sector building stock, with energy efficiency and renewable energy measures. LEEF has been allocated £50 million from the London Green Fund, and like the waste UDF, will seek to match this with private finance, taking the total investment to £100 million.

The remaining £14 million in the London Green Fund will initially be held in the Holding Fund before being allocated to the UDFs for investment before 2015.

These UDFs are managed by reputable external fund managers to ensure projects are fully analysed from both a financial and environmental perspective prior to investment. The

process allows the Mayor and LWaRB to determine the strategic objectives for the fund and its investment criteria whilst the independent fund manager ensures that the fund is focussed on investment and delivery.

Linking the London Green Fund and the Green Investment Bank

The Mayor sees the GIB, and especially its ability to borrow money, as essential to catalysing the flow of private sector finance and supporting London and the UK in making a cost effective transition to a low carbon economy. The Mayor is encouraging government to ensure that this timetable is at least maintained and accelerated if the opportunity arises.

The Mayor is also actively encouraging government to ensure that the GIB provides support for his climate change priorities. These include those that have been prioritised by the London Green Fund, such as decentralised energy and energy efficiency, as well as the potential to provide initial funding for the Green Deal. Chapters 4, 5 and 6 have further information on the Mayor's priorities for funding.

d) Establishing London as a low carbon innovator and exporter of low carbon solutions

In addition to building on London's strengths, setting the policy framework, and attracting the required investment for London's future low carbon economy, the Mayor believes that translating R&D into commercial opportunities will be a key driver for growth in the low carbon economy.

Supporting research in, and deployment of, less market-proven technologies can strengthen London's position as an innovative location capable of financing, developing, demonstrating and commercialising low carbon solutions for the 21st century.

London is the centre for UK innovation with London-based companies responsible for more than half of the total UK R&D spend of £21 billion. It has the largest carbon capture and storage (CCS) research programme in the UK and is also a world leader in advanced concepts of photovoltaics and in the development of biofuels.

The factors above, combined with the concentration of businesses and financial institutions provide London with an inherent position of strength within the low carbon R&D and innovation sector. In 2008, the UK hosted 34 private venture capital backed clean technology companies with a cumulative total of £186 million invested in them; of

these over 90 per cent were located in London. Germany followed with 25 companies with £123 million invested, and France had 12 companies with £30 million invested.

However, new low carbon technology companies find it difficult to access funding, and those that are funded often do not reach commercialisation. Venture capital funding is not spread evenly across the supply chain, is not evenly available across the size of investments, and tends to be concentrated in proven technologies. There is a risk that key low carbon technologies could be developed outside of London and pull highly-skilled people to these centres.

The Mayor will continue to support a number of projects through the ERDF that enable businesses and R&D institutions to invest in innovation, product development and business support. The projects provide support in areas including: business growth and advice, such as the Enterprise Europe Network London; innovation and collaboration, such as Knowledge Connect; and finance, such as the London Technology Fund and Understanding Finance for Business.

The Mayor will actively promote existing support through existing networks to ensure businesses and research centres are fully aware and able to take advantage of these programmes.

The Mayor will also work with partners in the public and private sector to assess the existing provision of support for innovation, technology development and wider climate change mitigation business support in order to understand where gaps exist. This will include a review of ERDF projects and its remaining budget, to understand how this can be used to support development of the low carbon and environmental goods and services sector. Programmes in this area will include opportunities to look at embodied energy within supply chains so that innovation is being deployed effectively to reduce the carbon footprint of London, through both direct and indirect CO_2 emissions.

The Mayor's low carbon prize

The Mayor is working with education and business partners to establish a competition for students with the most promising new ideas to reduce CO_2 emissions from buildings in the capital. London has one the highest concentrations of universities in the world and some of the world's leading teaching and research institutions. The Mayor believes that capturing the creativity and innovation of London's undergraduate and postgraduate students can play a big part in developing the solutions that will reduce CO_2 emissions in

London and stimulate the low carbon economy. The winners will receive funding to develop their ideas, and promotional support by the Mayor.

Encouraging innovation and exporting low carbon solutions

The real economic value of innovative solutions is in their capacity to solve a problem that can be exported beyond London into a global marketplace. By demonstrating that their low carbon products and services work in a big city setting, London's businesses will be well placed to export them nationally and internationally.

London's challenges are also its strengths. London's scale, with over 300,000 businesses, 3.2 million households and nearly eight million residents, creates a vibrant market for goods and services, but also a complex and intensive business environment. While London is one of the world's leading finance centres, this puts pressure on the infrastructure that supports the city and Canary Wharf. There is therefore an opportunity for London businesses to develop solutions to low carbon economy challenges in a major world city and export these internationally.

The Mayor is working with London Higher to understand how London could harness the knowledge and expertise in its leading research institutions to support London to develop and bring to market low carbon solutions. As an example, the Mayor is looking at how he can work with the data centre industry and London's R&D sector to develop high performing, energy efficient data centres. This will enable data centres to expand their operations to meet demand whilst reducing the energy they consume. Such innovations would not only benefit London's businesses directly, but could also be exported to the rest of the world.

e) Attracting the green pound - Investing in London

In addition to the above actions, the Mayor is also actively promoting London's low carbon economic activities. The Mayor is committed to attracting investment in the low carbon economy and encouraging innovation in low carbon technologies. To kick-start this, the Mayor has published the Low Carbon Capital action plan as well as the Green Enterprise District study.

The Mayor is working with London and Partners and other inward investment agencies to use the Low Carbon Capital and Green Enterprise District programmes to promote London's initial low carbon investment priorities and coordinate activity aimed at attracting inward investment for the low carbon economy.

London has had significant success historically in encouraging sectoral clustering, for example in the creative and cultural industries, and the legal and financial sectors, to help drive economies of scale. These already provide key strengths for London in the low carbon economy, having diversified their offer to respond to the growing demand across the value chain for environmental goods and services.

There are also a number of emerging geographical clusters that are specialising in low carbon industries, for example in the London Sustainable Industries Park at Dagenham Dock. Industrial and brownfield land in London presents opportunities for inward investment by target sectors such as the automotive, energy efficient buildings, waste management, wind power component manufacture and servicing, and low carbon housing systems sectors.

The Mayor is building on these sectoral and geographic strengths by identifying the Green Enterprise District, in east London, as a priority area for investment by low carbon enterprise. The Green Enterprise District study sets out the low carbon investment opportunity in east London in detail and has already begun to attract inward investment to the area in the form of an innovation and visitor attraction that will be built by Siemens.

The Mayor is implementing agreed proposals for the Green Enterprise District in east London. This includes working with public and private sector partners to identify where London has existing geographical and sectoral strengths in the low carbon economy and grow these clusters as it makes its transition to the low carbon economy. For more information on the Green Enterprise District, please see the case study in box 3.4.

Box 3.4 Case study – The Green Enterprise District

The Green Enterprise District lies at the heart of the Mayor's action plan to position London as a leader in the low carbon economy. The district has two complementary objectives: to build a vibrant economy focused on green enterprise; and to develop a sustainable environment that people want to live and work in as well as visit. The area will incorporate exemplar housing schemes, sustainable infrastructure networks, R&D projects and visitor attractions.

Located in the Thames Gateway, the district is poised to maximise green investment into the largest concentration of protected industrial land use in London. It covers 48 km^2 of land across six east London boroughs.

The district is already home to innovative new green projects such as the Sustainable Industries Park, the planned London Thames Gateway Heat Network and the Siemens Pavilion; a £30 million landmark exhibition centre which will publicly showcase the sustainable technologies needed to bring about the transition to a low carbon society.

The district is building on the momentum from these initial successes. The district seeks to create high-value green jobs and supply chains in three key sub-sectors: environment (for example, waste management, recovery and recycling); renewable energy (for example, biomass, wind and photovoltaics); and emerging low carbon (for example alternative fuel vehicles, alternative fuels and building technologies).

London's inward investment agencies are working with a pipeline of cutting-edge companies interested in establishing a presence within the district. A number of businesses have already showed potential interest in locating to the district and they could generate up to 1,500 jobs. These companies span the breadth of the district's targeted sub-sectors, offering diverse sustainability solutions ranging from low carbon transport, to wind power, to building retrofit, to household and industrial recycling initiatives.

Artist's impression of the Siemens Pavilion in the Green Enterprise District

f) London government leading by example

The final area under policy 1 of this strategy is the role of London's public sector in leading the way in driving the transition to a low carbon economy.

London has already been successful in encouraging the public and private sectors to procure lower carbon goods and services through the Mayor of London's Green Procurement Code. The Code provides a support service offering organisations a range of tools and guidance to reduce their environmental impact through responsible purchasing practices, with the aim of driving demand for sustainable products and services that use fewer natural resources and consume less energy or water in production or use. The Mayor

will continue to stimulate demand for low carbon products through the Mayor of London's Green Procurement Code.

The Mayor is also keen to build on this, working with public sector partners to ensure London's public sector bodies are setting the standard in using their spending power to drive market demand for low carbon environmental goods and services.

Catalysing growth in the low carbon economy through the public sector's own procurement will: promote inward investment in the low carbon economy, creating a demand for local labour; achieve economies of scale which will, in turn, incentivise low carbon procurement; demonstrate leadership in the low carbon economy; and stimulate low carbon R&D by demonstrating and de-risking low carbon purchasing solutions.

London's boroughs alone are responsible for a supply chain worth over £9 billion[xiv]. Together with the GLA group and the health sector, this presents a huge opportunity to stimulate demand in low carbon markets whilst driving down carbon emissions related to their activities through low carbon procurement activities. Whilst the public sector landscape in London is extremely complex, there are a number of real examples where organisations are already developing joint procurement initiatives. Therefore the Mayor will concentrate on supporting this activity and building upon it to bring forward a diverse range of low carbon procurement initiatives from across London's public sector.

The Mayor will identify priority areas and strategic goals for public sector low carbon procurement, such as establishing a way of recognising best practice and innovation in municipal procurement of low carbon technologies. This will be complimented by evaluating international models of best practice and assessing if they could be replicated or adapted for use in London.

The GLA group is committed to this approach and chapter 9 of the strategy illustrates how the GLA group is already working towards this goal and the areas of activity it has already embarked on.

POLICY 2: HELPING LONDONERS TO GAIN THE SKILLS AND EXPERIENCE NEEDED TO PARTICIPATE IN THE LOW CARBON ECONOMY

Vision

By 2025, Londoners have the skills and knowledge to access the significantly expanded number of jobs in low carbon sectors, as well as those jobs in value chains supporting the global low carbon economy.

Vision to policy

The Mayor will work with partners to understand the skills needed to support the low carbon sector in London, create appropriate training opportunities through the Mayor's programmes, and coordinate the requirements for low carbon skills training and employment support. This will aim to ensure that Londoners can develop the skills and knowledge required by businesses in the emerging low carbon economy, in order to compete effectively for the jobs created within it.

Policy to action

a) Maintaining London's clear and consistent employment and skills evidence base to inform present and future activity needed to support the low carbon sector in London

- **Action 2.1 -** The Mayor will continue to use, update and promote information on the current low carbon employment position, future projections for the low carbon sector in London, and the skill sets and occupations required to ensure a transition to a low carbon capital.

b) Creating jobs and training opportunities through the Mayor's climate change mitigation programmes

- **Action 2.2 -** The Mayor will utilise the lessons learned through the Retrofit Employer Accord Pilot when developing his climate change mitigation and energy programmes, to capitalise on the skills and employment opportunities they create for Londoners.

- **Action 2.3 -** The Mayor will develop procurement levers, such as in contracts, to ensure the Mayor's low carbon investment programme delivers local employment, skills and apprenticeship opportunities throughout the supply chain.

- **Action 2.4 -** The Mayor will work with London's largest existing environment employers as part of his apprenticeship programme to develop opportunities for Londoners in the low carbon sector, whilst developing a better understanding of the range, nature and level of skills these organisations require to help London become a low carbon capital.

c) Working with London partners to coordinate and identify the requirements for low carbon skills training and employment support

- **Action 2.5 -** The Mayor will continue to work with the Low Carbon Skills Forum, which has a membership from across the public, voluntary and private sectors, to ensure London's low carbon skills gaps continue to be understood and future provision is being stimulated to meet the emerging requirements of the sector.

To ensure that Londoners can access the job opportunities created by the low carbon economy they will need to have the necessary skills and experience. This policy therefore addresses how the Mayor and partners can help ensure that Londoners know what the necessary skills and experience are and how they can develop them.

The Mayor's Low Carbon Employment and Skills Programme is supporting Londoners to benefit from the job and wider economic opportunities that London's transition to a low carbon economy represents. The Low Carbon Employment and Skills Programme comprises three elements:

- creating a clear and consistent labour market evidence base

- creating jobs and training opportunities through the Mayor's climate change mitigation programmes

- working with national and regional partners to ensure the provision of skills and employment support is available to meet the emerging requirements of the low carbon sector.

The following actions set out how the Mayor is delivering these three elements.

a) Maintaining London's clear and consistent employment and skills evidence base to inform present and future activity needed to support the low carbon sector in London
There is currently insufficient information on low carbon jobs and skills in London, which constrains the development of effective programmes to get more people into green jobs. The Mayor is undertaking a programme of activities to map London's future low carbon skills requirements and training provision. These are helping London identify the most practical and cost effective ways of meeting London's needs.

The Mayor is working alongside BIS and DECC, sector skills councils, its own programme delivery partners and employers to ascertain future market demand, identify potential skills shortages and possible interventions required. This includes:

Low Carbon Skills for London research

The Low Carbon Skills for London research has created an evidence base for London, identifying current and future employment projections and analysing the skill and occupation levels required. This report has placed particular emphasis on those growth sub-sectors of the low carbon economy that can provide employment opportunities for London's workless population. Consequently this report concentrated on a slightly narrower definition of the low carbon and environmental goods and services sector by excluding carbon finance, which makes up about a quarter of the sector in London due to it being a major global financial centre. The key findings of this research are:

- In 2008-09 approximately 100,000 people were employed in the low carbon sector (excluding carbon finance) in London. Applying growth assumptions to this labour market, it is estimated that the low carbon sector will deliver 18,000 net jobs by 2012-2013. These new jobs will occur in sectors, such as energy efficiency and energy supply, waste-to-energy and low carbon transport, where existing programmes are stimulating demand and creating market opportunities for businesses that supply low carbon goods and services.

- The skills profile is characterised by high skills with more than one in two employees having at least a degree. However, a quarter of all jobs are at level 2 and below suggesting opportunities exist for low-skilled and workless Londoners.

- Higher education provision is well developed and likely to generate an excess supply of low carbon graduates.

- In contrast, the further education sector has yet to fully respond to the potential of the low carbon economy and may require market stimulation.

OECD International Research

This research focuses on challenges faced by labour markets at national and local levels to adapt to the low carbon demands of the economy. The project compares national strategies on employment, economic and workforce development between London and other parts of the world. The Mayor will use this to demonstrate and disseminate best practice. This will be completed in 2011.

The London Low Carbon Market Snapshot

This report includes carbon finance in its definition of the low carbon and environmental goods and services sector. According to this updated market analysis that uses data from 2009-10[xv], employment in the sector has grown, during the height of a recession, from 157,000 in 2008-09 to 160,000 in 2009-10. This illustrates that around 3,000 new jobs have been created in the sector during the year and these are mainly in the low carbon sub-sector.

These pieces of research and other relevant work undertaken with, and by, partners will help inform the development and delivery of the Mayor's climate change mitigation programmes so that they help to create jobs and training opportunities in the sector.

b) Creating jobs and training opportunities through the Mayor's programmes

Research has suggested that if the Mayor's climate change mitigation programmes are delivered in full they could create between 10,000 and 15,000 average annualised jobs (gross) each year by 2025[xvi].

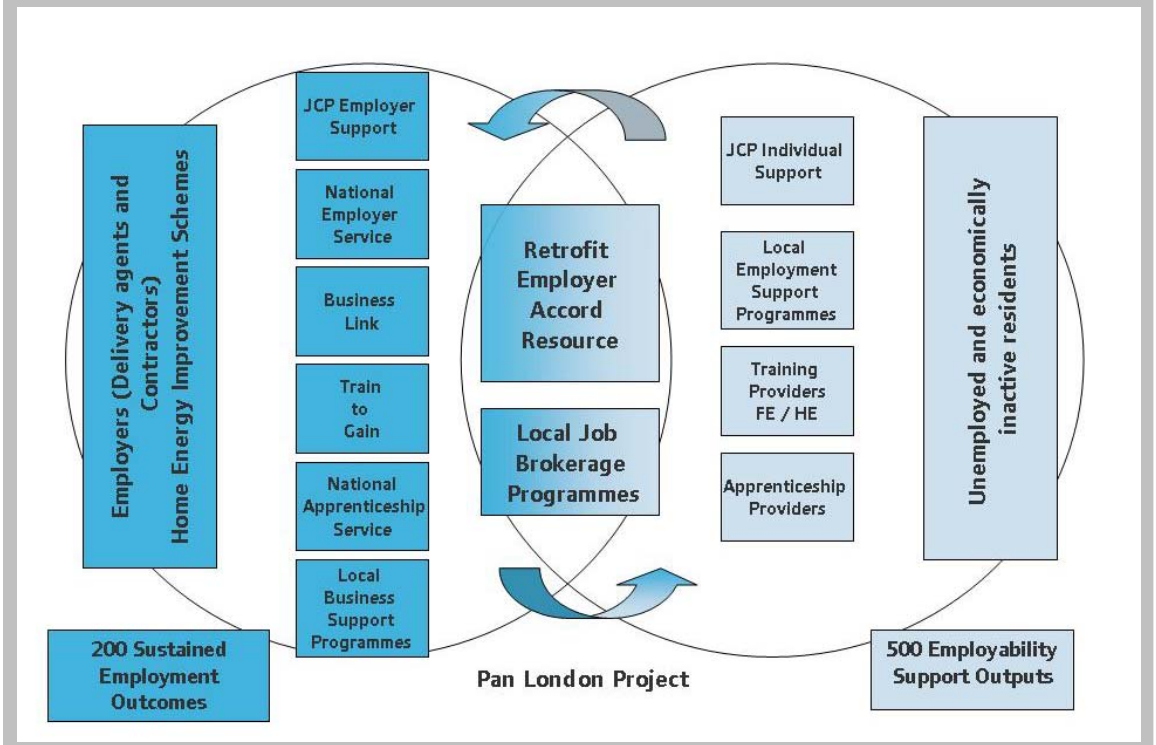
To support Londoners to develop the skills and expertise to access and benefit from these opportunities, as part of the Low Carbon Employment and Skills Programme, the Mayor has already delivered the Retrofit Employer Accord Pilot (REAP), a pilot aimed at testing a brokerage delivery model which is linking the skills and employment opportunities arising from the RE:FIT and RE:NEW programmes to London's long-term workless. Box 3.5 sets out more detail on the REAP project.

Box 3.5 The Retrofit Employer Accord Pilot

The REAP project was an innovative one year pilot project which sought to link workless Londoners to the jobs arising from the Mayor's retrofit programmes and use this to develop an understanding of how future programmes can best be procured to maximise local job and supply-chain opportunities.

It had four main objectives: source long-term jobs for workless Londoners; test the brokerage model for applicability in the low carbon sector; identify if there was a need for public sector intervention; and inform the development and design of future programmes.

Six separate projects delivered a brokerage model across London whereby an employment broker worked with the contractors delivering retrofit activity and identified suitable workless candidates to fill new positions. The below figure demonstrates how the REAP project operated.



The project provided employment support and bespoke training to over 350 workless Londoners between April 2010 and March 2011, of which over half were in either information, advice and guidance, or as energy assessors. As a result of that training over 44 candidates have already gained employment through the project. Over 65 per cent of those jobs were related to retrofitting activity either as energy assessors or installers of energy efficiency measures. Trainees from the programme will continue to be linked to the jobs arising from the RE:NEW programme rollout across London during 2011-12.

The main learnings from this pilot were:

- there needs to be a contractual agreement within the programme to provide employment opportunities for the unemployed and this can support an organisation's Corporate Social Responsibilities objectives
- there should be one broker or point of contact for organisations and people to work through
- those organisations supporting people into employment, such as JobCentre Plus, should recognise the employment opportunities that the low carbon and environmental goods and services sector offers and have an appropriate category for it
- there is a need for tailored and relevant training so that people are job–ready.

The Mayor is using the findings of the REAP project and other projects to develop the approach in procuring his climate change mitigation programmes, such as RE:FIT and RE:NEW. This is helping create opportunities for local employment, training and apprenticeships throughout the supply chain.

In addition, the Mayor will utilise his very successful London Apprenticeship Campaign to develop apprenticeship opportunities for Londoners in the low carbon and environmental goods and services sector. The Mayor's London Apprenticeship Campaign was launched in November 2010 in partnership with the National Apprenticeships Service (NAS) and by July 2011, the Mayor's campaign saw a total of 28,000 people finding places on schemes with companies across a wide range of the capital's business sectors. The campaign is particularly focused on companies in sectors that traditionally are not linked to

apprenticeships. The Mayor will approach some of London's largest existing low carbon and environmental sector employers as part of his apprenticeship programme to help develop opportunities for Londoners in the low carbon sector.

c) Work with London partners to coordinate and identify the requirements for low carbon skills training and employment support

In addition to brokerage and collecting an evidence base, the Mayor has established the Low Carbon Skills Forum to help implement a programme to develop low carbon skills in London. The Forum brings together key stakeholders, including sector skills councils, London Councils, the Skills Funding Agency, Jobcentre Plus, employer representatives, and education and training providers. It aims to build an understanding of the skills and occupation needs and demands required in the transition to a low carbon capital, and to identify how best to meet those needs.

The Forum will continue to establish and actively disseminate an understanding of London's skills and employment needs for making its transition to a low carbon capital. It will also identify those actions that the employment and skills system needs to undertake in order for it to effectively support this transition, including ensuring that skills and employment opportunities are effectively opened up to all Londoners and benefit the London economy.

The five priorities that the Forum has initially identified to pursue are:

- identify low carbon opportunities for London businesses, create the case for business to engage on this agenda, and coordinate dissemination of this information to employers (in particular SMEs)

- promote use of public sector responsible procurement to drive local business supply chains and local labour needs

- understand the blockages to acceleration of the training course accreditation process by working with local and national stakeholders

- support the development of the National Skills Academy for Environmental Technologies and encourage links to Welfare to Work providers in London, supporting the promotion of low carbon careers as an opportunity for workless people

- looking at ways of mainstreaming sustainability culture across all business sectors; encouraging both efficiency improvements and business growth opportunities for all London businesses.

3.6 Implementing Mayoral policies and actions

Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter.

Endnotes

[i] The environmental sub-sector includes the following traditional and more mature environment sub-sectors: air pollution; contaminated land; environmental consultancy; environmental monitoring, marine pollution control; noise and vibration control; recovery and recycling; waste management; and water and waste water.

The renewable energy sub-sector includes the following new and emerging technologies: biomass; geothermal; hydro; photovoltaics; renewable consulting; wave and tidal; and wind.

The low carbon sub-sector includes many of the newer and fringe technology areas which only recently have been brought into the wider environmental goods and services sector: additional energy sources; alternative fuels; alternative fuel vehicles; building technologies; carbon capture and storage; carbon finance; and energy management.

[ii] INNOVAS, Low Carbon and Environmental Goods and Services: an industry analysis (2009)

[iii] INNOVAS, The London Low Carbon Market Snapshot (2011)

[iv] UNEP, Global Trends in Sustainable Energy Investment 2009 – Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency (2009)

[v] Ernst & Young, Prospectus for London, the Low Carbon Capital (2009)

[vi] HSBC Climate Change Global, A Climate for Recovery – the colour of stimulus goes green (2009)

[vii] City of London Global Financial Centres Index

[viii] City of London, Global Financial Centres 7 (2010)

[ix] Ernst & Young, Prospectus for London, the Low Carbon Capital (2009)

[x] London Development Agency, Low Carbon Capital – London as a leader of the low carbon economy (2010)

[xi] DTZ / INNOVS, Skills for a Low Carbon London (2010)

[xii] INNOVAS, The London Low Carbon Market Snapshot (2011)

[xiii] Ernst & Young, Prospectus for London, the Low Carbon Capital (2009) (2009 prices)

[xiv] Ernst & Young, Prospectus for London, the Low Carbon Capital (2009)

[xv] INNOVAS, The London Low Carbon Market Snapshot (2011)

[xvi] Ernst & Young, Prospectus for London, the Low Carbon Capital (2009)

CHAPTER FOUR

SECURING A LOW CARBON ENERGY SUPPLY FOR LONDON

SUMMARY

Vision

By 2025, London's homes, businesses and infrastructure are supplied through an efficient, affordable, and secure supply of low and zero carbon energy. London is generating 25 per cent of the energy it uses within London, having unlocked the potential for the development of decentralised energy.

The Mayor will contribute towards this through the following policies:

- **Policy 3 - Enabling the identification and development of decentralised energy opportunities, and building capacity to deliver decentralised energy projects -** The Mayor will identify, develop, and disseminate up-to-date evidence on where London's decentralised opportunities exist, and build capacity in London boroughs and other stakeholders to deliver decentralised energy in London.

- **Policy 4 - Delivering decentralised energy through the planning system -** The Mayor will work with London boroughs to use London's strategic planning powers, and individual planning decisions, to identify priority areas for decentralised energy networks, and build decentralised energy into new development in London.

- **Policy 5 - Enabling the commercialisation of the decentralised energy market -** The Mayor will instil confidence to the decentralised energy market by providing guidance and commercial templates, providing expert support to stakeholders to design and deliver decentralised energy projects, stimulating the market for low and zero-carbon fuel sources, and encouraging government to provide a framework that supports decentralised energy.

The Mayor's main actions to deliver this are:

- **London Heat Map -** A web-based, interactive Geographic Information System tool that helps to identify decentralised energy opportunities for London boroughs, generation companies, and developers.

- **The Decentralised Energy Masterplanning Programme -** Offering a comprehensive package of support to London boroughs, helping them identify and develop decentralised energy projects.

- **Decentralised energy project delivery unit -** A dedicated team of experts providing strategic support to take potential decentralised energy projects from concept through to investment grade proposal, aiming to attract commercial investment.

CO_2 emissions from London's energy supply: 2008-2025

- **Current CO_2 emissions -** In 2008, CO_2 emissions from London's energy supply were 36.05 $MtCO_2$ per year.

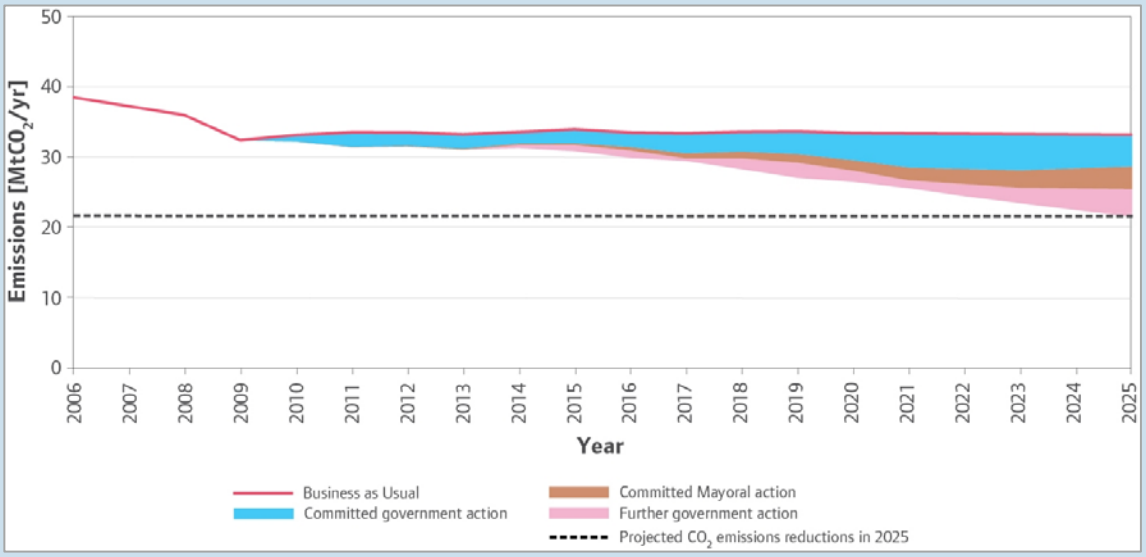
- **Business as Usual CO_2 emissions by 2025 -** Under a BaU scenario, London's energy supply emissions would be expected to reduce to 33.25 $MtCO_2$ per year.

- **CO_2 emissions reductions by 2025 from committed government action -** Decarbonisation of the national electricity grid is expected to reduce London's CO_2 emissions from energy supply by 4.52 $MtCO_2$ per year.

- **CO_2 emissions reductions by 2025 from committed Mayoral action –** Committed Mayoral action is expected to reduce London's CO_2 emissions from energy supply by 3.20 $MtCO_2$ per year.

- **CO_2 emissions reductions by 2025 from further government action -** If government adopts more ambitious scenarios for decarbonisation of the grid, as recommended by the Committee on Climate Change, it is expected CO_2 emissions from London's energy supply will reduce by a further 3.90 $MtCO_2$ per year.

Figure 4.1 Projected CO_2 emissions savings from energy supply in London (2006-2025)



For definitions of each category of CO_2 emissions reductions, please see pages 21-22

Source: GLA modelling

4.1 Introduction

Building on the climate change evidence set out in chapter 2 of this strategy, this chapter addresses the CO_2 emissions associated with energy supplied to buildings and stationary infrastructure in London[i] and the security of that energy supply in the future. Energy supply is defined as all electricity used in London, as well as other energy supply to London's homes and workplaces, predominantly gas used for heating. Total CO_2 emissions reductions from the supply of low and zero carbon energy are discussed and quantified here. However, to avoid double counting, these CO_2 savings are applied to each sector (homes, workplaces and transport), according to their relative share of energy use, and accounted for in the CO_2 emissions reductions for those sectors.

This chapter:

- summarises London's current CO_2 emissions from energy supply
- summarises London's CO_2 emissions from energy supply under a BaU scenario
- summarises the CO_2 emissions reductions expected as a result of committed government action on energy supply

- sets out the challenges and opportunities for London to reduce its CO_2 emissions from energy supply and to guarantee its future energy supply, developing a more flexible and open energy supply market

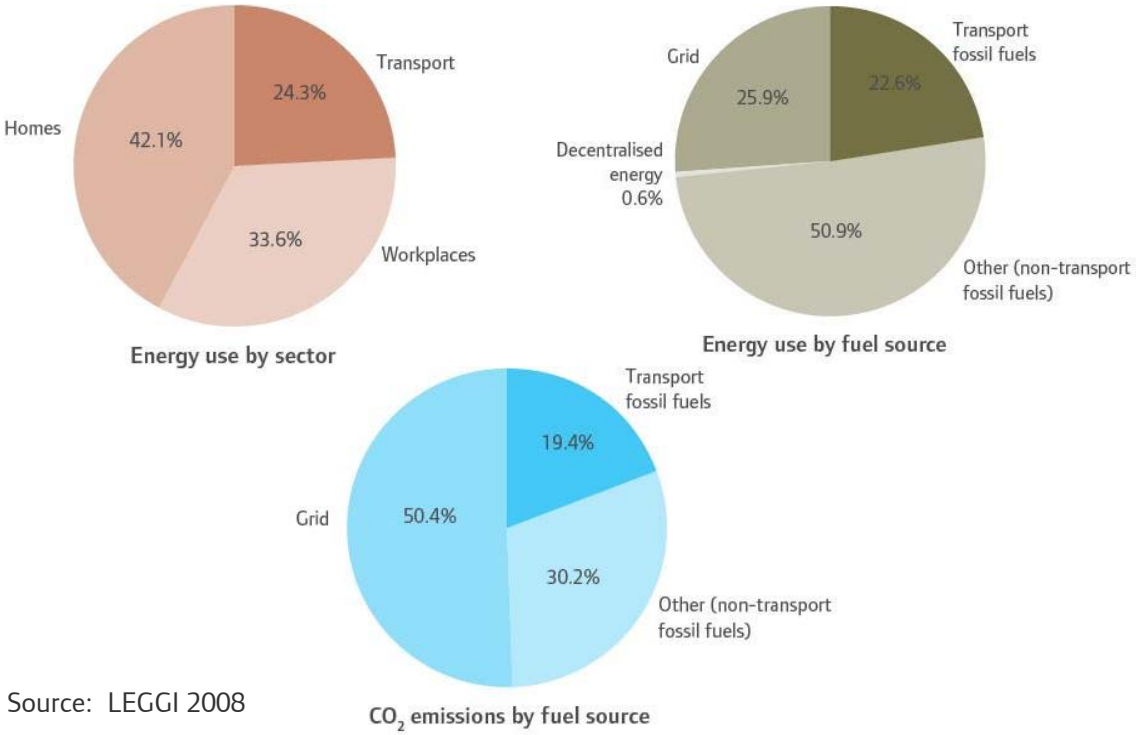
- details the specific policies and actions that the Mayor has committed to take to reduce London's CO_2 emissions from energy supply[ii]

- summarises further action that the Mayor encourages government to take to support the achievement of the Mayor's CO_2 emissions reduction targets.

4.2 Current CO_2 emissions from London's energy supply

The total energy used in London in 2008 was 152,000 gigawatt hours (GWh). The majority of this was used in homes and workplaces (42.1 per cent and 33.6 per cent respectively), with the remainder used in transport.

Figure 4.2 Breakdown of London's energy supply in 2008 by sector and source



Source: LEGGI 2008

As figure 4.2 shows, when breaking this energy use down by the source of supply, 50.9 per cent was supplied through non-transport fossil fuels (mainly gas for heating in buildings), 25.9 per cent was through electricity from the national grid, and 22.6 per cent was through transport fuels. Decentralised energy contributed 857 GWh, less than one per cent of overall supply, and 2.5 per cent of supply to homes and workplaces[iii].

When this energy use is converted into CO_2 emissions, 50.4 per cent of emissions are from grid electricity, demonstrating the proportionately high CO_2 emissions factor for electricity from the grid.

4.3 Projected CO_2 emissions under a Business as Usual scenario

By 2025, if CO_2 emissions from energy supply are allowed to continue under a BaU scenario, emissions will have fallen to 33.25 $MtCO_2$. This is a 7.8 per cent reduction relative to 2008 levels, and is due to policies that were put in place to decarbonise the national grid prior to the publication of government's 2009 Low Carbon Transition Plan.

4.4 Projected CO_2 emissions after committed government action

To reduce London's CO_2 emissions from energy supply requires a reduction in the direct combustion of fossil fuels (such as in buildings for heating), combined with the use of lower carbon sources of energy to heat and power London's infrastructure. Along with energy efficiency measures (covered in chapters 5-9 of this strategy), government policy on energy supply focuses on reducing the carbon intensity of the national electricity grid.

National and EU policies geared towards moving to low and zero carbon sources for supplying electricity via the national grid will drive down CO_2 emissions from the supply of London's energy. In the short term, this will involve the increased use of natural gas in power generation, and in the longer term, an increase in nuclear energy, renewable energy such as wind farms, tidal power and biomass heat and power, along with the introduction of carbon capture and storage (CCS) to coal-fired power stations such as Kingsnorth[iv]. Further information on government policies to reduce the carbon intensity of national energy supply is set out in box 4.1. This activity is projected to reduce London's CO_2 emissions from energy supply by 4.52 $MtCO_2$ per year by 2025[v].

Although government programmes will eventually reduce the carbon intensity of London's energy supply, there are insufficient guarantees that the transition towards a low carbon grid will happen at a pace to meet either government or Mayoral CO_2 emissions reduction targets. Of equal concern is the prospect of an energy gap emerging between demand and supply that would see Londoners and London's economy put at risk and facing increasing fuel costs.

Box 4.1 Government policies and programmes for energy supply

- **Renewable Energy Strategy (RES) -** The RES (2009) commits the UK to a 15 per cent target for production of renewable energy by 2020. This means an almost seven-fold increase in little more than a decade. At least 30 per cent of UK electricity will need to be sourced from renewables by 2020 and the production of renewable heat will need to increase ten-fold[vi].

- **Renewable Obligation (RO) -** The RO is the main government programme for delivering large-scale (above 5 megawatts (MW)) renewable electricity. Energy companies are required by law to generate a proportion of their electricity supply from renewable sources. Renewable obligation certificates (ROCs) are issued to show compliance. Generators can sell their ROCs to suppliers to receive a premium on top of income from the electricity generated.

- **Electricity Market Reform (EMR) -** The government has consulted on EMR. It has proposed an incentive framework for large-scale renewable electricity generation, such as nuclear and wind. The proposals are designed to ensure sufficient zero carbon electricity generation to meet long-term demand and UK renewable energy targets.

- **Climate Change Levy (CCL) -** This levy is an energy tax placed on non-domestic purchases of electricity, gas, coal and liquid petroleum, which typically adds 15 per cent to a business' energy bills. If the fuel is to be used in a Good Quality[vii] CHP engine, the fuel and energy generated and exported is currently exempt from paying the levy.

- **Feed-in Tariff (FIT) -** The FIT is a financial support mechanism to encourage small-scale renewable electricity generation. This gives installations up to 5MW a guaranteed tariff, which is significantly above the normal market rate and which energy companies are obligated to purchase.

- **Renewable Heat Incentive (RHI) -** The RHI will support growth in renewable heat sources, such as biomass, air source heat pumps and solar thermal. The incentives will apply to the generation of renewable heat at all scales. Industrial, commercial and public building-scale installations will receive incentives from 2011, with household installations supported from 2012.

4.5 Opportunities for, and challenges to, energy supply in London

a) Challenge: Securing London's energy supply

The Energy Gap

There are a number of challenges for London's energy supply. This includes the supply of fuels, particularly gas for energy generation, and the infrastructure required for power generation and transmission. Box 4.2 sets out the challenges and potential risks around the UK's supply of energy-generating fuels. The rest of this section sets out the challenges for London of a potential energy gap emerging as a result of risks to infrastructure.

Box 4.2 Challenges and risks to UK energy supplies

An increasing number of experts are pointing to the threat of peak oil and peak gas; the notion that we have reached, or will soon be reaching, the maximum rate of oil and gas production, to be followed by a sustained decline in future production. Although it is unclear exactly when these peaks were, or will be, reached it is clear that global demand for oil and gas is reaching unprecedented heights, due in large part to the growing energy appetite of developing economies around the world, and the increasing costs and challenges of extracting these fuels.

Domestically, the UK's own oil and gas production from the North Sea has peaked and is falling steadily. The UK is once again a net importer of oil and gas where not too long ago it was a net exporter. As global demand and extraction costs continue to increase, the result will be increased prices for net importers, posing serious economic risk to the UK and its citizens[viii].

Higher oil prices will lead to significantly higher prices for all forms of transport, as well as food, general retail goods and domestic heat and power. Such price increases could undermine the competitiveness of UK businesses and hit the poorest members of society hardest, more and more of whom would be unable to afford adequate levels of energy to meet their daily living requirements[ix]. UK investment in low carbon energy supply and demand reduction solutions would therefore help to protect London's businesses and residents from being held hostage to soaring global energy prices.

London is currently heavily reliant upon the national grid for electricity, and its supply is inextricably linked to national energy infrastructure and national energy policy. This presents a particular challenge as without significant investment in infrastructure and demand reduction, the UK faces an energy gap in the near future. Using DECC's peak

demand forecasts and the National Grid's seven year statement, this gap in electricity supply could be as high as 43,000 GWh by 2016 and there would already be an energy gap affecting peak demand by 2014[x] in the absence of investment in generating capacity.

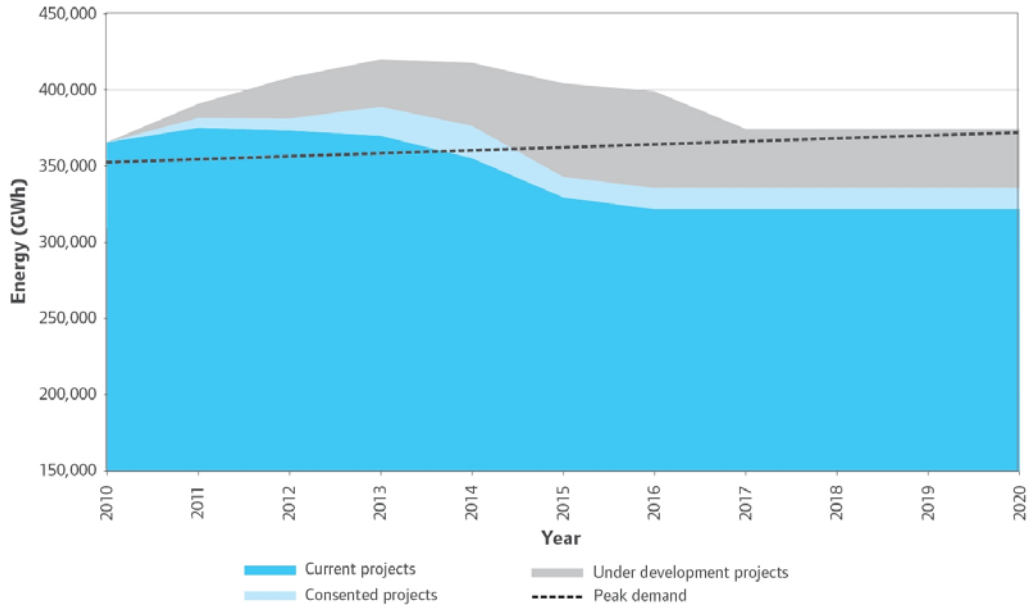
By 2015 the closure and decommissioning of many of the UK's oldest nuclear power plants will reduce the total generating capacity by 36,000 GWh (approximately ten per cent of the current capacity). The Large Combustion Plant Directive (LCPD) will enforce new and more stringent emissions standards on power plants. Under the LCPD a number of the UK's coal-fired and oil-fired power plants will fail to meet emissions standards and will therefore be forced to close by 1 January 2016. These anticipated closures could seriously jeopardise the UK's ability to meet its gas and electricity demand over the period to 2025.

New power plants are under construction, with 15 separate wind power projects and a further six gas-fired power stations having received planning consent. If the additional capacity from power plant construction projects that have been already been given planning consent is taken into account, the scale of the energy gap would reduce, but would still be around 30,000 GWh in 2016[xi].

A further 31 gigawatt electrical (GWe) of energy capacity could come on-stream between now and 2016 through other projects which are under development but do not have planning consent. This capacity would mitigate the risks of an energy gap emerging over this period. However, the scale of this infrastructure requirement is very significant, over a short timeframe. To illustrate, it would include a five-fold increase in wind power, which would then account for 15 per cent of electricity supply, and a 30 per cent increase in gas-fired power station capacity between now and 2016. Moreover, the hurdles to overcome to achieve planning, funding and construction of these plants in this timeframe make these infrastructure projects far from guaranteed.

Figure 4.3 shows the mix of current, consented, and under development energy capacity to 2020 against DECC's projected peak demand over this period.

Figure 4.3 UK electricity demand and supply: Existing, consented, and under development projects (2010-2020)



Source: GLA Modelling

Investing in the UK's energy infrastructure

Ofgem estimates that a staggering level of investment (up to £200 billion over the next ten years, more than twice the amount spent over the last ten years) will be needed to replace the UK's ageing infrastructure to meet the UK's energy needs[xii]. In fact, the UK's investment challenge is even more demanding than that of most other European countries due to a combination of factors: low existing renewable energy capacity; ambitious carbon reduction targets; and a regulatory environment that has historically been more uncertain and therefore less attractive to long-term investors[xiii]. Despite the priority that government has placed on decarbonising energy infrastructure, many crucial details have yet to be resolved.

Most notably, it is still unclear how such large-scale financing will be generated, and where it will come from. The dominant cost in infrastructure projects is the cost of capital[xiv]. Government's ability to contribute such financing is limited. This leaves the private sector to deliver the vast majority of the investment required, but competition for

private capital is fierce and low carbon technologies, particularly unproven ones, are often perceived as riskier than competing investment opportunities. Even more mature low carbon technologies such as offshore wind often require large-scale debt and equity finance, both of which are in limited supply in the current economic climate. Compounding these problems is the uncertainty over the long-term price of carbon, a factor that further undermines investor confidence in low carbon projects compared to alternative investments[xv].

Nuclear energy represents another challenge. The decision to build new nuclear power plants has been stalled for years, as the need for reliable and affordable sources of low carbon power has been pitted against public safety concerns and opposition from local communities. The government has declared its commitment to proceed with a new nuclear build programme, without public subsidy, but serious questions remain to be answered. The government has proposed, under the Electricity Market Reform proposals, a FIT mechanism for large-scale renewable generation that would apply to nuclear. However, it remains unclear how this would affect the commercial attractiveness of nuclear to prospective investors. A subsequent challenge will be gaining the buy-in of local communities, an issue that has proved quite contentious in the past. Finally, even if government's nuclear policy is realised, it will be years before the much-needed power comes online given historical timeframes of about four years for pre-development and a further five years for construction[xvi].

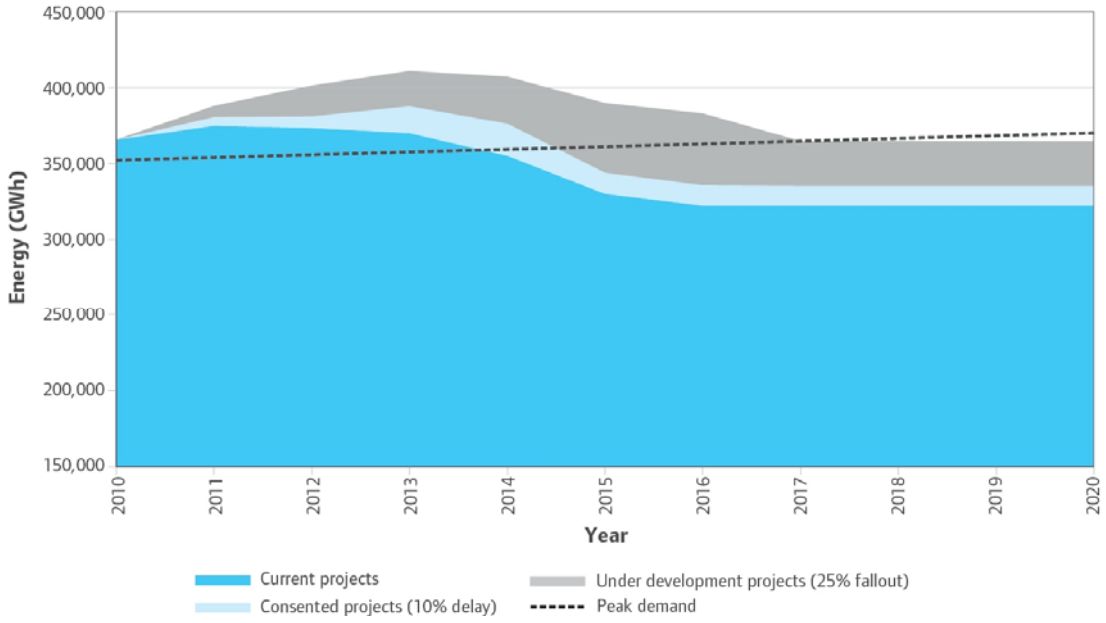
Planning and regulatory barriers

Planning and regulatory delays constitute another key barrier that must be overcome if the UK is to achieve a reliable, low carbon energy supply in time to meet its national targets. Previous government planning regimes for major infrastructure projects have been too slow and short-term focussed. This has led to the delay and even cancellation of critical projects, which in turn has disrupted supply chains and deterred investors from financing future projects[xvii]. Similarly, the previous grid access regime prevented some low carbon generators from connecting to the grid until as far out as 2025. Government has recognised the cost of these delays and has committed to reforming the planning process through such measures as replacing the existing Infrastructure Planning Commission, transferring more decision-making power to local communities, and establishing a new grid access regime to accelerate connections[xviii]. However, the ultimate impact of these measures on planning timeframes remains to be seen.

Figure 4.4 shows the same mix of current, consented, and under development energy capacity as figure 4.3, but assumes a ten per cent delay in construction and a 25 per cent

fall-out rate for projects which are under development. It then extrapolates these demand and supply scenarios forward to 2020. This demonstrates that the risks of an energy gap emerging remain high.

Figure 4.4 UK electricity demand and supply: Existing, consented, and under development projects (2010-2020) (assuming 10 per cent delay in construction and a fall-out rate of 25 per cent for projects under development)



Source: GLA modelling

London's role in securing a low carbon energy supply

The uncertainties and risks surrounding national issues such as financing, nuclear supply, and planning serve to illustrate the challenges of installing low carbon infrastructure across the UK. In London, the Mayor's energy demand reduction and energy supply programmes have the potential to reduce the vulnerability of the capital to the risks of the energy gap. Under the scenario outlined in figure 4.4, London's share of the electricity demand not met by national supply would be around 981 GWh in 2020[xix]. The Mayor's programmes have the potential to easily fill London's share of the gap, and significantly contribute towards plugging the national energy gap.

While London's energy future is inextricably linked to that of the UK as a whole, it stands to reap huge economic and environmental benefits from pressing ahead with its own

ambitious climate change initiatives irrespective of the national landscape. Replacing London's outdated infrastructure with low carbon alternatives will drastically reduce CO_2 emissions. At the same time, it will reduce the long-term cost of doing business in the capital and attract further investment from industries that would otherwise invest elsewhere[xx].

b) Opportunity: The capacity for low and zero carbon decentralised energy in London
In light of the challenge of a national energy gap, an opportunity exists in London to deploy low and zero carbon decentralised energy. Decentralised energy is defined here as low and zero carbon power and/or heat generated and delivered within London. This includes microgeneration, such as photovoltaics on individual buildings, through to large-scale heat networks (please see box 4.3 for definitions of decentralised energy projects by scale).

Box 4.3 Definition of decentralised energy projects by scale

There are broadly four scales of decentralised energy system:

- **Microgeneration -** Generation systems are often mounted on or next to a particular building, supplying energy to a single user, who usually owns the generation equipment. Typically these renewable energy systems have a capacity up to 50KWe.

- **Single development (small scale) -** Energy is generated and sold to a single development that may include a number of buildings and customers (up to around 3,000 domestic customers). The plant may or may not be owned and operated by the energy users. This would include smaller communal heating schemes. It would also include larger onsite networks with CHP generation equipment in the order of 3MWe capacity and project capital costs in the region of £10 million. The Cranston Estate regeneration project in Hackney is a typical example.

- **Multi-development (medium scale) -** These supply energy to more than one site, for which district heat networks are a necessary requirement. A wide range of customers and demand types may be involved, with a number of different generation systems connected totalling up to 40MWe in capacity. This scale could support up to 20,000 homes, public buildings, and commercial consumers. It is very likely that the plant would be owned and operated by a third party. The system could cost up to £100 million.

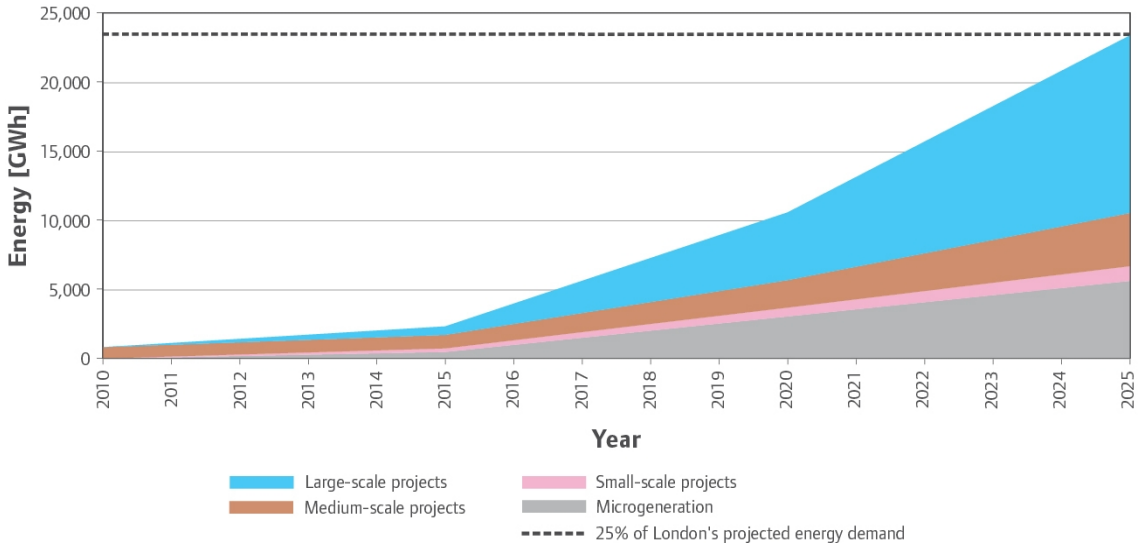
- **Area-wide (large scale) -** These are large infrastructure projects with a lifetime of at least 40 years. Such schemes typically involve several tens of kilometres of heat pipe supplying 100,000 customers or more, and providing connection to multiple heat generators such as power stations. Capital costs of piping would exceed £100 million. It is likely that separate bodies would own and be responsible for different parts of the system. Such systems can take from five to ten years to deliver. The proposed London Thames Gateway Heat Network is an example.

In combination with a responsive electricity distribution network, decentralised generation (including microgeneration) gives London a more diverse range of energy supply options and a more competitive market. It also allows the distribution network to be managed using the most cost effective and lowest carbon generation available at a given time.

In 2010-11 the Mayor undertook a major study to assess the potential for low and zero carbon energy supply in London. This demonstrated that there is a considerable opportunity for London to generate its own energy, reducing its reliance on the national grid. The Decentralised Energy Capacity Study used DECC's Renewable and Low Carbon Energy Capacity Methodology and estimated the deployment potential for a range of technologies at different scales, taking into account physical limitations, planning and regulatory constraints, economic feasibility, and supply chain capacity.

The study showed that over half of the overall opportunity for decentralised energy in London is through medium and large-scale heat networks. As figure 4.5[xxi] shows, these are likely to be scaled-up after 2015, with a more rapid acceleration from 2020 to 2025. Alongside this, the study found that there is significant potential for microgeneration technologies in London.

Figure 4.5 Potential for decentralised energy in London by scale (2010-2025)



Source: GLA modelling

In addition to the identification of medium and large-scale heat networks as a particularly promising opportunity, the study found that a significant proportion of the opportunity for decentralised energy in London will be powered through Combined Heat and Power (CHP) generation[xxii]. The combination of medium and large-scale heat network schemes with CHP is a particular opportunity in London for the following reasons:

- **London's suitable energy demand density -** London's mixed building types and uses, and its high building densities provide the high and diverse energy demands that allow CHP systems to be run efficiently, as well as the high heat-demand densities that make heat network deployment cost effective.

- **Transition to lower carbon fuels -** Although heat networks are likely to be fuelled predominantly by natural-gas-fired CHP initially, they have the potential to use a range of low and zero carbon fuel sources such as waste-derived-fuels and biomass as these become more commercially available. This is complementary to the planned decarbonisation of the electricity grid. For example, heat networks have the potential to capture and distribute heat from large-scale heat pumps powered by a lower carbon electricity grid. Deployment will therefore accelerate CO_2 emission reduction and support delivery of national targets for renewables.

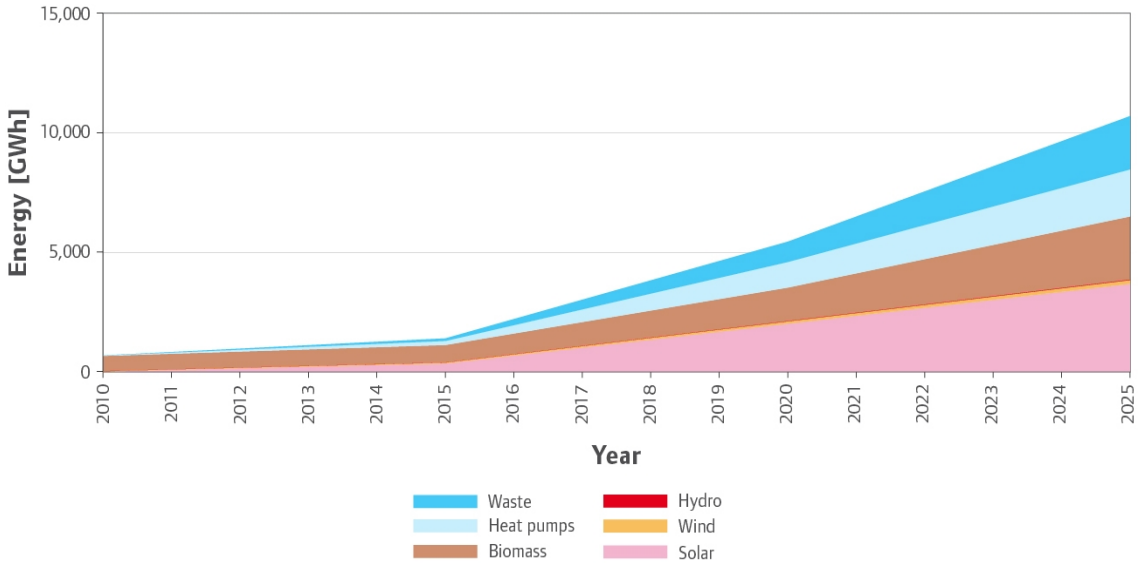
- **Lower cost per unit of energy generated -** Generally, large-scale schemes benefit from economies of scale, more efficient systems and the capacity to process cheaper, lower quality fuel. These all drive down the cost of generating a unit of energy. Medium-scale decentralised gas-fired CHP system costs per MW installed are broadly equivalent to those of the centralised combined cycle gas turbines (CCGT) power stations and nuclear power stations envisaged by government to come online over the next 20 years. A major study for DECC found that the overall cost of CO_2 abatement (£/tCO_2 saved) is significantly lower for area-wide decentralised energy schemes compared with smaller standalone CHP plants serving individual developments[xxiii]. Larger plant can also support more expensive exhaust-cleaning equipment and so tend to have lower emissions of local air quality pollutants.

- **Attractive investment -** Inward investment into CHP and heat networks represents a significant long-term opportunity, with rates of return that improve significantly over the life of a project, with the potential to make energy more affordable to end-users and more resilient to energy price fluctuations.

- **Introduction of competition to the heat market -** As a number of different energy generating sources can feed into medium and large-scale heat networks, there is the potential to offer customers access to multiple heat suppliers, therefore introducing competition.

The Decentralised Energy Capacity Study also investigated the potential for renewable sources of energy for London. Figure 4.6 shows the potential for each renewable source. In 2025, these sources could supply more than 10,000 GWh of energy, or 12 per cent of London's total energy supply. The largest opportunity is in the wide-scale deployment of small and medium-scale renewable heat and power technologies, particularly photovoltaics and air source heat pumps. Alongside this, biomass CHP projects and waste-to-energy projects using advanced conversion technologies such as anaerobic digestion and gasification/pyrolysis offer opportunities.

Figure 4.6 Potential for renewable energy in London (2010-2025)



Source: GLA modelling

The study found that it is achievable for 25 per cent of London's energy for homes and workplaces to be supplied through decentralised systems by 2025. However, meeting this target will require considerable financial and regulatory support. At present there are a number of barriers to achieving this.

c) Challenge: Implementing decentralised energy in London

The challenges to overcome in the deployment of decentralised energy within London are:

- **Knowing where London's decentralised energy opportunities are -** Successful project development is reliant on an up-to-date spatial evidence base that identifies suitable energy demands and supply opportunities (including buildings, land and resources) in locations and circumstances suitable for low carbon technology deployment.

- **The capacity of key stakeholders to develop decentralised energy projects -** Stakeholders are integral to the development of decentralised energy, in particular London boroughs, their strategic partners, and the development community. However, often they do not have the capacity to develop large-scale decentralised energy projects.

- **Risks inherent in the delivery of decentralised energy projects -** Large-scale decentralised energy projects can present project delivery risks. They require significant upfront capital investment, whilst, in general, revenues have to be both predictable and sufficient to attract private investment.

- **A lack of investment in the heat and electricity infrastructure required to make effective use of low carbon fuels in London -** In the power market, this means investment in a responsive and accessible distribution network that can manage supply from both decentralised and intermittent sources to meet changing demands. In the heat market, this means investment in heat network infrastructure and a maturing heat market that can compete with mains gas and electric heating on price and carbon content.

- **Immature markets for low and zero carbon fuels available within and around London -** Given that opportunities for the deployment of local low carbon resources at scale will need to be led by the distribution of heat generated from biomass, waste heat and waste-derived-fuels, the markets for these fuels need to develop, via incentives, to reach their potential.

- **The regulatory framework is currently not favourable to decentralised energy -** It is difficult for decentralised generators to take part in the electricity market, due to its complexity, high fixed costs and the lack of rewards available for exporting the excess electricity produced. Licensing arrangements that could enable generators to realise greater value now exist, but need to be developed.

d) Opportunity: The public sector's role in reducing decentralised energy project risks
The public sector has a significant opportunity to participate in the development and commercialisation of strategic decentralised energy projects. Firstly, London boroughs can utilise planning policy to catalyse decentralised energy projects, particularly large projects, and also use their unique position to convene delivery partners to promote the viability of large-scale heat networks.

Secondly, there is an opportunity for the wider public sector to de-risk projects by offering buildings up to long-term, low-risk energy purchase contracts that stabilise revenues for private investors. Public sector buildings are often major heat users (for example hospitals, prisons and leisure centres) and can act as anchors[xxiv] for decentralised

energy networks. Engaging the wider public sector and committing the buildings they own and manage are therefore of central importance.

Finally, the public sector can de-risk decentralised energy projects by developing delivery models and underwriting projects in their early stages. The public sector can invest capital, taking a long-term view to help lever private sector investment. Partnerships between public and private sectors will be critical to unlocking the potential of decentralised energy and providing long-term, stable returns on investment.

Projects with relatively assured revenue streams may be best structured through a commercial vehicle responsible for the design, build, operation and financing of the infrastructure, its generation assets, and sales of energy to customers. For example in some cases, but not all, an Energy Services Company (ESCo) may be appropriate. Projects with relatively large capital costs and pipe networks are best delivered through a number of legal entities, as described in box 4.4. Of those available, the ESCo model is more common for smaller projects, with a greater number of bodies becoming involved as project size and complexity increase.

Box 4.4 Types of energy services companies

- **Energy service company (ESCo) -** A single entity responsible for generation, infrastructure, and selling energy to the customer.
- **Generation company (GenCo) -** Provides generation assets and sells electricity and heat. It is likely to be a commercial entity that remains at arms length from the decentralised energy infrastructure.
- **Transmission company (Transco) -** Owns transmission assets connecting local pipework.
- **Distribution company (DisCo) -** Owns and operates local pipework, with the ability to take energy from the GenCo and sell on to customers (in the absence of HeatCo). A TransCo and DisCo may also be a single entity.
- **Heat company (HeatCo) -** Buys heat (and possibly other services) and sells to customers. These might be public sector organisations acting as a front for customers or commercial billing organisations.

Apportioning project risk in this way allows different entities to operate without liability for anything outside of their remit. This makes the risk more manageable, making it easier to attract private sector involvement. Projects are likely to be financed through commercial debt leveraged through a combination of public and/or private sector equity funding where available. Revenues will come from a combination of a distribution tariff, heat sales, and connection fees.

4.6 Reducing CO_2 emissions from London's energy supply through committed Mayoral action

This section sets out policies and actions to overcome the challenges described above and make the most of the opportunities presented by decentralised energy. The Mayor has four overarching objectives for London's energy supply:

- Energy supply should be low carbon, in line with the supply contribution to the Mayor's target to reduce CO_2 emissions by 60 per cent on 1990 levels by 2025.

- Efficient use should be made of a range of fuel sources, so that they provide a guaranteed supply of heat and power to London. This includes making use of international, national, and local sources of power and heat to guarantee supply to London in the long-term, and using efficient power and heat generation technologies and distribution infrastructure.

- Markets for heat and power should be open, fair, sustainable, affordable, and provide investment opportunities. This requires a regulatory and fiscal regime that allows large and small providers of power and heat equal access to the market and provides choice and supply guarantees to customers. It also requires a carbon price floor that underpins low carbon and decentralised energy market development and market interventions that support medium and long-term cost efficient solutions and do not create perverse incentives for particular technologies.

- Heat and power infrastructure should be fit for purpose to deliver the above objectives. Specifically, this means a responsive, robust and accessible electricity distribution network that can accommodate decentralised and intermittent generation and a low carbon heat network infrastructure for London.

The Mayor has set a target to generate 25 per cent of London's energy from decentralised sources by 2025. It is estimated that this target amounts to around 23,500 GWh of energy

demand in 2025. This figure includes total energy for buildings and infrastructure, including electricity and heating, but not fossil fuels used in vehicles. Supplying 25 per cent of London's energy from local, decentralised sources by 2025, will reduce CO_2 emissions by 3.2 $MtCO_2$ per year.

To achieve this, the Mayor's approach is to facilitate the identification, development and delivery of decentralised energy projects at scale in partnership with a range of public and private stakeholders, to encourage private sector investment in decentralised energy in London, and to encourage government to provide a facilitating regulatory framework. The Mayor's has therefore introduced three policies on decentralised energy:

POLICY 3: ENABLING THE IDENTIFICATION OF DECENTRALISED ENERGY OPPORTUNITIES, AND BUILDING CAPACITY TO DELIVER DECENTRALISED ENERGY PROJECTS

Vision

By 2025, London boroughs, developers, investors, and the wider public sector are aware of the full range of opportunities for decentralised energy in London and have the capacity to deliver them.

Vision to policy

The Mayor will identify, develop, and disseminate up-to-date evidence on where London's decentralised opportunities exist, and build capacity in London boroughs and other stakeholders to deliver decentralised energy in London.

Policy to action

a) Knowing where London's decentralised energy opportunities are

- **Action 3.1 -** The Mayor will continually update the London Heat Map to include accurate local data on opportunities for decentralised energy.

- **Action 3.2 -** The Mayor will encourage government to make data on large boilers available to public sector organisations.

- **Action 3.3 -** The Mayor will publish work to assess the potential of using the tidal range of the River Thames to support tidal energy generation.

b) Building the capacity of stakeholders to develop decentralised energy projects

- **Action 3.4 -** The Mayor, through the Decentralised Energy Masterplanning Programme, will support London boroughs to produce local heat maps and energy masterplans, and build the capacity of the public sector to develop decentralised energy opportunities.

a) Knowing where London's decentralised energy opportunities are

The first step the Mayor is taking to decentralise London's energy supply is to gain a clear understanding of where the opportunities for microgeneration, medium-scale and large-scale decentralised energy projects exist, and the capacity to deliver these. The Mayor has already completed a Decentralised Energy Capacity Study (see pages 80 to 83) which defines this for London. He will continue to build on this through the following projects:

The London Heat Map

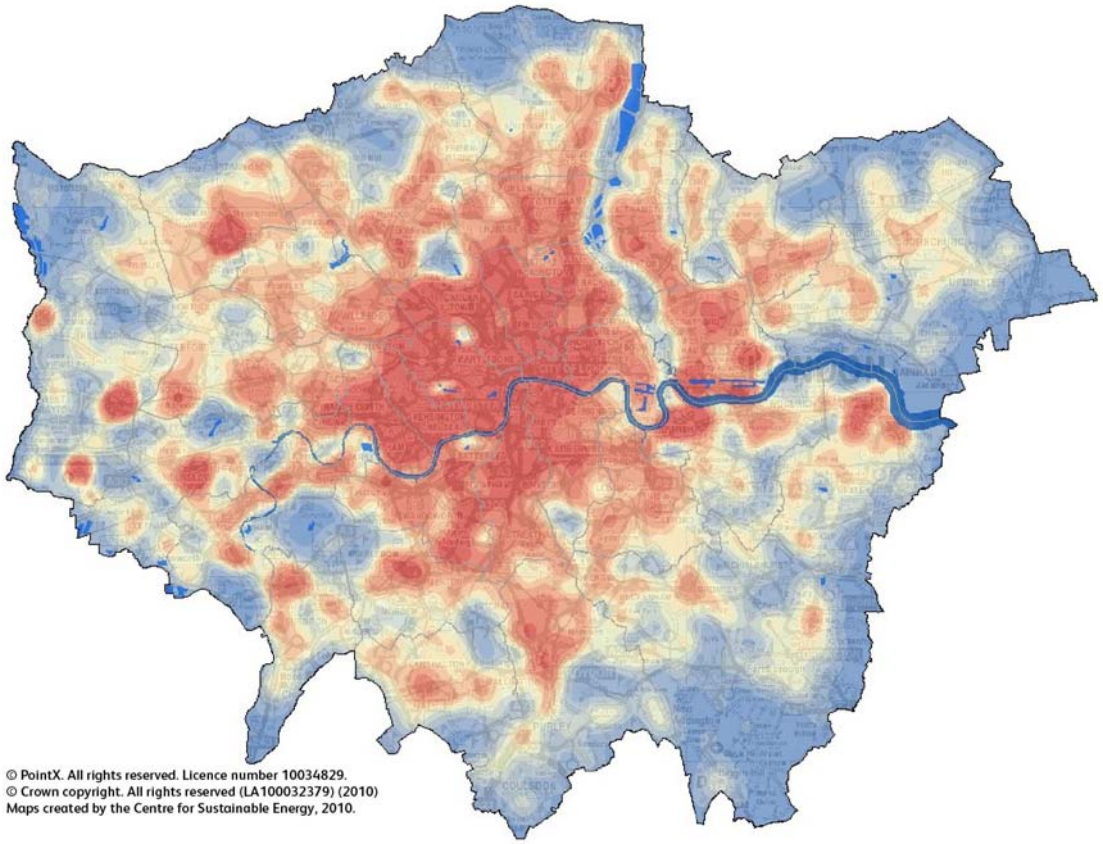
The start of any medium or large-scale decentralised energy project involves the identification and assembly of suitable local energy demands. This includes assessing energy demand density, diversity of user types, suitable land for energy generation, appropriate corridors for distribution infrastructure and catalysing factors such as new developments or large public sector heat loads. High density of heat demand is imperative for large-scale decentralised energy projects because it minimises the amount of piping required, which can be the main cost for a decentralised energy project.

To provide this information, the Mayor has developed the London Heat Map. This is an online interactive tool that provides spatial intelligence on decentralised energy, allowing users to identify opportunities for decentralised energy projects in London. Data on a range of factors are available, including major energy consumers, fuel consumption, CO_2 emissions, energy supply plant, community heating networks, and energy demand density. It is accessible at www.londonheatmap.org.uk.

The map allows users to upload and share energy data. It can be used and updated to assist in building detailed energy masterplans and developing decentralised energy policies. It can help developers to meet London Plan policies, and investors to identify opportunities for investment in decentralised energy. In addition, the London Waste and Recycling Board (LWaRB) has built a complementary map of existing and potential waste management sites in London, available at www.londonwastemap.org. The maps are linked to identify energy-from-waste opportunities.

The map will become more sophisticated and more accurate at higher resolutions and will provide an information hub for the decentralised energy market. Twenty-three borough heat maps produced under the Decentralised Energy Masterplanning Programme (DEMaP) have already been incorporated into the London Heat Map. Fifty new priority locations for decentralised energy projects in London have been located.

Figure 4.7 The London Heat Map



Data availability

Critical to the establishment of area-wide heat networks in countries such as Denmark was a much better understanding of heat generation equipment in operation. A national requirement for information on all boilers (all fuel types) above 500 kilowatt thermal (kWt) to be collated and made available, including data such as age and location, would enhance the London Heat Map and accelerate the process of designing heat networks.

Information on larger commercial and industrial boilers in London should be prioritised. The Mayor is therefore encouraging government to start this process through the Energy Performance Certificate and Display Energy Certificate requirements, with buildings providing, as part of the certification process, full onsite boiler information.

Identifying London's hydro-electric capacity

In addition to developing the London Heat Map and identifying London's decentralised energy potential through the Mayor's Decentralised Energy Capacity Study set out previously in this chapter, the Mayor is also specifically assessing the hydro-electric power resource on the Thames. Although this resource is not large when compared to other renewable energy resources, its cumulative contribution is considered important and projects may provide significant local benefits. The study will be used to set targets for hydro-electric power generation in London and to develop a shortlist of projects with potential for development.

b) Building the capacity of stakeholders to develop decentralised energy projects

To overcome challenges to the development of decentralised energy projects presented by a lack of capacity in stakeholder organisations, the Mayor has delivered a comprehensive decentralised energy support package for London boroughs. DEMaP works with key stakeholders, whether within the borough, the local strategic partnership, or local property owners and developers, to highlight the benefits of taking forward decentralised energy projects.

Successful decentralised energy projects can make significant contributions to London boroughs' climate change mitigation targets, particularly for those boroughs with high building densities and building stock that is less amenable to demand reduction measures. At the time of writing, 23 London boroughs have received support under DEMaP.

Key outputs of DEMaP include:

- local energy demand and supply maps, and high-level feasibility studies that provide the evidence base London boroughs need to underpin decentralised energy policies in key planning documents and strategies

- the integration of these local maps and datasets into the London Heat Map, and identification of cross-borough decentralised energy opportunities

- identification of opportunities to use publicly-owned land for energy centres and CHP generation plant, and policies and strategies for using land and land sales agreements to stimulate decentralised energy projects

- plans for publicly-owned buildings, housing, and regeneration projects to provide large existing and new heat loads for decentralised energy schemes

- workshop sessions with key borough officers, decision-makers, members of the local strategic partnerships, and politicians to embed decentralised energy within the plans of the organisation

- the development of decentralised energy project stakeholder groups with the capacity, financial commitment, and power to take projects forward, supported by expert advice on decentralised energy engineering and project delivery.

The Mayor will continue to support London boroughs to develop energy masterplans that provide the evidence base to develop area-wide heat networks.

In combination, these are increasing capacity and knowledge to deliver decentralised energy in London. To ensure further delivery, the Mayor is also using his planning powers, as set out in Policy 4.

POLICY 4: DELIVERING DECENTRALISED ENERGY THROUGH THE PLANNING SYSTEM

Vision

By 2025, London will have used its planning powers to incorporate decentralised energy into new development wherever possible, significantly contributing towards the Mayor's target to supply 25 per cent of London's energy from decentralised energy.

Vision to policy

The Mayor will work with London boroughs to use London's strategic planning powers, and individual planning decisions, to identify priority areas for decentralised energy networks, and build decentralised energy into new development in London.

Policy to action

a) Delivering decentralised energy through planning decisions

- **Action 4.1-** Through the London Plan, the Mayor will require new development to incorporate onsite low carbon and renewable energy generation where appropriate and not contradictory to wider strategic energy objectives, and to support the implementation of decentralised energy systems and networks, making use of the Community Infrastructure Levy and carbon offset mechanisms where appropriate.

b) Delivering decentralised energy through strategic planning

- **Action 4.2 -** Through the London Plan, the Mayor will require that London boroughs identify decentralised energy network opportunities in their Local Development Frameworks.

- **Action 4.3 -** Through Opportunity Area Planning Frameworks, the Mayor will continue to work with London boroughs to identify and develop strategic multi-development and area-wide decentralised energy networks.

- **Action 4.4 -** The Mayor will work with London boroughs to use Local Development Orders to enable deployment of district heat networks.

a) Delivering decentralised energy through planning decisions

The London Plan strongly promotes the use of decentralised energy for new developments and seeks to encourage integration of appropriate energy supply solutions for the site itself with those for the surrounding area (please see London Plan policies 5.5, 5.6 and 5.7). This allows greater and more cost effective carbon saving opportunities to be taken into account through the planning decisions process, and prioritises strategic decentralised energy solutions. Appropriate mechanisms for doing this are provided through the Mayor's energy hierarchy and opportunities for carbon offsetting (please see chapter 7 for more information on the Mayor's energy hierarchy).

As set out in policy 5.6 of the London Plan, new development is required to connect to existing local district heat and cooling networks where feasible, or to use site-wide heat networks and, where appropriate, install CHP systems. These requirements promote opportunities to extend the supply of low or zero carbon energy beyond site boundaries.

New developments are required to achieve CO_2 savings onsite (please see chapter 7 and the London Plan for details). Where proposed onsite CO_2 savings are not sufficient to meet the requirements of the London Plan, developers will be able to use an offset mechanism to meet the requirement offsite or through a financial contribution to the borough (please see London Plan policy 5.2). The Mayor is working with government and London boroughs to develop suitable local mechanisms that can provide contributions, where appropriate, to decentralised energy projects.

Supporting the development of heat network infrastructure has also been identified in government guidance on the Community Infrastructure Levy (CIL)[xxv] as an appropriate use of funds received from developers under this mechanism. London boroughs can use funds received under the CIL to invest in heat network infrastructure. The Mayor is exploring with London boroughs what opportunities may develop to enhance this through investment by the London Green Fund.

b) Delivering decentralised energy through strategic planning
In addition to delivering decentralised energy through individual planning decisions, the Mayor is also encouraging the delivery of decentralised energy through strategic planning.

Local Development Frameworks

The Mayor, through the previous London Plan, encouraged London boroughs to safeguard and develop area-wide decentralised energy networks. Over the past three years, the Mayor has provided input to over 70 Local Development Framework (LDF) documents and worked with a number of boroughs to develop their LDF decentralised energy policies. To date, the London Plan has been very successful in securing site-wide CHP in individual developments.

The new London Plan develops the Mayor's strategic planning policy on decentralised energy further, ensuring that LDFs include policies that show how the borough will safeguard existing decentralised energy infrastructure, identify new decentralised energy opportunities, and develop energy masterplans to help ensure those opportunities are used.

In addition, the Mayor has indicated in policy 5.7 of the London Plan that LDFs should include detailed policies and proposals to support the rollout of renewable energy. Spatial planning policies should look to identify potential for large-scale deployment in particular.

Opportunity Area Planning Frameworks

The Mayor also encourages London boroughs to work with neighbouring authorities to identify cross-boundary opportunities. In particular, within Opportunity Area Planning Framework (OAPF) areas, the Mayor will develop energy masterplans in partnership with the boroughs that establish a decentralised energy strategy for the area. The energy masterplan for the Vauxhall-Nine Elms-Battersea OAPF is the first of these.

Local Development Orders

The Mayor is working with London boroughs to use Local Development Orders (LDOs) to enable heat network deployment. An LDO is an instrument that allows the local planning authority to create a blanket planning permission in the absence of specific planning applications. This will remove some of the risk associated with seeking planning consent for heat network pipe routes. The extant Planning Policy Statement 1 indicates that, 'Planning authorities should give positive consideration to the use of LDOs to secure renewable and low carbon energy supply systems'[xxvi]. Where enacted by a London borough, an LDO can be used to accelerate significantly the consent and installation of heat networks. The UK's first heat network LDO was piloted by the Mayor with financial support from the Planning Advisory Service. Working with four planning authorities, an LDO was developed as a part of the London Thames Gateway Heat Network Project development.

Policies 3 and 4 of this strategy are working towards building the knowledge base and capacity to deliver decentralised energy, as well as the required planning framework. However, achieving the Mayor's 25 per cent decentralised energy target will require the commercialisation of decentralised energy projects on a large scale. Policy 5 sets out how the Mayor will catalyse action to achieve this commercialisation.

POLICY 5: ENABLING THE COMMERCIALISATION OF THE DECENTRALISED ENERGY MARKET

Vision

By 2025, the decentralised energy market in London is unlocked, creating investment opportunities to deliver the Mayor's target of providing 25 per cent of London's energy from decentralised sources.

Vision to policy

The Mayor will instil confidence in the decentralised energy market by providing guidance and commercial templates, providing expert support to stakeholders to design and deliver decentralised energy projects, stimulating the market for low and zero-carbon fuel sources, and encouraging government to provide a framework that supports decentralised energy.

Policy to action

a) Guidance and templates to provide confidence to the decentralised energy market

- **Action 5.1 -** The Mayor will work with industry to build London's decentralised energy market by developing consistent technical standards across London, and publishing a Technical Guide for district heating systems.

- **Action 5.2 -** The Mayor will develop commercial templates and a London Heat Charter to help give confidence to potential decentralised energy market participants.

b) Facilitating and delivering large-scale projects

- **Action 5.3 -** The Mayor will provide an expert team to deliver exemplar decentralised energy projects, offering project-specific support on procurement, including legal and financial considerations, helping to establish special purpose vehicles to take decentralised energy projects forward, and carrying out technical feasibility and commercial viability work to build the business case to secure investment.

- **Action 5.4 -** The Mayor will work with London boroughs to explore opportunities across publicly-owned land and waste facilities to install decentralised energy generation and commit public sector buildings and housing as energy loads.

- **Action 5.5 -** The Mayor will use the London Green Fund as a potential source of investment in decentralised energy infrastructure in London.

c) Stimulating the market for low and zero carbon fuel sources

- **Action 5.6 -** The Mayor will work with London boroughs and the London Waste and Recycling Board to ensure London's indigenous energy resources, particularly waste, are available to support meeting the Mayor's target to supply 25 per cent of London's energy from decentralised sources.

- **Action 5.7 -** The Mayor will continue to support low carbon hydrogen fuel production and its use in London. This will be achieved through the implementation of the London Hydrogen Action Plan with the London Hydrogen Partnership and industry.

- **Action 5.8 -** Through his existing programmes, the Mayor will work to ensure London takes full advantage of the Feed-in Tariff and Renewable Heat Incentive to encourage delivery of renewable energy at scale.

d) Encouraging government to provide a framework that supports decentralised energy

- **Action 5.9 -** The Mayor will encourage government to establish a regulatory and commercial framework that supports decentralised energy and accessible heat and power markets.

Delivering decentralised energy in London requires the large-scale commercialisation of projects and low carbon fuel sources. To achieve this a number of barriers will need to be overcome, including providing confidence to developers, investors, and consumers that decentralised energy projects of all sizes are viable, increasing the availability of low carbon generation, and encouraging government to develop a supportive policy framework.

a) Guidance and templates to provide confidence to the decentralised energy market
As a starting point to building confidence in London's decentralised energy future, the Mayor is working with industry to develop consistent technical and commercial standards across London. The Mayor will publish technical guidance for district heating systems to ensure technological compatibility between medium-scale decentralised energy projects so they can, in future, connect to large-scale projects. This will include investigating the need for a code or charter to facilitate arrangements for developers to connect new developments to existing networks.

The Mayor will also develop commercial templates for decentralised energy projects. These can be used in the development of future decentralised energy projects to reduce the resources required. In addition, the Mayor will produce a London Heat Charter to help give confidence to potential heat market participants and in particular to residential heat customers and housing providers. This charter will set out guarantees on heat supplies and timescales for heat contracts. In combination, these standards will help overcome some of the existing barriers to a mature, fair and competitive market for heat.

b) Facilitating and delivering large-scale projects
In addition to easing the development of large-scale decentralised energy projects through technical guidance and commercial templates and standards, the Mayor has also secured around £3 million in European Local Energy Assistance (ELENA) funding from the European Investment Bank to support the commercialisation of large-scale decentralised energy projects.

Building on the capacity development and evidence base of DEMaP, this funding is supporting a team of experts to take potential decentralised energy projects from concept through to investment grade proposals. This includes developing a business case by providing feasibility studies, identifying heat customers, gaining agreement from developers and other stakeholders, providing detailed legal advice, and understanding potential levels of revenue and rates of return. The aim is to get projects to a point where they can secure investment.

As part of this, the Project Delivery Unit will work with London boroughs to identify the preferred option for public and private investment in their decentralised energy opportunity areas. The preferred option will also depend in part on the appetite of the borough and its public sector partners for public investment.

The initial projects will be developed from those identified under DEMaP, existing schemes under development, and others as they become available.

The Mayor is already supporting a number of these projects to demonstrate to the market that large-scale decentralised energy can be delivered in London and is commercially viable. These are strategic, pioneering opportunities for decentralised energy that require direct support and/or investment to ensure delivery. These projects include:

- the extension of the Olympic Park's Energy Centre heat network to the Stratford High Street area (please see box 4.5)

- the development of a new project along Euston Road involving Camden Council, residential developments, and the UK Centre for Medical Research and Innovation

- the connection of the Whitehall energy centre to the Pimlico District Heating Undertaking, providing low carbon heat to government departments, commercial buildings, and homes in Victoria

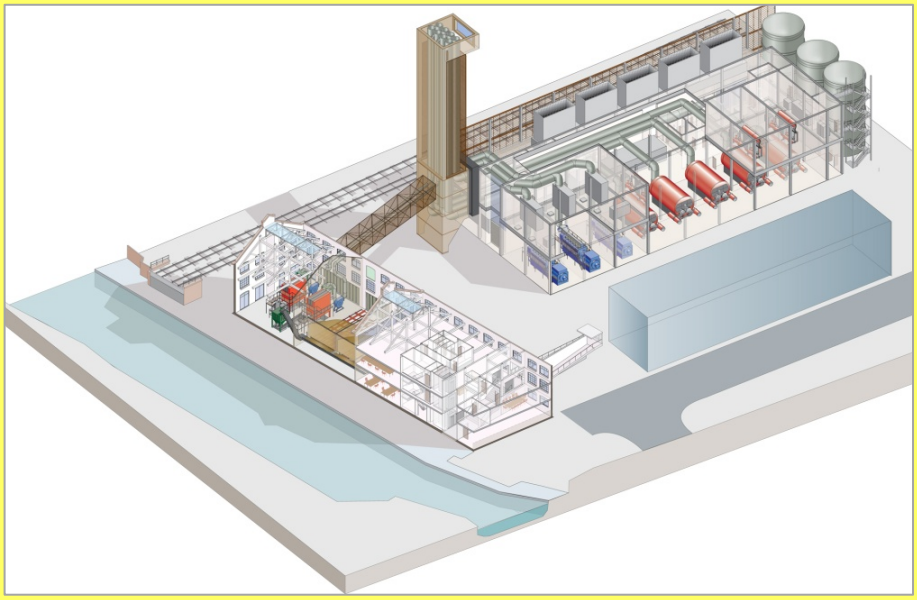
- the redevelopment of the energy centre and heat network on the Cranston Estate in Hackney, with significant potential to reduce the incidence of fuel poverty in a deprived area of London

- the Southbank Employers Group project, bringing together iconic buildings and a range of commercial stakeholders to deliver a low carbon heat network in the capital's arts centre

- connection of the energy centre at the Royal Free Hospital in Camden to neighbouring housing estates.

Box 4.5 Case study - Extension of the Olympic Park heat network

The Mayor and the London Thames Gateway Development Corporation have supported the extension of a heat network from the energy centre at the Olympic Park to new developments in the Stratford Fringe regeneration area. The project makes available 20MW of low carbon heat and the first connection is due to be to the Genesis development at 150 High Street. This initial public investment is designed to put the project in a position where it quickly becomes commercially viable, returns the initial public investment, and can extend to other buildings in the area.



Design drawings of the Olympic Park energy centre

The London Thames Gateway Heat Network

In addition to these projects the Mayor is also supporting the development of the London Thames Gateway Heat Network (please see figure 4.8). The Thames Gateway is Europe's largest regeneration area and holds the key to the future expansion of London. There is potential for a large heat transmission network capturing low carbon and renewable heat from a number of generating plants. This includes energy from power stations, industrial process plants and potentially new energy-from-waste plants. This would then be delivered to diverse heat loads such as existing and future homes, businesses, schools, hospitals and public buildings throughout the Thames Gateway.

Connection to the London Thames Gateway Heat Network would enable developers to meet the Mayor's planning requirements and would offer a cost effective solution to decarbonise existing developments. Connecting the London Thames Gateway's buildings to the network has the potential to save 100,000 tonnes of CO_2 each year and, in the construction phase, to create over 200 jobs. Through the ELENA-funded project team, the Mayor will continue to support decentralised energy projects in the Thames Gateway.

More information on these projects, and on the Mayor's role in moving decentralised energy forward in London, is available in the Mayor's Powering Ahead: Delivering Low Carbon Energy for London report[xxvii].

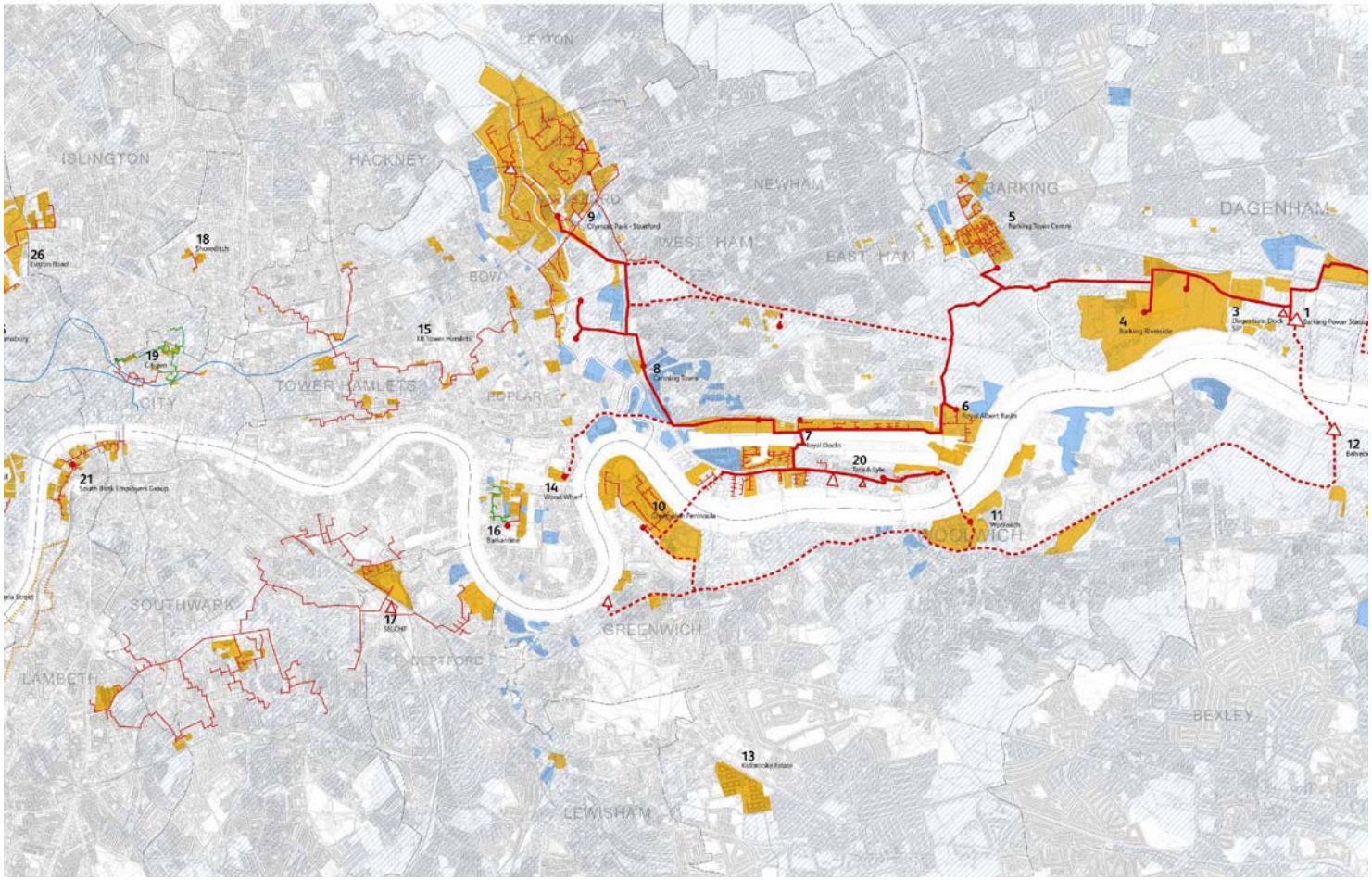
Committing public sector land

As part of the development of decentralised energy projects, the Mayor will work with London boroughs to explore opportunities across publicly-owned land and waste facilities to install decentralised energy generation and commit public sector buildings and housing as energy loads. As part of these efforts, the Mayor will encourage the public sector to commit buildings to large-scale heat networks.

Attracting investment to fund decentralised energy at scale

The total investment required to achieve the Mayor's target to supply 25 per cent of London's energy from decentralised sources by 2025 is in the order of £5 to £7 billion[xxviii] over the next 15 years. The Mayor believes this level of investment is deliverable and should be considered in the context of the £200 billion investment in energy supply required nationally over the same period[xxix]. Inward investment to London can be attracted through the establishment of investment vehicles, and investing public money to develop markets in the decentralised energy sector. The Mayor has established the London Green Fund, using significant public sector investment to lever in private funds. This Fund has the potential to support decentralised energy projects (please see chapter 3 for more information on the London Green Fund).

Figure 4.8 The proposed London Thames Gateway Heat Network



c) Stimulating the market for renewable and indigenous fuels

The actions and programmes outlined above will stimulate not only the development of markets for low and zero carbon heat and power, but also the increased use of London's own low and zero carbon energy resources.

For large-scale and CHP projects, the Mayor aims to move to progressively lower carbon fuel sources. In the case of CHP, in the immediate future natural gas is likely to provide the main fuel source. However, in the longer-term, the aim is to make the transition to a range of lower and zero carbon fuel sources such as renewable gas, waste-derived-fuels, biomass and waste heat.

This will support progress towards national and regional renewables targets and will further stimulate the low carbon economy in London. The Mayor is taking specific action to catalyse the use of waste-to-energy and hydrogen technologies as they have significant market potential in London. The Mayor also supports the development of the London Array offshore wind project in the Thames estuary.

Waste-to-energy

Modern energy-from-waste technologies have significant CO_2 reduction potential and can achieve high efficiencies. These are now available commercially and government is offering incentives for their use through mechanisms such as Renewable Obligation Certificates (ROCs). There are a number anaerobic digestion plants operating in the UK and overseas and the Mayor has recently granted planning permission for London's first gasification facility in East London, expected to open in 2013.

Whilst waste and biomass have the potential to be important sources of renewable heat in London, how effectively energy produced from these sources can be distributed as heat to consumers will be an important factor in their rate of development.

The Mayor, through LWaRB funding, is providing financial support for the development of new waste management infrastructure in London, including energy-from-waste technologies that generate renewable heat and power. In particular, LWaRB has the capacity to support existing waste infrastructure to convert from waste facilities operating in electricity-only mode to CHP generation. The Mayor's plans to develop waste management infrastructure in London can be found in the Mayor's Municipal and Business Waste Management Strategies.

The Mayor will also work with LWaRB and the private sector to support the development of food waste infrastructure, such as anaerobic digestion. To this end the Mayor has established the Food to Fuel Alliance which aims to promote the development of at least five exemplar projects in London that include renewable heat and power, and the demonstration of links to hydrogen fuel cells.

The Mayor also strongly recognises the importance of London's air quality. In most cases, measures to tackle CO_2 emissions will have an air pollution benefit as well. However, poor air quality is a problem in some parts of London, and where this is the case, measures must be taken to ensure that local air quality is not compromised.

Gas and biomass fuels release emissions of air quality pollutants and the Mayor intends to tackle emissions from both of these fuels. However, emissions of local air quality pollutants from biomass fuels can be higher than those from natural gas, though they are generally lower than from coal. In some cases, therefore, the deployment of fuel-burning renewable energy systems will not be appropriate and alternatives will need to be proposed through the planning process.

The Mayor will use his planning powers through the London Plan to ensure that emissions from biomass and natural gas boilers are limited so that they do not worsen local air quality, and to ensure that low and zero carbon energy supply provides opportunities to improve local air quality. The air quality impacts of proposed systems will be assessed on a case-by-case basis. Limits are likely to be at least as stringent as those currently proposed in the RHI. As technology improves, emission limits will be re-assessed. Further information on boilers and air quality is provided in the Mayor's Air Quality Strategy and London Plan.

Hydrogen energy

The Mayor will continue to support near-market decentralised energy technologies such as hydrogen fuel cells through the London Hydrogen Partnership. The biggest hydrogen fuel cell in a UK building to date was installed in the TfL Palestra building in Southwark, and the sale of an even larger 300 KW fuel cell was recently announced as part of a redevelopment project on central London's Regent Street.

The London Hydrogen Partnership will continue to identify and promote new opportunities for the installation of stationary hydrogen fuel cells through partnerships within the GLA group, with London boroughs, and with private organisations. It will also

examine the availability of UK and EU funding to support further stationary deployment in London. For more information please see the London Hydrogen Action Plan.

Microgeneration

The Mayor has supported the installation of microgeneration technologies on GLA group buildings and through the London Plan requirements for new developments. The Mayor is ensuring that existing programmes are modified to allow London to take full advantage of the RHI and FIT to deliver renewable energy generation capacity at scale. Opportunities are being maximised through targeted advice and via the RE:NEW, RE:FIT and RE:CONNECT programmes, ensuring that homeowners, housing providers, public building owners and businesses understand the incentives and the range of technologies and offers from the market.

d) Encouraging government to develop a framework that supports decentralised energy

Alongside the direct interventions of the Mayor, government action is needed to support the commercialisation of decentralised energy (at all scales) and the development of accessible, mature markets for low carbon heat and power. These interventions should be designed to facilitate the wide-scale deployment of decentralised energy in London and transform the London energy supply market in line with the Mayor's objectives. The Mayor will look to work with government in a number of areas, described below.

Developing a market for heat

The technical, commercial and conduct standards under development in London are being shared with government as it develops its heat policy. This development includes consideration beyond heat only from mains gas and the electricity grid, towards a market that is accessible to generators and distributors of low carbon heat at all scales. The Mayor welcomes fiscal incentives for renewable heat under the RHI, but is encouraging government to supplement this with support for heat network infrastructure that can deploy low and zero carbon heat at scales, and that facilitate genuine market transformation. Key elements of this support should include:

- direct financial support for heat network infrastructure, potentially via the proposed Green Investment Bank, in partnership with the London Green Fund

- enhanced capital allowances for pre-insulated district heating pipes

- allowing district heat companies Statutory Undertaking Rights in relation to constructing heat networks.

The introduction of the RHI can play an important part in driving the production of renewable heat in London and the development of a heat market. The Mayor would welcome the inclusion of a financial uplift for renewable district heating. Moreover, incentives should cover low carbon heat when connected to a heat network, as well as zero carbon heat, as this would support the infrastructure that will facilitate the transition to zero carbon sources as they become more commercially viable.

Electricity market reform to support decentralised energy

The Mayor supports a new regulatory framework for the electricity market that could enable access for decentralised electricity generators and commercialisation at all scales. Under the new framework, decentralised energy operators will take part in a new market system, developed to enable them to buy and sell distributed electricity on a fair basis and within the electricity market system rather than outside it. The arrangements now require practical implementation. London has played a pivotal role in developing this framework and continues to do so.

New licensing arrangements for distributed electricity suppliers that supply more than 1MWe to consumers, should make it possible for decentralised energy operators (along with other smaller electricity suppliers) to apply for a licence without requiring them to join the complex and risk-related market structures in which the major suppliers operate. Instead the licensing arrangement should enable these operators to buy and sell locally-produced electricity on a distributed generation market at retail prices. The Mayor will continue to encourage government through its Electricity Market Reform proposals to ensure that smaller operators can access energy markets in a competitive manner.

Smart grid development

In achieving the Mayor's target to deliver 25 per cent of London's energy supply from decentralised sources by 2025, a range of new energy generating projects will need to feed into London's electricity distribution network. As a result, London's existing electricity distribution network will not be fit for purpose by 2025. The network needs to become a smart grid, making use of decentralised electricity generation at all scales. It will also need to able to accommodate intermittent wind generation at the national scale, and manage higher electricity demands associated with electric vehicles, heating, and high electricity demand sites at vulnerable points on the network. In addition, the network

needs to manage and mitigate peaks in demand at certain times of the day or year that make the network vulnerable to outages and dependent on the use of carbon-intensive peaking plant.

The Mayor therefore supports government plans to accelerate the development of responsive, robust and accessible electricity grids. He is working though Ofgem's Smart Cities programme, and in conjunction with London's electricity distribution network operator and a range of commercial and academic partners, on a major project to understand the demands of a London smart grid. The project will pilot smart grid technologies that improve access to decentralised generators and accelerate the deployment of smart meters and demand management incentives and mechanisms.

4.7 Reducing CO_2 emissions from London's energy supply through further government action

The above committed Mayoral and government programmes, on top of BaU reductions, will reduce CO_2 emissions from London's energy supply by 10.52 $MtCO_2$. However, further government action will also be required to contribute to meeting the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025.

The Committee on Climate Change (CCC) challenged government to work towards an Extended Ambition scenario for power generation. This scenario undertakes a much deeper de-carbonisation of power supply by 2030 than that put forward in the Low Carbon Transition Plan. The scenario includes an additional 23 GW of new wind capacity, four CCS demonstration power stations and three new nuclear power stations[xxx].

The Mayor agrees with the CCC that government needs to show more ambition and commit to a much faster rate of decarbonising power generation, and will encourage government to commit to further decarbonisation, in line with recommendations from the CCC. Figure 4.1 sets out the projected emissions reductions to which the government is already committed, and also the additional savings from the Extended Ambition scenario set out by the CCC. Under this scenario, grid decarbonisation would make a further contribution to London's CO_2 emissions reductions from energy supply of 3.90 $MtCO_2$.

4.8 Implementing Mayoral policies and actions

Annex A of this document sets out the projected CO_2 emissions reductions, by source, as a result of activities in the energy supply sector, along with assumptions for expected CO_2

emissions reductions. Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter

Endnotes

[i] Including streetlights and water pumps.

[ii] This includes actions the Mayor encourages other bodies or persons to take.

[iii] The source of data used for figure 4.2 is the DECC Energy Trends report (DECC, Combined Heat and Power in Scotland, Wales, Northern Ireland and the regions of England in 2010). This data does not provide a breakdown by size or fuel source. For this reason the CHP contribution has not been included. In 2010, decentralised energy contributed over 3,500 GWh, around 4 per cent of energy supply to homes and workplaces. The majority of this was from CHP.

[iv] DECC, Low Carbon Transition Plan (2009)

[v] This strategy uses the CO_2 emissions reductions from the previous government's Low Carbon Transition Plan for committed government action.

[vi] The target also requires ten per cent of transport energy from renewables, up from the current level of 2.6 per cent of road transport consumption. The use of biofuels is discussed further in chapter 8 of this strategy as well as in the Mayor's Transport Strategy.

[vii] Good Quality refers to CHP generation that is highly efficient in operation, meeting the standards set down in the EU CHP Cogeneration Directive.

[viii] Policy Exchange, Running on empty: Coming to terms with UK Gas Dependence (2010)

[ix] Ofgem, Project Discovery: Options for delivering secure and sustainable energy supplies (2010)

[x] GLA modelling (2011)

[xi] Note that the first year in which an energy gap materialises is also pushed back by one year under this scenario when compared to the previous one.

[xii] Ofgem, Project Discovery Energy Market Scenarios (2009)

[xiii] Green Investment Bank Commission, Unlocking Investment to Deliver Britain's Low Carbon Future (2010)

[xiv] Policy Exchange, Delivering a 21st Century Infrastructure for Britain (2009)

[xv] Green Investment Bank Commission, Unlocking Investment to Deliver Britain's Low Carbon Future (2010)

[xvi] HM Treasury & Infrastructure UK, Strategy for National Infrastructure (2010)

[xvii] HM Treasury & Infrastructure UK, Strategy for National Infrastructure (2010)

[xviii] DECC, Annual Energy Statement DECC Departmental Memorandum (2010)

[xix] This is based on London's relative share of energy consumption in 2008 (the most recent figures), which was 13 per cent.

[xx] Policy Exchange, Delivering a 21st Century Infrastructure for Britain (2009)

[xxi] Government data for 2010 does not provide a breakdown by size or fuel source for decentralised energy in London (DECC, Combined Heat and Power in Scotland, Wales, Northern Ireland and the regions of England in 2010). For this reason, the CHP contribution in 2010 has not been included in figure 4.5. By 2025, however, the projected rollout of decentralised energy will have accounted for the existing capacity.

[xxii] Producing heat and power in combination makes more efficient use of the fuel source, whether mains gas or a lower carbon fuel such as biomass or biogas, by capturing and using the waste heat from electricity generation. CHP is usually at least 80 per cent efficient whereas conventional power stations are currently between 35 per cent and 55 per cent efficient, before losses (of up to ten per cent) in distributing power to the end-user are accounted for. This means that CHP produces significantly lower CO_2 emissions than conventional power and heat generation per unit of energy production.

[xxiii] Poyry for DECC, The Potential and Costs of District Heating Networks (2009)

[xxiv] Anchor Heat Loads are large, initial purchasers of heat from a decentralised energy supplier via long-term contracts that provide the stable returns on investment to underpin the commercial case for network development.

[xxv] CLG, Community Infrastructure Levy: An Overview (2010)

[xxvi] CLG, Planning Policy Statement: Planning and Climate Change - Supplement to Planning Policy Statement 1 (2007)

[xxvii] GLA, Powering Ahead: Delivering Low Carbon Energy for London (2009)

[xxviii] GLA, Powering Ahead: Delivering Low Carbon Energy for London (2009)

[xxix] Ofgem, Project Discovery - Energy Market Scenarios: Consultation (2009)

[xxx] UK Committee on Climate Change, Meeting Carbon Budgets - The Need for a Step Change (2009). Updated grid electricity emissions factors were applied using the Medium Investment Scenario figures of the Committee on Climate Change's Fourth Carbon Report (2010).

CHAPTER FIVE

LONDON'S HOMES: DRIVING OUR ENERGY FUTURE

SUMMARY

Vision

By 2025, the rate of rollout of energy efficiency measures, low and zero carbon microgeneration technologies, and water saving measures to London's homes is exponentially increased. Londoners understand their energy use and are increasingly more energy efficient, reducing CO_2 emissions from homes even further. The most vulnerable will be better able to heat their home affordably and have better access to the support and benefits that they are entitled to, resulting in their being better able to pay their energy bills.

The Mayor will contribute towards this through the following policies:

- **Policy 6 - Retrofitting existing homes with energy efficiency measures, water efficiency measures, and low and zero carbon microgeneration technologies -** The Mayor will work with partners to use public funds to develop commercial models that catalyse markets to offer appropriate whole-house retrofitting of energy efficiency, energy supply, and water efficiency measures to 1.2 million existing homes in London by 2015, and all homes in London by 2030. The Mayor will encourage government and boroughs to develop supportive frameworks to achieve this, and encourage energy companies to adopt supportive delivery models in London.

- **Policy 7 - Tackling fuel poverty in London -** The Mayor will work to help eradicate fuel poverty in London by increasing the uptake of energy efficiency measures offered through his programmes in fuel poor households wherever possible, increasing the provision of energy efficient affordable housing in London, increasing the income of Londoners, and encouraging government and energy companies to effectively define and target fuel poor households.

The Mayor's main actions to deliver this are:

- **RE:NEW -** The Mayor, working in partnership with London Councils, London boroughs and the Energy Saving Trust, is using RE:NEW to exponentially increase the rollout of energy efficiency measures to all of London's homes through a new delivery model. By 2015 RE:NEW aims to catalyse delivery of advice and easy-to-install energy efficiency measures to 1.2 million homes, and loft and cavity wall insulation where

practical. By 2012 RE:NEW aims to develop an approach that will utilise the Green Deal to support the installation of easy-to-install energy efficiency measures along with more expensive whole-house measures into every London home that wants it by 2030.

- **The Mayor's London Housing Strategy -** The Mayor's London Housing Strategy sets high energy efficiency standards for retrofitting existing homes, and the Mayor will seek to maximise funding for homes retrofit from central housing funding and ensure it complements the overall approach adopted by RE:NEW.

- **RE:CONNECT -** The Mayor is working with London boroughs and local communities to cut CO_2 emissions by 20.12 per cent by 2012 from ten Low Carbon Zones, and work towards a 60 per cent reduction by 2025. The Zones act as exemplar models for a whole-community approach to reducing CO_2 emissions that can be rolled out within and beyond London.

CO_2 emissions from London's homes: 2008-2025

- **Current CO_2 emissions -** In 2008 emissions from London's homes were 15.93 $MtCO_2$ per year.

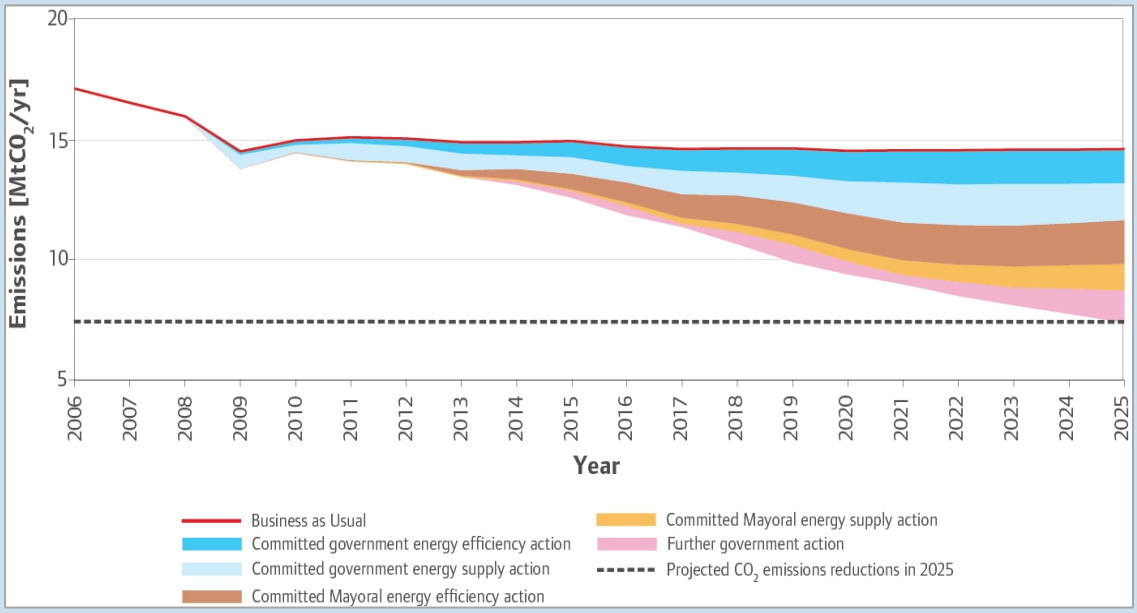
- **Business as Usual CO_2 emissions by 2025 -** Under a BaU scenario, CO_2 emissions from London's homes are expected to reduce to 14.55 $MtCO_2$ per year.

- **CO_2 emissions reductions by 2025 from committed government action -** Government, EU and international action is expected to reduce CO_2 emissions from London's homes by 2.92 $MtCO_2$ per year.

- **CO_2 emissions reductions by 2025 from committed Mayoral action -** Committed Mayoral action is expected to reduce CO_2 emissions from London's homes by 2.91 $MtCO_2$ per year.

- **CO_2 emissions reductions by 2025 from further government action -** If government implements more ambitious CO_2 emissions reduction programmes, according to the recommendations of the Committee on Climate Change, it is expected London's CO_2 emissions from homes will reduce by 1.33 $MtCO_2$ per year.

Figure 5.1 Projected reductions in CO_2 emissions from London's homes (2006-2025)



For definitions of each category of CO_2 emissions reductions, please see pages 21-22.

Source: GLA modelling

5.1 Introduction

This chapter sets out the contribution London's existing homes make to CO_2 emissions, and actions currently underway and proposed that will contribute towards minimising them. It focuses on policies and actions to reduce CO_2 emissions from the use of energy in existing homes. Although the CO_2 emissions reductions as a result of policies and actions on energy supplied to homes are included in the overall CO_2 emissions reductions in figure 5.1, details on these policies and actions are included in chapter 4 of this strategy. Likewise, chapter 7 sets out the detailed policies and actions for reducing CO_2 emissions from new homes in London.

This chapter:

- summarises London's current CO_2 emissions from existing homes
- summarises London's CO_2 emissions from homes under a BaU scenario

- summarises CO_2 emissions reductions expected as a result of committed government action on homes

- sets out the challenges and opportunities for London to further reduce its CO_2 emissions from homes

- details the specific policies and actions that the Mayor has committed to take to reduce CO_2 emissions from London's homes[i]

- summarises further action that the Mayor encourages government to take to reduce CO_2 emissions from London's homes, and support the achievement of the Mayor's CO_2 emissions reduction targets.

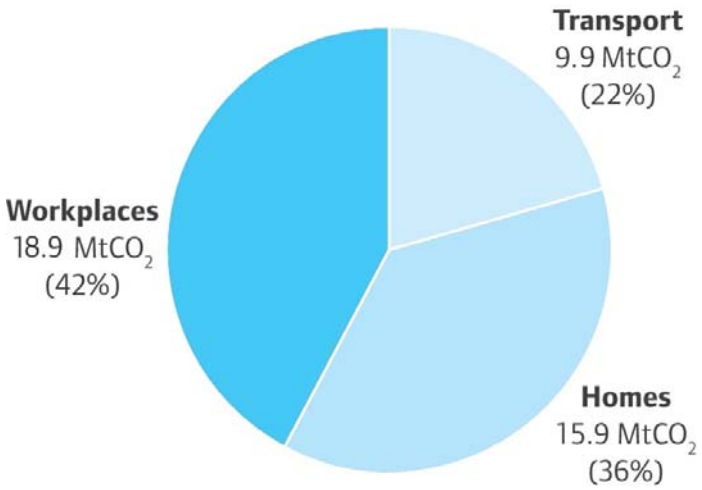
5.2 Current CO_2 emissions from London's homes

As shown in figure 5.2, London's homes were estimated to have emitted 15.93 $MtCO_2$[ii] in 2008, around 36 per cent of London's total emissions for 2008. Forty-six per cent of this was from electricity consumption in the home and 54 per cent was the result of consumption of non-electricity related energy.

As figure 5.3 shows the majority (nearly 80 per cent) of energy consumed in a home is used either for space heating or heating water. This highlights the importance of directing energy efficiency measures to drive down demand for these energy-consuming activities. The remainder is split between lighting and appliances, which account for 18 per cent of energy use, and cooking which accounts for three per cent. This energy use can be minimised by specifying the most energy efficient appliances, for example an A+ rated washing machine.

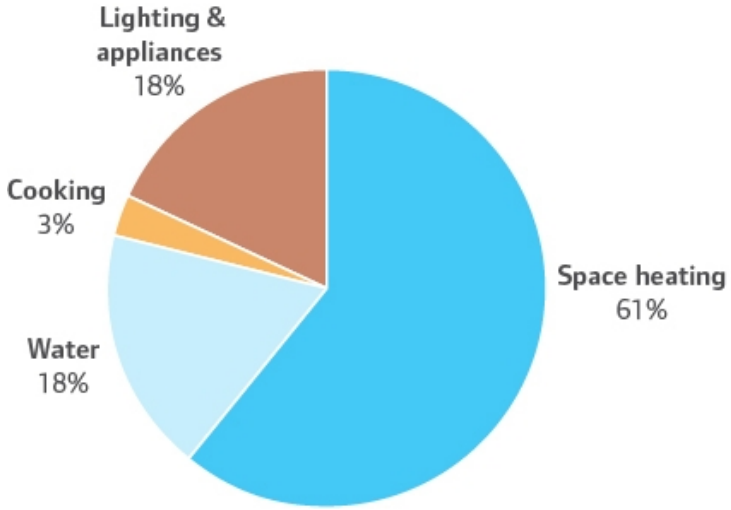
CO_2 emissions from London's homes stayed approximately level between 1990 and 2008. This is despite London's population rising by around three quarters of a million in that period and an overall increase in the number of energy consuming goods in homes, demonstrating there has been a reduction in CO_2 emissions per capita from 2.38 tonnes of CO_2 per capita in 1991, to 2.08 tonnes of CO_2 per capita in 2008.

Figure 5.2 The contribution of London's homes to CO_2 emissions in 2008



Source: LEGGI 2008

Figure 5.3 Energy use in homes in 2009



Source: DECC, Energy consumption in the UK, 2011

5.3 Projected CO_2 emissions under a Business as Usual scenario

If the existing trend in energy use in homes were to continue on a BaU basis, it is estimated that London's homes would be emitting around 14.55 $MtCO_2$ per year by 2025.

This fall in CO_2 emissions is principally driven by changes in energy supply, but includes a baseline level of ongoing reactive energy efficiency retrofitting improvements to the housing stock. The ongoing improvements include households voluntarily replacing single-glazed windows with double glazing, or old boilers with A rated new boilers, independently of government programmes.

5.4 Projected CO_2 emissions after committed government action

Government has a number of policies and programmes to reduce CO_2 emissions from homes and reduce fuel poverty. Its flagship programme from the end of 2012 will be the Green Deal, supported by the Energy Company Obligation (ECO). Although high level information on these programmes is included in the Energy Act 2011, details of how they will work in practice will only become available in secondary legislation. However, a number of policies and programmes will continue to run up to, and alongside, the introduction of the Green Deal and ECO, including the Carbon Emissions Reduction Target (CERT), Community Energy Saving Programme (CESP), and Warm Front. These programmes are expected to reduce emissions from London's homes by 2.92 $MtCO_2$ by 2025[iii]. For more information on government policies and programmes, please see box 5.1.

Box 5.1 Government CO_2 reduction policies and programmes for homes

The government's flagship programme to reduce CO_2 emissions from homes and reduce fuel poverty is the Green Deal, supported by the ECO. These are expected to be available from the end of 2012. Although the detail of these programmes is yet to be announced, early indications suggest:

- **The Green Deal -** This scheme will see households provided with upfront finance to pay for energy efficiency measures, particularly more expensive measures. The finance will be attached to the home and paid back through savings on energy bills.

- **Energy Company Obligation (ECO) -** This obligation will replace the existing CERT, CESP and Warm Front schemes. An obligation on energy suppliers and generators, the ECO is expected to continue to provide a package of insulation and heating improvements to those struggling to keep warm affordably, and subsidise more expensive measures, such as solid wall insulation, provided under the Green Deal. It is unclear how much funding will be provided through the ECO.

In addition to these programmes, a number of other government programmes will continue up to, and alongside, the introduction of the Green Deal and ECO:

- **Carbon Emissions Reduction Target (CERT) -** CERT is an obligation on domestic energy suppliers with over 50,000 customers to reduce the amount of CO_2 emitted by households. The obligation has been in place since 2005, and will run until December 2012 when it will end and be replaced with the Green Deal and ECO. Energy suppliers are required to deliver overall lifetime CO_2 savings of 293 $MtCO_2$, with 108 $MtCO_2$ being delivered in the CERT extension period from March 2011 to December 2012. At least two thirds of the increase in the target (68 per cent) must be delivered through professionally installed insulation measures.

- **Community Energy Saving Programme (CESP) -** The £350 million CESP is aimed at helping households in areas of low income. It is funded by an obligation on energy suppliers and generators, and promotes a whole-house approach to energy efficiency. The programme is delivered through community-based partnerships between local authorities, energy companies and community groups. CESP is expected to come to an end in 2012.

- **Warm Front -** The Warm Front scheme provides a package of insulation and heating improvements up to the value of £3,500 (or £6,000 where oil, low carbon or renewable technologies are recommended) targeted at those struggling to keep warm affordably. The scheme is expected to come to an end in 2013.

- **Warm Home Discount -** This mandatory scheme replaces the previous voluntary agreement with energy suppliers to provide further help to vulnerable consumers. It obliges energy suppliers to provide rebates to vulnerable electricity customers of £120 in 2011-12, increasing to £140 in 2014-15. The discount will be worth up to £1.1 billion, and is projected to help around two million households per year.

- **Decent Homes -** This programme aims to ensure all social housing meets a standard of decency. The standard means that it is in a reasonable state of repair, has reasonably modern facilities and provides a reasonable degree of thermal comfort. This programme is expected to come to an end in 2012.

- **Smart meters -** Government has mandated energy suppliers to roll out smart meters for electricity and gas to all homes in Great Britain by 2020.

5.5 Opportunities for, and challenges to, reducing CO_2 emissions from London's homes

Although government action will make reductions in CO_2 emissions from London's homes, meeting the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025, will require the pace and scale of activity to be faster in London. It will also need to enable mass uptake of measures including loft and cavity wall insulation and boiler replacement, as well as more expensive measures such as solid wall insulation and low and zero carbon microgeneration technologies. The Mayor's activity to achieve this is addressing a number of challenges and opportunities in London:

a) Challenge: Delivering energy efficiency measures in London has historically been more difficult

There are a number of challenges in London that make delivering energy efficiency measures more difficult and expensive than in other parts of the country. These include:

- **The number of hard to treat walls**[iv] **-** It is estimated that 59 per cent of homes in London have solid walls[v]. This makes them more expensive and challenging to retrofit than homes with cavity walls due to the higher costs of the insulation and the disruption for the household of installing the insulation.

- **The number of flats in London -** Almost 50 per cent of London's homes are flats[vi] which are logistically harder to retrofit than a house. This is firstly because of the multiple owners within a block or house, and secondly because the external building fabric of a block itself is often owned by the freeholder and managed by an agent on their behalf. Therefore measures such as cavity wall insulation, cladding, and windows must often be installed for all flats in a building at the same time. Flats are also individually less suited to accommodating low and zero carbon microgeneration technologies unless they are designed to serve the entire block, such as communal heating, due to the smaller amount of available roof space to install technologies such as solar photovoltaics. Combined with the number of solid walled properties in London, this means seventy per cent of London's homes are considered hard to treat[vii].

- **The number of properties in conservation areas -** As some 13 per cent of London's homes are in conservation areas, certain types of glazing, solid wall insulation and low and zero carbon microgeneration technologies may be less suitable or more expensive to install. In addition, planning requirements can be confusing for a household.

- **The number of properties with loft insulation -** It is estimated that approximately 95 per cent of lofts in the London area already have some loft insulation, but that this loft insulation is often inadequate. Insulation schemes are therefore essentially top–up schemes. Although this can deliver significant CO_2 savings, many people are unaware that they require additional insulation, and energy savings from additional insulation will be less than for an empty loft. This makes them less cost effective to insulate.

- **The higher costs associated with installing measures in London -** The high-density urban nature of London increases the associated logistical costs of installing energy efficiency measures. Additional costs include congestion charging, car parking, higher wages and livings costs, and the time it takes for installers to travel from job to job in London's traffic.

- **Private rented properties -** London has the highest proportion of private rented sector homes in England[viii]. Landlords have little incentive to improve the energy efficiency of their properties as they do not receive any direct return from the installation, and have historically felt they could not charge higher rent to recoup the cost. This has meant that rates of insulation installation in this sector have been low, even where fiscal incentives such as the Landlord's Energy Saving Allowance have been offered.

b) Challenge: Fragmented delivery in London
At any one time there can be over 30 home retrofit schemes in operation in London. Although some have been very successful in meeting their specific CO_2 reduction and fuel poverty goals, all are limited to certain energy efficiency measures and certain recipients. This fragmented approach to delivery creates a level of confusion that reduces the uptake of energy efficiency programmes that are being offered. It also means that opportunities for realising economies of scale are being lost.

c) Challenge: Funding to deliver energy efficiency in homes at the pace and scale required
There are a number of funding streams for home energy efficiency in London, but as highlighted earlier, these can only be used for certain measures and delivered to certain tenures. The fragmented nature of this funding exacerbates the fragmented delivery model in London.

Currently the largest funding stream for homes energy efficiency is CERT. However, due to the inherent difficulty in delivering retrofitting activity in London, it has generally been

more cost effective for energy companies to deliver their CERT obligations elsewhere in the UK. The London Assembly estimated that only 4.5 per cent of total UK insulation installations under CERT from 2005-2008 took place in London, even though the capital has 12 per cent of the population. In the 2008-2011 CERT period, Energy Saving Trust data suggests that London received only 4.7 per cent of total UK insulation installations[ix]. This means that, under a conservative estimate, London lost out on approximately £350 million in energy efficiency funding over the period from 2005 to 2011[x]. This shortfall in funding means that London cannot deliver homes energy efficiency at the scale and pace required to meet the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025.

In addition, funding streams for delivering more expensive home retrofitting measures such as solid wall insulation or low and zero carbon microgeneration are currently far more limited and harder to access. The payback periods for these types of measures can also be too long to make them attractive to households. The government's proposal for a pay-as-you-save (PAYS) model under the Green Deal is intended to make this funding available from the end of 2012. However, as detail is yet to emerge on how the Green Deal will work in practice, it is unclear how new funding streams will overcome the current barriers faced by London with CERT funding.

d) Opportunity: Savings on fuel bills and opportunities for new income streams
Delivering energy efficiency measures in homes reduces energy consumption and fuel bills for most households. Fuel prices have fluctuated significantly between 1996 and the present, and continue to change. The average domestic fuel bill (gas and electricity) in London increased from £573 to £1,100 (an increase of over 90 per cent) between 1998 and 2010[xi], and the long-term trend for energy prices is likely to be upwards. However, demonstration projects as part of the RE:NEW programme showed undertaking a whole house energy efficiency retrofit saved an average of £154 per home (please see page 124 for further detail on RE:NEW).

In addition to saving money on fuel bills, reducing CO_2 emissions from homes through installing low and zero carbon microgeneration technologies represents an opportunity to access additional income streams. The introduction of the FIT in April 2010, and the upcoming Renewable Heat Incentive has created a potential income stream for households that can afford to install these technologies. Under these initiatives households receive a pre-set tariff per unit of renewable energy generated. The financial value of the tariff is different for each technology.

e) Challenge: Reducing fuel poverty in London

Government considers a household to be in fuel poverty if it needs to spend more than ten per cent of its net income on fuel for adequate heating (usually 21 degrees for the main living area, and 18 degrees for other occupied rooms)[xii]. Fuel poverty can lead to serious health implications and is also linked to a number of winter deaths (please see box 5.2).

Under government's full income definition of fuel poverty, where a household is defined as living in fuel poverty if it spends more than ten per cent of its income, after tax, on fuel in 2008, 328,000 households in London were in fuel poverty[xiii]. However, government's definition fails to take account of the much higher costs of housing within London. If a household is defined as living in fuel poverty if it spends more than ten per cent of its income after tax and housing costs on fuel (the residual income definition), it is estimated this number could more than double to 760,000 households[xiv]. However, delivering energy efficiency measures can particularly benefit those in fuel poverty by allowing them to heat their homes to a reasonable level at a lower cost.

Box 5.2 Causes and effects of fuel poverty in London

A 2009 report, Fuel Poverty in London, found that causes of fuel poverty include: low income; under-occupation of homes; high energy costs related to inefficient and expensive heating systems; poor energy efficiency; energy price fluctuations; and payment differentials. Of these factors, the strongest correlation with fuel poverty was found to be income, with a household over 117 times more likely to be in fuel poverty if it falls in the lowest quintile of income. A household in a property falling into the lowest quintile of Standard Assessment Procedure (SAP) rating was around three times more likely to be in fuel poverty than if it were in a higher SAP-rated property.

The consequences of fuel poverty can affect quality of life and health, as well as imposing wider community costs. Although the relationship between indoor temperatures and ill health is complex, illnesses such as influenza, heart disease, and strokes are all exacerbated by the cold. Cold homes can also promote the growth of fungi and numbers of house dust mites, which have been linked to conditions such as asthma. Ill health can lead to absences from work, leading to wider economic costs.

Households with children, older people and sick or disabled members can be particularly vulnerable to these effects. For example, about half of excess winter deaths are

circulatory in cause, which are exacerbated by cold homes, and children are particularly vulnerable to respiratory conditions such as asthma, which have been linked to cold and damp homes. Cold homes also increase the time taken to recover from other illnesses so that children may be absent from school for longer periods, affecting education[xv].

f) Challenge: Supply chains for homes energy efficiency measures
Currently the supply chain is capable of satisfying the demand that existing energy efficiency programmes create for loft and cavity wall insulation in London. However, the energy efficiency market is relatively immature and the main drivers of demand are from government energy efficiency programmes, predominantly CERT. This creates an unreliable and cyclical demand focused around the funding cycles of these programmes. When compounded by the existing seasonal peaks and troughs in demand, the sector does not have sufficient confidence in market demand to increase operating capacity.

In terms of more expensive measures such as solid wall insulation, there is currently very little demand. This means the supply chain is immature and is unlikely to strengthen until a consistent level of demand is available to give confidence to the market. The government's proposed Green Deal may help to provide greater consistency of demand, but detail of how the Green Deal will work in practice is yet to be made available.

g) Challenge: Lack of data on homes in London
Boroughs currently lack access to accurate data on CO_2 emissions, levels of insulation and energy ratings on a house-by-house basis in London. This makes it difficult to target energy efficiency measures at those homes that most require it in the most cost effective ways. A range of data exists in various formats and is held by different organisations. For example, details of installations under CERT are held in the Energy Saving Trust's Homes Energy Efficiency Database (HEED), energy suppliers hold data on which homes use most energy, and the Department for Communities and Local Government holds data on the energy rating of homes through Energy Performance Certificates. However, this information is not collated universally in one place and is not easily accessible, if at all, by local authorities.

5.6 Reducing CO_2 emissions from London's homes through committed Mayoral action

The Mayor is committed to helping Londoners to save money on their energy bills and minimising CO_2 emissions from London's homes and has developed RE:NEW - a homes energy efficiency programme - to achieve this. RE:NEW is coordinating the delivery of

existing and new programmes in a way that will support the exponential rollout of energy efficiency activity to all of London's homes[xvi].

RE:NEW aims to progress from projects which are initially funded and delivered by the public sector to projects where the public sector stimulates and aggregates demand for retrofitting activity, creating a market opportunity to be funded and delivered by the private sector.

Combined with policies on reducing emissions from energy supply, as set out in chapter 4, the Mayor's committed contribution to reducing CO_2 emissions from London's existing homes will be 2.91 $MtCO_2$ by 2025. The Mayor will achieve this through the following policies:

POLICY 6: RETROFITTING EXISTING HOMES WITH ENERGY EFFICIENCY MEASURES, WATER EFFICIENCY MEASURES, AND LOW AND ZERO CARBON MICROGENERATION TECHNOLOGIES

Vision

By 2025, the rate of rollout of energy efficiency measures, low and zero carbon microgeneration technologies, and water saving measures to London's homes is exponentially increased. Londoners understand their energy use and are increasingly more energy efficient, reducing CO_2 emissions from homes even further. By 2030, every London home is offered a whole-house retrofit.

Vision to policy

The Mayor will work with partners to use public funds to develop commercial models that catalyse markets to offer appropriate whole-house retrofitting of energy efficiency, energy supply, and water efficiency measures to 1.2 million existing homes in London by 2015, and all homes in London by 2030. The Mayor will encourage government and boroughs to develop supportive frameworks to achieve this, and encourage energy companies to adopt supportive delivery models in London.

Policy to action

a) Working with boroughs, energy companies, government, and partners to install appropriate easy energy efficiency measures into 1.2 million homes, and further measures, including installing loft and cavity wall insulation in those homes where appropriate, by 2015

- **Action 6.1 -** Working with London boroughs, the Mayor is committing £7.8 million to developing and rolling out the RE:NEW delivery model to 2012. This first phase of RE:NEW aims to create the momentum to provide energy saving advice and deliver easy-to-install energy efficiency and water saving measures to 200,000 homes, along with enabling loft and cavity wall insulation wherever practical. This will be dependent on a supportive government framework and the wider market adopting the cost effective RE:NEW model.

b) Maximising uptake of more expensive measures

- **Action 6.2 -** The Mayor will encourage partners to establish financing mechanisms as part of the Green Deal to enable the rollout of more expensive measures on a large scale by the end of 2012, such as solid wall insulation, new boilers, double glazing and low and zero carbon microgeneration technologies, as part of a whole-house approach to retrofitting London's homes.

c) Working with partners to deliver energy efficiency measures to London's homes

- **Action 6.3 -** The Mayor will work with boroughs to support the delivery of RE:NEW, including systematic data collection, reducing the operational costs of delivery, maximising referrals for further energy efficiency measures, and developing partnerships with Green Deal providers and energy companies.

- **Action 6.4 -** The Mayor will encourage government to: ensure that London receives at least an equitable share of national funding that is available for improving energy efficiency in homes; utilise RE:NEW as an effective model to deliver the Green Deal; provide national data on housing stock; and integrate smart meter rollout with RE:NEW delivery wherever possible.

- **Action 6.5 -** The Mayor will work with partners and energy companies to help them use the RE:NEW model to deliver a greater share of their supplier obligations in London, share their energy efficiency data to better target and evaluate the success of activity, and work to ensure a greater quantity and more constant flow of insulation installations in London.

d) Improving homes energy efficiency standards

- **Action 6.6 -** In implementing his London Housing Strategy, the Mayor will seek to maximise funding for homes retrofit from central housing funding and ensure it complements the overall approach adopted by RE:NEW.

- **Action 6.7 -** As required in the Mayor's London Housing Strategy, where existing homes are retrofitted and where the building fabric will allow, the Mayor will require that homes achieve a high energy efficiency rating.

e) Developing effective community-based approaches to delivering home energy efficiency measures

- **Action 6.8 -** The Mayor will support London boroughs to deliver ten low carbon zones to demonstrate the potential for CO_2 savings from physical measures and community engagement, and encourage innovation. The Mayor aims to expand the programme if successful.

a) Working with boroughs, energy companies, government and partners to install appropriate easy energy efficiency measures into 1.2 million homes, and further measures, including installing loft and cavity wall insulation into those homes where appropriate by 2015

RE:NEW - Homes energy efficiency for tomorrow

To retrofit London's homes with energy efficiency measures, low and zero carbon microgeneration and water saving measures, the Mayor is working with partners to deliver RE:NEW, a Londonwide model for retrofitting homes. This initiative aims to overcome the barriers to retrofitting homes in London on a large scale. RE:NEW is building on existing energy efficiency schemes and models, such as those used in Kirklees, and helping co-ordinate the plethora of schemes that are offered at a borough level into a more integrated and coherent energy efficiency programme for households, based on best practice models. This is creating a consistent and engaging experience with a common branding that is simple for households to understand. It is also increasing the likelihood of households taking up the measures on offer under RE:NEW.

The RE:NEW model has been developed, and is being rolled out, through a collaboration between the Mayor, London Councils, London boroughs, and the Energy Saving Trust. RE:NEW uses a single, common, customer-acquisition model to deliver maximum CO_2 emissions reductions. The key features of the model are:

- **A whole-house approach -** Under RE:NEW, energy assessors visit homes and carry out a whole-house energy survey identifying which energy saving measures are appropriate for the home. During the visit, easy-to-install cost effective energy and water efficiency measures such as real time displays, tap aerators and hot water tank jackets are installed, and energy saving advice is given. The advice and easy measures increase the likelihood of the household taking up further measures. In the case of loft and cavity wall insulation and heating measures, during the visit, the energy assessor books appointments to enable their installation. For further more expensive measures, such as low and zero carbon microgeneration technologies and solid wall insulation, if the household is willing to pay for the measures upfront, they are referred to appropriate organisations, such as the Energy Saving Trust, to provide them with further information and support. If the household is unable to pay upfront, data on the home is logged so they can be re-visited should funding, such as under the Green Deal, become available in late 2012.

- **Area-based delivery by boroughs -** Homes are visited on a street-by-street basis. This approach enables community engagement and neighbour recommendations to take place which increases the overall uptake of visits and measures by up to three times. It also allows for the identification of groups of homes in a local area requiring the same further measures. This can help to cut down costs, particularly through time saved between installations, making them more cost effective.

- **Capability to tackle all types of housing -** The RE:NEW model promotes approaches for retrofitting all types of housing and all tenures. The energy survey evaluates the range of interventions that are most suited to each housing and customer type. The RE:NEW model also suggests the most appropriate approaches or combination of approaches for engaging with the three main types of housing tenure in London: social housing; private rented; and owner occupier, as each has their own specific challenges. For example, in the private rented sector, communication is through direct contact, advertising in tenant and landlord magazines, and through landlord accreditation schemes, estate agents and other networks. In the social sector, communications focus primarily on social landlords and behavioural communications to tenants.

- **Free upfront -** The RE:NEW model offers easy-to-install energy efficiency and water efficiency measures to homes for free. By the end of 2012, it aims to integrate with

Green Deal models so that more expensive measures are also offered free upfront, and paid back through savings on energy bills.

- **Integrated with wider priorities –** RE:NEW aims to integrate local priorities and wider environmental priorities to ensure it maximises the impact of its home visit for the resident and the environment. For example, it not only delivers energy efficiency advice and measures, but also water efficiency measures, and other services such as installing smoke alarms and conducting benefit checks.

Figure 5.4 The RE:NEW customer journey

The Mayor has committed £7.8 million between 2009 and 2012 to RE:NEW. The RE:NEW partnership carried out three technical trials during summer 2009, and a further nine demonstration projects between 2009 and 2010 to determine the package of easy-to-install measures on offer, test delivery on a large-scale, and inform the final RE:NEW delivery model. The trials and demonstration projects retrofitted approximately 9,000 homes, saved over 44,000 lifetime tonnes of CO_2 and delivered over £6.7 million lifetime energy savings. Results have shown uptake rates for energy surveys of up to 35 per cent of the targeted area, which is best practice for these kinds of schemes. Positive customer feedback has also been received, with examples of 100 per cent of homes saying they would recommend RE:NEW to a friend. As RE:NEW is rolled out on a pan-London basis with a single recognisable brand, these high levels are expected to continue and increase. Box 5.3 gives a case study on the RE:NEW demonstration project in Lewisham.

The trials and demonstration projects tested a range of approaches, and although the diversity of London's housing stock requires a degree of flexibility in approach, there were general lessons learnt in the three distinct elements of the RE:NEW model:

- **Marketing and engagement -** It was found that smaller marketing areas, combined with a range of direct marketing approaches, including direct mail (with the borough as the lead brand), follow-up mailings, door-knocking up to three times at different times of day, use of liveried vans and branded uniforms, and other community engagement events, led to the highest uptake rates for home energy surveys.

- **Home visits -** It was found that including advice and some specific easy measures as a basic offering for households delivered immediate CO_2 savings, and increased the likelihood of households taking further measures. In deciding which measures to install, it was found that a balance is required between the measures that save the most CO_2 per £ spent, for example hot water tank jackets, and those that engage the householder sufficiently to lead to installed measures, for example real time displays.

- **Referrals for further measures -** This stage delivers the highest CO_2 emissions reductions so is key to the success of RE:NEW. To maximise referral rates for further measures, inefficient and unnecessary steps should be removed so that eligibility assessments, technical assessments and bookings for installation of further measures are made at the same point. Accurate data collection and quick follow-up are essential to ensure that drop-outs do not occur.

Building on experience from the trials and demonstration projects, the RE:NEW model is now being rolled out to areas in all boroughs. It is expected that the Mayor's funding will enable the retrofitting of 55,000 homes. In addition to this, the Mayor has secured funding from the Olympic Delivery Authority to retrofit at least a further 2,000 homes using the RE:NEW model in four of the Olympic host boroughs.

The Mayor's ambition is for energy and water efficiency measures to be installed in 200,000 homes by the end of 2012 across London's energy efficiency programmes. By 2015, the aim is for a package of easy-to-install measures and energy efficiency advice to be delivered to 1.2 million homes in London, to insulate loft and cavity walls where practical and top-up those lofts that only have a small amount of insulation. Reaching these aims will be dependent on a supportive government framework and the wider market adopting the cost effective RE:NEW model, particularly energy companies delivering against CERT and the ECO.

b) Maximising uptake of more expensive measures
So far this policy has focussed on how RE:NEW will deliver easy-to-install energy efficiency measures, loft and cavity wall insulation, and heating and glazing measures. However, given the nature of London's housing stock as set out earlier in this chapter, reaching the Mayor's aim for every London home to be offered a whole-house retrofit by 2030 will require more than these measures. More expensive measures including solid wall insulation and low and zero carbon microgeneration technology will need to be installed rapidly, far exceeding current levels of installation.

However, for those homes where measures are appropriate, installation can involve high upfront costs. To make them attractive to households they need to be offered in ways that make them more affordable. From the end of 2012, government's proposed Green Deal and ECO are expected to become available, allowing households to make repayments over a period of time through the savings on their energy bills. The ECO is expected to provide a subsidy for more expensive measures to ensure that repayments are lower than the household's predicted energy bill savings.

The Mayor is actively working with government to ensure that RE:NEW can be utilised to roll out more expensive measures through a whole-house approach on a large scale as soon as possible. As a cost effective acquisition model, RE:NEW provides an effective delivery vehicle for the Green Deal and ECO in London, and is also ideally placed to deliver phases of the Green Deal prior to national rollout at the end of 2012. The Mayor is therefore already gathering data on potential homes for the Green Deal as part of the 2011-12 RE:NEW rollout.

Box 5.3 Case study - RE:NEW Lewisham Demonstration Project

Catford Energy Savers delivered one of the nine demonstration projects for RE:NEW. The demonstration project ran from November 2009 to April 2010 and offered residents in Lewisham's Catford South ward free energy and water saving measures installed in their home by a professional energy advisor, subsidised loft and cavity wall insulation, and practical energy and water efficiency advice.

Over 1,000 households in Catford South were visited by the RE:NEW programme and over 10,500 energy and water savings measures were installed, with 645 properties referred for additional measures including loft and cavity wall insulation and heating improvements.

Many of the participating households will save over £100 a year on their fuel bills, with some saving considerably more. The energy and water efficiency measures delivered through this demonstration project will reduce CO_2 emissions from these homes by more then 490 tonnes per year.

Customer satisfaction was excellent with 98 per cent of participants describing themselves as satisfied or very satisfied with the service. One-hundred per cent would recommend the service to a friend.

Energy advisor installing a real time display

c) Working with partners to deliver energy efficiency measures to London's homes

The Mayor will not be able to deliver RE:NEW in isolation. It requires working with boroughs, government, energy companies and Green Deal providers to create the right framework and conditions in London to attract the necessary levels of funding. In particular it will depend on the development of a cost effective delivery model by boroughs, the development of a framework that allows London to gain an equitable share of national funding in the future, and a commitment by Green Deal providers and energy companies to fund programmes in London. To achieve this, the Mayor is pursuing a three-pronged approach:

Working with boroughs

As cost effectiveness will be key to attracting funding into London, particularly from energy companies and the wider private sector, the Mayor is encouraging boroughs to reduce the operational costs of RE:NEW through a number of practical steps:

- Gather detailed data across their housing stock on types and tenures of housing, insulation and heating measures already installed, and the potential for further measures to be installed. This data will help boroughs target areas requiring similar measures, and help energy companies and Green Deal providers to understand the market opportunity for retrofitting in the borough. To support boroughs, the Mayor has already commissioned the Londonwide gathering of initial data on housing types, tenure and measures already installed. This is forming the basis for further detailed data collection and interpretation in the future.

- Target RE:NEW delivery to 2012 on areas with a large proportion of homes yet to have their lofts and cavity walls insulated. This will ensure that the programme creates local clusters of these insulation activities, helping energy suppliers to meet their CERT obligations, and making them more cost effective to deliver.

- Maximise the rate of referrals and installations of further measures, such and loft and cavity wall insulation from RE:NEW visits. This will maximise the CO_2 emissions from the programme and bring down overall delivery costs.

- Ensure consistency in parking requirements across boroughs for installers, offer reduced parking rates or ease parking permit administrative burdens, provide free or cheaper storage areas for the easy-to-install measures, and provide meeting spaces for RE:NEW assessors and installers to reduce their operational costs.

- Increase the likelihood of insulating empty lofts and cavities in the private rented sector by increased enforcement of the Housing Health and Safety Rating System, along with increasing awareness and support through relevant private rental networks.

- Drive uptake by raising awareness of RE:NEW through local marketing and community awareness events. The RE:NEW demonstration projects have shown that 16 per cent of homes booked RE:NEW visits as a result of a recommendation from within their community, and uptake of up to 70 per cent was achieved in some streets where there was a particular community presence.

To maximise uptake the Mayor is also working with boroughs to develop a common, recognisable, Londonwide RE:NEW brand for their homes energy efficiency retrofitting activities. This will utilise the power of London's scale to increase recognition and the uptake of measures for the benefit of Londoners.

To attract funding in the long term, boroughs will also need to develop partnerships with potential Green Deal providers and energy companies. These partnerships can range from simple marketing agreements, through to boroughs becoming Green Deal providers in their own right. The Mayor is working with boroughs to develop these partnerships to ensure that London maximises funding and CO_2 emissions reductions available through the Green Deal and ECO.

Working with government

The Mayor is actively working with government to develop the Green Deal and ECO framework, alongside other funding streams, to ensure the conditions are created which allow for London to retrofit its housing at scale. To this end, the Mayor is encouraging government to:

- Ensure that national programmes including the Green Deal and ECO provide London with an equitable share of the funding that is made available for improving energy efficiency in homes, for instance by stipulating regional allocations.

- Utilise RE:NEW as an effective model to gain high rates of uptake of further energy efficiency and energy supply measures.

- Integrate low and zero carbon microgeneration technologies into the Green Deal. This will increase the attractiveness of retrofitting for households[xvii], allow for whole-house solutions, and maximise all potential CO_2 emissions reductions.

- Provide national data on housing stock, including address-level data on types and tenures of housing, measures installed, Energy Performance Certificate ratings, energy use in buildings, and benefits claimed. Local authorities should be able to access this free of charge. Accessing this data will be vital for the UK and London to target energy efficiency measures cost effectively.

- Provide capital in early years to give confidence to the market, either through the Green Investment Bank, or to local authorities to develop early Green Deal delivery vehicles.

- Ensure the Green Deal leads to an increase in the value of a building, such as discounts on stamp duty, to stimulate sufficient levels of uptake of the Green Deal.

- Combine the rollout of smart meters with the RE:NEW and Green Deal rollout. Smart meters offer a real opportunity to help households reduce the amount of energy they consume by allowing them to monitor how they use energy in real-time and assess the subsequent cost of their consumption patterns. It also allows for the real savings that retrofitting delivers for households to be evaluated over time, which is essential to proving the business case for Green Deal financing models, and for increasing uptake.

Working with energy companies

The Mayor is also working with energy companies to understand how the RE:NEW model can link closely with their obligations. This includes:

- encouraging energy companies to share data on energy use in homes so that the RE:NEW model can be targeted at the highest CO_2 emitting properties and therefore be more cost effective

- encouraging energy companies to ensure a more constant flow of insulation activity to enable the development and growth of supply chains by creating larger scale and more visible activity in London

- encouraging energy companies to commit CERT and future ECO funding to deliver energy efficiency activity in London through RE:NEW.

These actions will enable the successful delivery of RE:NEW and increase London's share of energy efficiency measures to at least its equitable share of 12 per cent by 2015.

Working with private sector partners

The Mayor is also actively exploring opportunities to attract investment in domestic carbon saving measures from the finance community to expand the delivery of more expensive measures, including through the London Green Fund. For more information, please see chapter 3.

In addition, the FIT and RHI offer significant potential to retrofit low and zero carbon microgeneration technologies on London's homes, creating attractive pay-back periods for households and investors. The Mayor will work with investment partners to make sure these and any similar financial incentives are integrated into whole-house offers through RE:NEW and RE:CONNECT.

d) Improving homes energy efficiency standards

In addition to RE:NEW and working with partners, the Mayor's London Housing Strategy has set high energy efficiency standards for retrofitting existing homes, which should be reached so long as the fabric of the building allows. In addition, the Mayor is seeking to maximise funding for homes retrofit from central housing funding. He is also working to ensure that the energy elements of his London Housing Strategy that are related to energy efficiency retrofitting work are effectively implemented and linked to RE:NEW. This action is not only supporting the Mayor's aims on homes energy efficiency, it is also supporting the Mayor's housing priorities to improve social housing.

e) Developing effective community-based approaches to delivering home energy efficiency measures

To complement RE:NEW, the Mayor, working with boroughs, is delivering RE:CONNECT; ten low carbon zones in London neighbourhoods. The zones are showing the extent of savings achievable when the full range of low and zero carbon technologies and services available are concentrated at the neighbourhood scale, and local communities are fully engaged. Twenty-nine applications for funding support were received demonstrating the strength of interest that exists in developing community-focused carbon saving projects.

Box 5.4 Case study - Muswell Hill low carbon zone

Muswell Hill low carbon zone in Haringey contains 840 homes, three schools, a community centre, library, retailers and 30 SMEs. Baseline emissions are estimated at 7,500 tonnes of CO_2 per year, and the borough expects a 20 per cent reduction over the life of the programme.

Mayoral commitment to the zone has helped secure an additional £340,000 of investment from DECC towards solar measures on community buildings, cycle parking and an educational installation in a local school called the LivingARK - a mobile eco-house demonstrating sustainability features.

Muswell Hill Sustainability Group, an active community group in the zone, has set up a community interest company to invest in renewables and access financial incentives such as the FIT. They have secured free roof space from Marks & Spencer to install solar panels and commercially supply the energy generated back to the retailer. They intend to use income from this project to invest in energy saving projects, develop a local revolving fund for solar projects, and promote the low carbon zone to local shoppers.

Haringey Council's own Sustainable Investment Fund is being used as an investment vehicle to supplement Mayoral and DECC funds, and the borough will also be drawing on CERT funding for energy efficiency measures.

Muswell Hill Primary School Living Ark

Through an LSx-funded volunteer coordinator, 15 volunteers have delivered almost 400 referrals for a Home Energy Assessment in the zone. A personal carbon trading pilot is also underway in the local community.

In addition, a business audit, web-interface metering and ongoing support scheme is underway.

The zones aim to deliver a reduction in CO_2 emissions of 20.12 per cent by 2012 and bring together London boroughs, community organisations, residents, businesses and utilities to work in partnership. The zones cover over 13,000 residential properties, around 1,000 shops and businesses, and 20 schools, as well as hospitals, places of worship and community centres. The Mayor has committed between £200,000 and £400,000 per zone. The boroughs are coordinating delivery with support from other private/public sector partners and the local community. Box 5.4 provides a case study on the Muswell Hill low carbon zone, giving examples of activity in zones.

At the end of March 2011 the following had been achieved through RE:CONNECT:

- secured over 6,000 tonnes of CO_2 savings per year
- directly levered funding of £5.5 million as well as securing investment from boroughs and housing providers of £8.2 million
- retrofitted over 3,800 homes
- engaged over 400 businesses and 9,000 Londoners
- secured funding in partnership with London's electricity distribution network operator and other funding to deliver over 5,000 smart meters to households in the zones.

The successes of the zones are being carefully evaluated as the Mayor is keen to explore how they can become self-sustaining and how the lessons learned can inform a wider rollout both in London and nationally. In particular, given their emphasis on engagement of residents, communities and businesses, it is important to understand the successes of the zones in changing behaviour and lowering the wider carbon footprint of a neighbourhood, as distinct from simply retrofitting buildings, and in understanding how communities can take ownership of local retrofitting and environmental projects.

POLICY 7: TACKLING FUEL POVERTY IN LONDON

Vision

By 2025, the most vulnerable will be better able to heat their home affordably and have better access to the support and benefits that they are entitled to, resulting in their being better able to pay their energy bills.

Vision to policy

The Mayor will work to help eradicate fuel poverty in London by increasing the uptake of energy efficiency measures offered through his programmes in fuel poor households wherever possible, increasing the provision of energy efficient affordable housing in London, increasing the income of Londoners, and encouraging government and energy companies to effectively define and target fuel poor households.

Policy to action

a) Increasing uptake of energy efficiency measures in fuel poor households

- **Action 7.1 -** The Mayor will use RE:NEW to increase uptake of CERT measures, Warm Front offers and successor scheme offers in fuel poor households in London by implementing an effective referral system.

- **Action 7.2 -** The Mayor will work to maximise the income of fuel poor households by including the opportunity to conduct benefits checks as part of RE:NEW and through his Know Your Rights campaign.

- **Action 7.3 -** The Mayor will promote energy efficiency measures to black, Asian and minority ethnic groups, low-income families and older people through the RE:NEW programme and his Know Your Rights campaign.

b) Improving data on fuel poverty

- **Action 7.4 -** The Mayor will encourage government to produce more accurate, up-to-date and regional data on fuel poverty, and encourage energy companies to roll out smart meters in London ahead of government's 2020 timetable for national implementation.

c) Promoting the London Living Wage and accounting for housing costs

- **Action 7.5 -** The Mayor will continue to promote the London Living Wage and increase the provision of energy efficient affordable housing in London through the Mayor's London Housing Strategy.

- **Action 7.6 -** The Mayor will encourage government to re-define fuel poverty to take account of housing costs.

Government has a range of initiatives that includes energy efficiency activity as one of the ways of addressing fuel poverty, and the Mayor supports proposals for the ECO to include an obligation to install subsidised and free energy efficiency measures in fuel poor homes. However, the Mayor believes that further measures are needed as part of a robustly coordinated, detailed and funded plan to eradicate fuel poverty by 2016, and this section sets out how the Mayor is contributing to this.

a) Increasing uptake of energy efficiency measures in fuel poor households

One important long-term element in addressing fuel poverty is improving the energy efficiency of London's housing stock. Improving the insulation and heating systems in homes is important in reducing fuel bills and helping households out of fuel poverty. The Mayor is therefore working to increase uptake of energy efficiency measures funded through CERT, which includes funding for priority groups[xviii], Warm Front and successor schemes offered in London by implementing an effective referral system for these measures through RE:NEW.

As receipt of certain income or disability benefits is an eligibility criterion for obtaining energy efficiency measures from national schemes such as Warm Front, the Mayor is working to increase awareness of eligibility for income and disability benefits. This should have a positive impact on the number of installations delivered. The Mayor has already run a Know Your Rights campaign to raise awareness amongst low-income families and older people of the benefits and energy efficiency measures that they are entitled to[xix]. He will continue to promote energy efficiency measures to these groups through his Know Your Rights campaign, and is including a benefit eligibility check as part of the offer to households through RE:NEW.

In targeting fuel poverty support, the GLA's 2009 report, Fuel Poverty in London, found that the incidence of fuel poverty in black, Asian and minority ethnic (BAME) households is approximately twice as high as in white households, whilst households with children and

older people are amongst those most likely to be in fuel poverty and can be particularly vulnerable to its impacts. The Mayor is therefore continuing to promote energy efficiency measures to BAME households, low-income families, and older people through RE:NEW and his Know Your Rights campaign.

b) Improving data on fuel poverty
The success of fuel poverty programmes will depend on access to accurate data for the effective targeting of fuel poor households. Currently, data on fuel poverty is provided at the national level and is not fully up-to-date. For example, national fuel poverty data is published with a two-year time lag and Ofgem data on numbers of disconnections and fuel debt is not available on a regional basis. The Mayor is encouraging government to release more accurate, up-to-date and regional data on fuel poverty.

The Mayor is also investigating working with energy suppliers, including through RE:CONNECT, to roll out smart meters in London ahead of government's 2020 timetable for national implementation. Current billing arrangements mean one in three energy bills is an estimate. This can lead to the final bill being higher than originally predicted and people falling into debt. Ofgem's approach of encouraging customers to switch provider to get the cheapest rate is less realistic for those in fuel poverty as they are less likely to have access to the internet. Smart meters, however, provide households with accurate data and bills, helping them to better plan their budgets and avoid fuel debt.

c) Promoting the London Living Wage and accounting for housing costs
The 2009 Fuel Poverty in London report published by the Mayor found that the most significant determinant of fuel poverty is income, with Londoners in the lowest quintile of income over 100 times more likely to fall into fuel poverty.

The Mayor has set up the Living Wage Unit to ensure that data is available about what a living wage is in London, and is continuing to promote payment of the living wage, in particular by requesting that contractors to the GLA group pay the living wage.

Housing costs, which are higher in London, strongly affect the available income a household has to spend on fuel. Average house prices are 51 per cent higher and private rents 64 per cent higher in London than in England as a whole[xx]. A significant aspect of the Mayor's London Housing Strategy is provision of more affordable housing.

The Mayor is encouraging government to recognise the true scale of fuel poverty in London as a consequence of the higher cost of living in London, and is encouraging government to adopt the residual income definition for accounting for fuel poverty.

5.8 Reducing CO_2 emissions from London's homes through further government action

The above committed Mayoral and government action, on top of the BaU, will reduce emissions from London's homes by 7.12 $MtCO_2$. However, further government action will be required to contribute to meeting the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025. It will require government to adopt more ambitious CO_2 emissions reductions, as recommended by the Committee on Climate Change, including reducing the carbon intensity of electricity which supplies London's homes to below 200g CO_2/kWh. If these recommendations were to be adopted, this would further reduce CO_2 emissions from London's homes by 1.33 $MtCO_2$ per year.

5.9 Implementing Mayoral policies and actions

Annex A of this document sets out the projected CO_2 emissions reductions, by source, as a result of activities in the homes sector, along with assumptions for expected CO_2 emissions reductions. Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter.

Endnotes

[i] This includes actions the Mayor encourages other bodies or persons to take.

[ii] The most recent CO_2 measurements for London are from the LEGGI 2008.

[iii] This strategy uses the CO_2 emissions reductions from the previous government's Low Carbon Transition Plan for committed government action.

[iv] Hard to treat properties are those for which it is difficult to install cheaper traditional energy savings measures, in particular loft and cavity wall insulation. This leaves only harder to install, more expensive, measures such as solid wall insulation and low and zero carbon microgeneration technologies.

[v] Survey of English Housing (2007-08)

[vi] Census in England and Wales (2001)

[vii] Department of Communities and Local Government (2010)

[viii] GLA Modelling (2009)

[ix] Energy Saving Trust, Homes Energy Efficiency Database, CERT Summary Report (Q12) by region, (2011)

[x] London Assembly, Lagging Behind: Insulating homes in London (2009) and GLA modelling (2011)

[xi] DECC, Energy Price Statistics Annual Tables (2011)

[xii] Under the Warm Homes and Energy Conservation Act (2000) "A person is regarded as living in fuel poverty if he or she is a member of a household living on a lower income in a home which cannot be kept warm at reasonable cost."

[xiii] DECC, Sub-regional fuel poverty levels, England (2009)

[xiv] GLA, Fuel Poverty in London (2009)

[xv] Defra, The UK Fuel Poverty Strategy (2001)

[xvi] Government schemes and funding sources levered through the RE:NEW programme have been counted towards Mayoral emissions reductions in the modelling for this strategy. This is based on the assumption that RE:NEW will be the mechanism that allows those schemes to be delivered effectively in London.

[xvii] GLA, Climate Change/energy use August 2010 telephone survey briefing (2010)

[xviii] CERT requires that at least 40 per cent of measures are focused on a low-income priority group, such as those on certain income or disability benefit, or tax or pension credit. Under the CERT extension (2011-2012), an additional target has been introduced, that requires 15 per cent of the savings be achieved in a subset of low-income households (a Super Priority Group) considered to be at high risk of fuel poverty.

[xix] In 2007, Age Concern estimated that in the UK, £4.2 billion in benefits for older people went unclaimed each year.

[xx] Communities and Local Government, July House Price Index (2009)

CHAPTER SIX

CUTTING COSTS AND CO_2 IN LONDON'S WORKPLACES

SUMMARY

Vision

By 2025, the roll out of retrofitting London's existing workplaces with energy efficiency measures and low and zero carbon microgeneration technologies is well underway. London's workplaces understand their energy use and adopt increasingly more energy efficient practices to reduce CO_2 emissions even further.

The Mayor will contribute towards this through the following policy:

- **Policy 8 - Retrofitting London's existing workplaces with energy efficiency measures and low and zero carbon microgeneration technologies -** The Mayor, working with partners, will use public funds to develop commercial models that catalyse markets to retrofit workplaces with energy efficiency measures and low and zero carbon microgeneration technologies. The Mayor will encourage organisations taking a lead on energy efficiency to spread their best practice in order to build the knowledge and capacity of workplaces across London to use energy more efficiently.

The Mayor's main actions to deliver this are:

- **RE:FIT -** This programme uses an innovative commercial model to support the public sector to retrofit buildings with energy efficiency measures. The programme has already retrofitted 42 GLA group buildings and is now being expanded to provide support to all of London's public sector buildings.

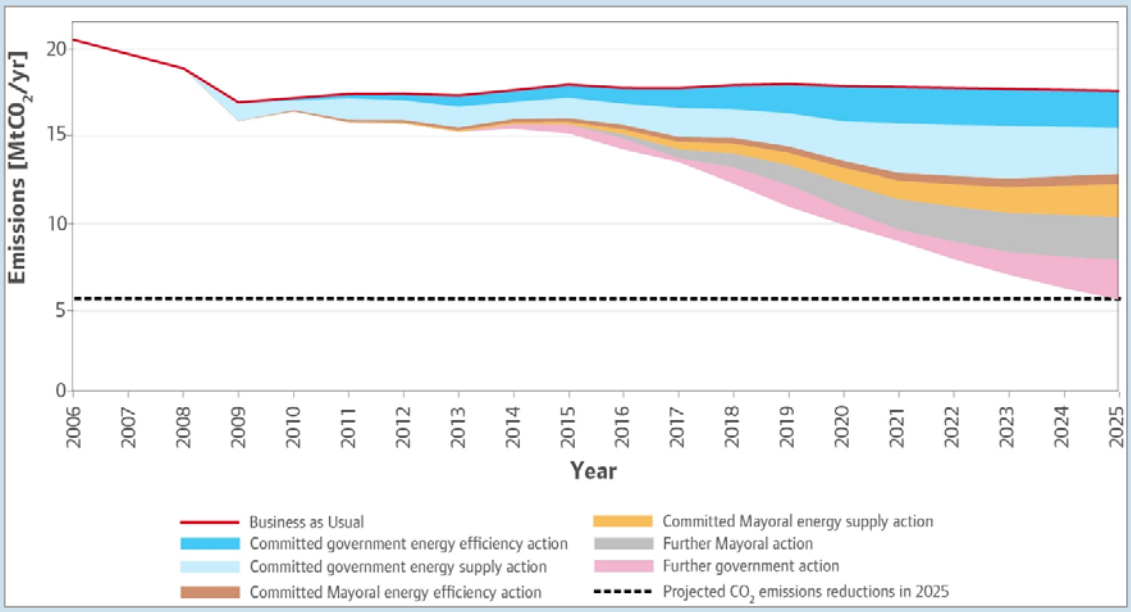
- **Mayor of London's Green Awards -** These will recognise and reward organisations demonstrating leadership and facilitating the sharing of energy efficiency best practice to a wider group of organisations.

- **The Better Buildings Partnership (BBP) -** The BBP brings together 14 of the largest and most influential commercial landlords in London. For the first time, these companies are developing sustainability solutions for the entire market, to provide incentives and support for landlords and tenants alike to improve the energy efficiency of buildings.

CO_2 emissions from London's workplaces: 2008-2025

- **Current CO_2 emissions -** In 2008 emissions from London's workplaces were 18.88 $MtCO_2$.
- **Business as Usual CO_2 emissions by 2025 -** Under a BaU scenario, emissions from London's workplaces would be expected to reduce to 17.60 $MtCO_2$ per year.
- **CO_2 emissions reductions by 2025 from committed government action -** Government, EU and international action, are expected to reduce London's CO_2 emissions from workplaces by 4.76 $MtCO_2$ per year.
- **CO_2 emissions reductions by 2025 from committed Mayoral action -** Committed Mayoral action is expected to reduce CO_2 emissions from London's workplaces by 2.44 $MtCO_2$ per year.
- **CO_2 emissions reductions by 2025 from further Mayoral action -** If the RE:FIT programme is rolled out to the commercial sector, and a RE:NEW-type programme is rolled out to SMEs, CO_2 emissions from the workplaces sector will reduce by 2.44 $MtCO_2$ per year.
- **CO_2 emissions reductions by 2025 from further government action -** If government adopts a more ambitious CO_2 emissions reduction scenario, as recommended by the Committee on Climate Change, emissions are expected to reduce by a further 2.29 $MtCO_2$ per year.

Figure 6.1 Projected reductions in CO_2 emissions from London's workplaces (2006-2025)



For definitions of each category of CO_2 emissions reductions, please see pages 21-22

Source: GLA modelling

6.1 Introduction

This chapter sets out the relative contribution of workplaces to London's CO_2 emissions, and the actions currently underway and proposed that will contribute towards reducing the use of energy in London's workplaces. Chapter 4 has already set out how CO_2 emissions from the generation and supply of energy to London's workplaces will be reduced by 2025 and chapter 7 will set out how CO_2 emissions from new buildings in London will be reduced. This chapter therefore focuses on how CO_2 emissions from the use of energy in London's existing workplaces will be minimised.

This chapter:

- summarises London's current CO_2 emissions from existing workplaces
- summarises London's CO_2 emissions from workplaces under a BaU scenario
- summarises CO_2 emissions reductions expected as a result of committed government action on workplaces

- sets out the challenges and opportunities for London to further reduce its CO_2 emissions from workplaces
- details the specific policies and actions that the Mayor has committed to take to reduce CO_2 emissions from London's workplaces[i]
- sets out further Mayoral action that can be taken to reduce CO_2 emissions from London's workplaces, and that will be deliverable subject to further support, including funding from government and the private sector
- summarises further action that the Mayor encourages government to take to reduce CO_2 emissions from London's workplaces, and support the achievement of the Mayor's CO_2 emissions reduction targets.

6.2 Current CO_2 emissions from London's workplaces

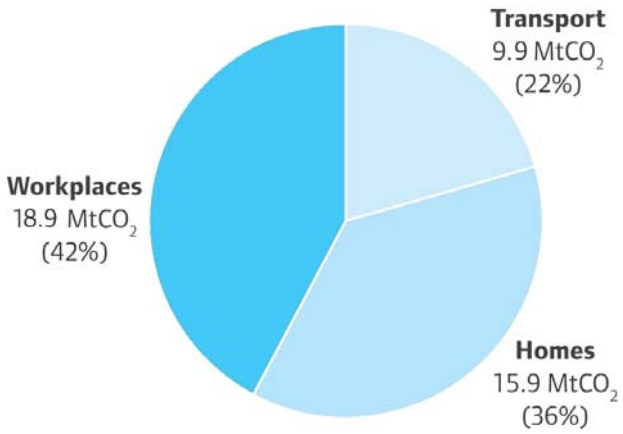
London's workplaces are diverse, with a wide range of organisations from the public, private and third sectors. These include banks, retailers, manufacturers, government, charities, schools and hospitals. Workplaces in the capital emitted 18.88 $MtCO_2$ in 2008[ii], equivalent to 42 per cent of London's total CO_2 emissions[iii]. This includes CO_2 emissions from both commercial and industrial activity. The majority of CO_2 emissions (74 per cent) are from the sector's use of electricity and over 20 per cent are from the use of gas. Figure 6.3 shows that the greatest use of energy in service sector workplaces (the majority of London's workplaces) is for heating and lighting. This highlights the importance of making the fabric of buildings more energy efficient to reduce this sector's CO_2 emissions.

From 1990 to 2005, London's CO_2 emissions from workplaces increased, reflecting the growth in economic activity in London, after which they started falling. Overall, CO_2 emissions have decreased by four per cent between 1990 and 2008[iv]. This reduction reflects London's shift to a more service-based economy.

6.3 Projected CO_2 emissions under a Business as Usual scenario

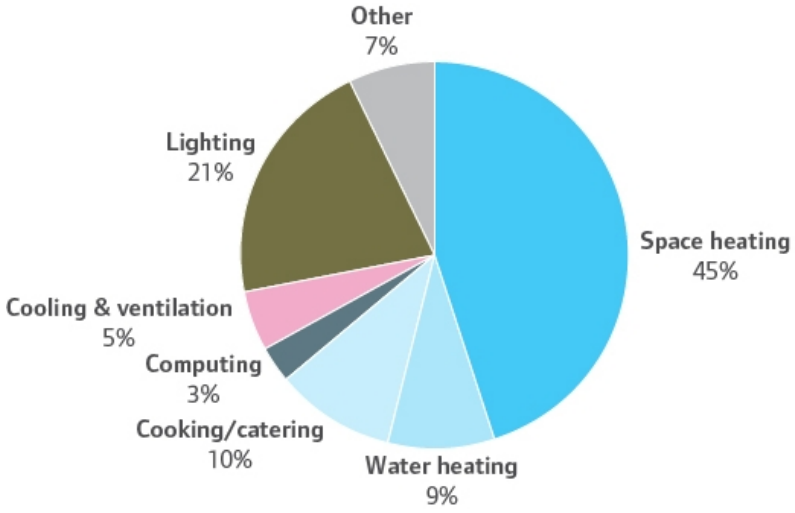
By 2050 approximately 80 per cent of buildings in London today will still be in use. Retrofitting these buildings with energy efficiency measures is vital if we are to reduce CO_2 emissions from London's workplaces. The BaU scenario[v] estimates that CO_2 emissions from London's workplaces are projected to fall by around seven per cent by 2025 to 17.60 $MtCO_2$.

Figure 6.2 The contribution of London's workplaces to CO_2 emissions in 2008



Source: LEGGI 2008

Figure 6.3 Energy use in service sector workplaces in 2009



Source: DECC, Energy Consumption in the UK, 2011

6.4 Projected CO_2 emissions after committed government action

Government has a number of policies and programmes to reduce CO_2 emissions from workplaces. These include the proposed Green Deal, the CRC Energy Efficiency Scheme and participation in the EU Emissions Trading System, as well as policies to decarbonise electricity supply (as set out in chapter 4 of this strategy). Government is still developing a number of these programmes, such as the Green Deal, with details yet to emerge on how they will operate, the expected levels of uptake, and the resulting CO_2 emissions

reductions expected. However, the details that are available on these programmes suggest that government action will reduce emissions in London by 4.76 $MtCO_2$ by 2025[vi]. Still, further action will be required to meet the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025.

Box 6.1 Government and EU CO_2 reduction policies and programmes for workplaces

European Union policy

- **EU Emissions Trading System –** This is the largest multi-national emissions trading scheme in the world and aims to reduce emissions of GHGs from industrial sources across the EU. Around 900 sites in the UK are participating in the system, representing over 50 per cent of UK CO_2 emissions[vii].

- **Energy Performance of Buildings Directive –** This EU Directive aims to improve the energy efficiency of buildings. It includes measures such as minimum energy performance standards for new buildings, boiler and air-conditioning inspections, Display Energy Certificates for public buildings over 1,000 square metres, and Energy Performance Certificates for all other buildings[viii].

UK government policy

- **The Green Deal –** Government has announced its intention to introduce a Green Deal which could finance the upfront cost of energy efficiency measures in workplaces, allowing organisations to pay back the cost through savings on their energy bills. Enabling powers for this have been introduced through the Energy Act 2011. However, further detail will only become available in secondary legislation.

- **CRC Energy Efficiency Scheme (CRC) –** Formerly known as the Carbon Reduction Commitment, this is the UK's mandatory energy saving scheme that aims to drive down energy consumption and CO_2 emissions from large energy users that are not already covered by Climate Change Agreements and the EU Emissions Trading System. These organisations are responsible for around ten per cent of the UK's CO_2 emissions.

- **The Climate Change Levy –** Introduced in April 2001, the Climate Change Levy is a tax on the use of energy in industry, commerce, and the public sector. Eligible energy-intensive businesses can receive up to an 80 per cent discount from the Climate Change Levy in return for meeting energy efficiency or CO_2 targets set under Climate Change Agreements.

- **Smart metering -** Smart meters perform the traditional meter function of measuring energy consumption, but also offer a range of extra uses, such as allowing energy suppliers to communicate directly with their customers. Government's aim is for smart meters to be rolled out to all small and medium non-domestic gas and electricity sites by 2020.

6.5 Opportunities for, and challenges to, reducing CO_2 emissions from London's workplaces

Although government policy assists in reducing CO_2 emissions from London's workplaces, further action will need to be taken in order to retrofit buildings at the scale and pace required to deliver CO_2 emissions reductions and cut unnecessary energy costs for organisations. The Mayor is committed to minimising CO_2 emissions from buildings, and his action in this area will address a number of challenges and opportunities in London's workplaces, including:

a) Challenge: The pace of retrofitting public buildings

It is estimated that public sector buildings are responsible for over 30 per cent of energy consumption in the service sector in London[ix]. This offers the potential for significant energy savings and CO_2 emissions reductions in this sector. However, the Committee on Climate Change predicts that while public sector CO_2 emissions will fall in the period to 2020, this will be driven largely by the lower carbon intensity of electricity supply[x]. Barriers to reducing CO_2 emissions in public sector buildings include: limited capacity to identify and install appropriate energy saving measures; risks associated with investing money with long-term paybacks; and a lack of financing for energy efficiency measures. Traditionally energy efficiency measures, such as new boilers, have been considered as a one-off capital cost, and their resulting cost savings have not been included in ongoing revenue budgets. Finding upfront financing for these measures has therefore proven difficult.

Research shows that households and small and medium enterprises (SMEs) are reluctant to take action on installing energy efficiency measures and low and zero-carbon microgeneration technologies without seeing that government is taking action on it first[xi]. Reducing public sector emissions is therefore an important step in developing the leadership needed to inspire residents and businesses to take action themselves.

b) Challenge: Landlords and tenants lack the incentives and support to improve the energy efficiency of their buildings

Commercial landlords have an important role to play in reducing CO_2 emissions from their buildings. Landlords get windows of opportunity to improve buildings as part of refurbishment projects, but usually need to work with occupiers and managing agents to retrofit buildings that are still in use. The main challenge faced by landlords is that it is hard to justify investment to improve the energy performance of buildings when returns from energy savings accrue to the occupier. From the occupier's perspective, it can be difficult to justify investment in a building where the asset improvement benefits accrue to the landlord. Finding solutions to these challenges will therefore prove important in unlocking CO_2 emissions reductions in this sector.

c) Challenge: Energy efficiency is not a priority for many public and private sector organisations

For most organisations, energy costs are typically between one and six per cent of their cost base. Reducing energy use in order to save costs is therefore not a significant driver for many organisations. Making energy efficiency measures and behaviours hassle-free and free upfront can provide a greater incentive, as can introducing competition and recognition through awards.

d) Challenge: Support for smaller businesses

Ninety-nine per cent of total businesses in London are classified as SMEs, employing less than 250 people each. They are diverse in their nature, ranging from the self-employed working at home, to offices, garages and small manufacturers. There are currently over 830,000 SMEs in the capital, 80 per cent of which are sole proprietorships and partnerships comprising only the self-employed owner-manager(s), and companies with only an employee director[xii]. It is estimated that collectively SMEs emit 20 per cent of the UK's total CO_2 emissions. Due to their size, SMEs often do not have sufficient resources and expertise to allocate to energy management, and therefore require support and advice to reduce their energy use. However, it is also often hard to reach SMEs and much of the support or drivers through legislation and other programmes are geared towards large organisations.

e) Challenge: Uncertainty around government policy

The government's proposal for a pay-as-you-save (PAYS) model under the Green Deal, along with potential accompanying legislation that would require organisations to retrofit buildings may help overcome some of these challenges. However, as detail is yet to

emerge on how the Green Deal will work in practice, it is far from certain that it will overcome the current barriers faced by London's workplaces.

6.6 Reducing CO_2 emissions from London's workplaces through committed Mayoral action

The Mayor is committed to minimising CO_2 emissions from London's workplaces and has developed a number of programmes which aim to overcome the challenges set out above. In developing these programmes, the Mayor has identified areas where the market is failing to deliver the required action at scale or quickly enough, and is focusing on programmes with large-scale impact to address these gaps. It is expected that, combined with energy supply savings in the workplaces sector, they will reduce CO_2 emissions from London's workplaces by 2.44 $MtCO_2$ per year by 2025.

POLICY 8: RETROFITTING LONDON'S EXISTING WORKPLACES WITH ENERGY EFFICIENCY MEASURES AND LOW AND ZERO CARBON MICROGENERATION TECHNOLOGIES

Vision

By 2025, the roll out of retrofitting London's existing workplaces with energy efficiency measures and low and zero carbon microgeneration technologies is well underway. London's workplaces understand their energy use and adopt increasingly more energy efficient practices to reduce CO_2 emissions even further.

Vision to policy

The Mayor, working with partners, will use public funds to develop commercial models that catalyse markets to retrofit workplaces with energy efficiency measures and low and zero carbon microgeneration technologies. The Mayor will encourage organisations taking a lead on energy efficiency to spread their best practice in order to build the knowledge and capacity of workplaces across London to use energy more efficiently.

Policy to action

a) Retrofitting London's existing workplaces with energy efficiency measures

- **Action 8.1 -** The Mayor will make RE:FIT available to all public sector organisations in London, which will guarantee energy efficiency savings to all those organisations that sign up to the programme.

- **Action 8.2 -** The Mayor will work with the Better Buildings Partnership to roll out green lease agreements with its 14 members which collectively own a significant proportion of London's commercially-rented floorspace, and promote them to other London businesses.

- **Action 8.3 -** Through the Better Buildings Partnership, the Mayor will make a significant contribution to the debate on energy consumption benchmarking in the commercial property sector by widely publicising the Partnership's benchmarking toolkit; promoting the best ways for landlords to make a business case for retrofit through the Partnership's toolkit on enabling low carbon retrofit; and rolling out a toolkit on the role of managing agents in sustainable building management.

b) Providing energy efficiency support and advice

- **Action 8.4 -** The Mayor will build on the success of the Green500 to develop energy efficiency support to a wider group of organisations. As part of this, the Mayor will continue to recognise and reward achievement through the annual Mayor of London's Green Awards.

- **Action 8.5 -** The Mayor will support SMEs to reduce their energy use by working with partners and using his programmes to signpost SMEs to existing sources of energy efficiency support. The Mayor will also review the provision of energy efficiency support to SMEs in London, identifying areas where further action is required, and developing support in areas where the Mayor can contribute to its quality, availability and accessibility.

- **Action 8.6 -** The Mayor will build on existing sector-specific energy efficiency support and programmes, and identify priority sectors for action.

c) Encouraging those organisations already taking a lead on CO_2 reduction activities to share best practice and cascade through their supply chains

- **Action 8.7 -** The Mayor will encourage those businesses engaged in his climate change mitigation programmes to measure and disclose CO_2 emissions in their supply chains, procure lower carbon products and services, and support suppliers to reduce their CO_2 emissions through awareness raising and practical guidance.

a) Retrofitting London's existing workplaces with energy efficiency measures

RE:FIT - Building energy efficiency for tomorrow

As indicated in the previous section of this chapter, there is a large potential to retrofit London's public sector building stock. To start this retrofitting, the Mayor has developed the RE:FIT programme with the support of the Clinton Climate Initiative. RE:FIT uses an innovative commercial model and by 2025, the programme aims to catalyse activity that will be reducing CO_2 emissions by approximately 400,000 tonnes per year.

RE:FIT is based on an energy performance contracting approach where public sector building owners identify a portfolio of buildings they would like to retrofit. They then run a mini-competition from RE:FIT's approved framework panel of Energy Service Companies (ESCos) to appoint an ESCo to undertake the work. The framework panel has been procured under the OJEU process[xiii], which simplifies procurement for the public sector organisation. London is the first city in the world to appoint such an approved panel of ESCos.

Once the ESCo is procured, it undertakes audits of buildings to identify potential energy saving measures and then installs them. The ESCo guarantees the resulting energy savings, and the payback of the initial investment. This means the delivery risk is transferred to the ESCo.

RE:FIT is designed to achieve energy savings of over 25 per cent per building. The energy saving measures installed by ESCos vary in cost and payback periods. By combining these in a package and guaranteeing set savings on energy bills, ESCos can deliver an attractive overall payback proposition. This therefore mitigates the risks associated with investing money with long payback periods.

Throughout the entire retrofitting process, a RE:FIT project delivery unit provides hands-on support and guidance to participating organisations, from procurement and

contracting, to support on monitoring delivery. This helps to overcome barriers around the public sector's capacity to install energy saving measures at scale.

The GLA group has completed a pilot of RE:FIT in 42 of its buildings, including fire stations, police stations and TfL offices. Installation of energy efficiency measures is complete in ten fire stations, ten police stations, and 22 TfL buildings. The measures will deliver an identified average CO_2 emissions reduction of 28 per cent across the pilot buildings. The average payback period of the energy efficiency measures being installed is seven years, and this will deliver guaranteed energy savings worth over £1 million per year. Box 6.2 provides a case study on the RE:FIT pilot at Ilford fire station.

In addition to the 42 GLA group buildings that have been retrofitted under RE:FIT, a further 140 organisations have shown interest in using the model. In London, the University of London, Newham University Hospital, the Royal Botanic Gardens, Kew, and Waltham Forest Primary Care Trust are all undertaking works through RE:FIT. Fourteen more London organisations have signed a Memorandum of Understanding on RE:FIT, or are in the process of procuring suppliers to retrofit 200 buildings to the combined value of over £35 million. This includes another ten fire stations, over and above those completed through the GLA group pilot. Retrofitting these 200 buildings equates to approximately 30,000 tonnes of carbon savings annually.

Outside of London, the Mayor is liaising with public sector organisations that wish to use the framework. Leeds City Council and Sheffield City Council are in the process of using the framework. In addition, five other organisations have expressed an interest in the RE:FIT framework and are now receiving advice to develop their plans. These local authorities are Southampton City Council, Milton Keynes Council, Oxford City Council, Reading Borough Council and Portsmouth City Council.

The total floorspace of London's workplaces is estimated at 110 million m^2, and 27.5 million m^2 of this is occupied by public sector organisations[xiv]. RE:FIT will seek to retrofit approximately three per cent of this on an annual basis, totalling 40 per cent by 2025. To support this, the Mayor has made a successful bid to the EIB's ELENA fund for a grant of €2.8 million (approx £2.4 million). This is supported by match funding from the Mayor of €320,000 (£270,000). This funding will support the RE:FIT project delivery unit over the next three years, enabling the Mayor to support hundreds more public buildings to use the programme. It will help organisations progress their RE:FIT projects, and help them source funding for upfront building works where necessary.

Box 6.2 Case study - RE:FIT project on Ilford Fire Station

Ilford Fire station was fitted with energy efficient systems, automatic controls and a photovoltaic panel as part of the RE:FIT programme. The overall CO_2 reduction is guaranteed at 44 per cent per year compared to pre-works levels. Following a desktop audit and investment grade proposal, works were identified that covered all aspects of energy use in the building.

This included upgrading the lighting to high frequency with T5 lamps and occupancy controls, thermostatic radiator valves on radiators, a timer on the drying room humidifier, voltage optimisations, draught proofing, replacement of heating boilers, and a 9kWp PV system on the roof. All of the measures were installed over a four month period while the fire station was fully operational, with only minimal disturbance to the occupants. These measures will reduce energy consumption by 41 per cent and cut CO_2 emissions by over 51 tonnes per year, saving the station over £10,000 per year in energy costs. The Ilford project was part of a ten station portfolio that is delivering overall savings of 242 tonnes of CO_2 per year. A further ten fire stations are also being retrofitted under RE:FIT.

Mayor of London Boris Johnson with photovoltaic panels at Ilford Fire Station

RE:FIT has been designed for organisations that have funds or can borrow funds to install energy efficiency measures. The £100 million London Energy Efficiency Fund will be available for a range of energy efficiency measures, including providing funding to those organisations that do not currently have access to their own energy efficiency funding. For more information on the London Energy Efficiency Fund, see chapter 3 of this strategy.

In addition to the above, the Mayor will encourage government to: make available more upfront financial assistance for organisations participating in RE:NEW; extend the Salix funding scheme to include measures with longer term payback periods; and encourage government departments to lead by example by joining RE:FIT.

The Better Buildings Partnership (BBP)

In addition to overcoming the barriers to reducing CO_2 emissions from public buildings, the Mayor is also addressing the barriers between landlords and tenants in commercial buildings through the BBP. This programme aims to catalyse activity that will reduce CO_2 emissions by 5,000 tonnes per year, and through to 2025 by a cumulative total of 75,000 tonnes of CO_2.

The BBP has brought together 14 of the largest and most influential commercial landlords in London, who collectively own a significant proportion of London's commercially-rented floorspace. For the first time, these companies are developing sustainability solutions not just for their own portfolios but for the entire market.

The BBP members have already produced a Green Lease Toolkit that provides practical and flexible templates for owners and occupiers of commercial buildings. These can be used to establish agreements on managing the environmental aspects of their buildings at any time during a lease period, as well as for new leases and lease renewals.

To support businesses in retrofitting their existing buildings, the Mayor, through the BBP, is rolling out the Green Lease Toolkit with the 14 members of the partnership, and promoting it to organisations that are engaged in the Mayor's climate change mitigation programmes.

In addition to the Green Lease Toolkit, the BBP has developed toolkits and guidance in five other key areas; sustainability benchmarking; the role of managing agents; green building management groups; carrying out low carbon retrofits; and advanced metering.

The toolkits are available at www.betterbuildingspartnership.co.uk and are being promoted to the wider London property sector.

The BBP is also contributing to the debate on energy consumption benchmarking in the commercial property sector. By June 2011, BBP members had carried out three annual rounds of data gathering to build a good understanding of sustainability benchmarking. Lessons from these activities are being published to spread best practice to the wider sector.

b) Providing energy efficiency support and advice

The programmes set out above aim to improve the fabric of London's buildings, making them ever more energy efficient. However, to achieve this will require further support and advice across business sectors, including the wider commercial sector, and the SME sector.

Green500

Since 2008, the Mayor has supported businesses to reduce their energy use through the Green500, which offered energy audits to identify where energy efficiencies could be made, as well as practical support and advice on how to implement energy saving measures and encourage staff to adopt more energy efficient behaviours. Over 200 businesses, including HSBC, M&S, John Lewis, Chelsea and Arsenal football clubs and Radisson Edwardian Hotels joined the programme and implemented energy efficiency measures. For an example of how the Green500 has supported organisations, please see the case study in box 6.3

The Mayor will build on the success of the Green500 and continue to develop carbon reduction support to a wider group of organisations. The details of the programmes and support will be developed. Options for consideration will include mentoring and sharing best practice through supply chains, extending support to SMEs, and working through sectors to share best practice. In addition, the Mayor will continue to recognise and reward achievement through the annual Mayor of London's Green Awards.

Box 6.3 Case Study - The Green500 and Radisson Edwardian Hotels

"A Good Night's Sleep Needn't Cost the Earth" was a key slogan in Radisson Edwardian's campaign to reduce carbon emissions across its chain of hotels when it joined the Green500.

After a board-level strategic review, responsible business teams were set up in each hotel. Through these teams, all staff members were encouraged to generate greener ways of operating. Membership of the Green500 provided structure to the campaign and acted as a catalyst for its implementation.

Working with the Green500 team a carbon reduction action plan was developed and agreed with the Radisson Edwardian senior management team. The Green500 carbon mentor was on-hand to provide the necessary support and advice to set in place the internal carbon management procedures. Green500 provided advice to support the adoption of a number of key measures. One of the most significant measures to reduce costs and carbon emissions was the installation of guest key-operated master switches to all bedrooms. Further examples of measures include fitting low energy light bulbs in all guest rooms and back of house areas, and a new CHP system providing cleaner energy to the Heathrow hotel. Additionally, water consumption was targeted, with initiatives including low-flow shower and tap filters in all guest bathrooms.

The first year of Radisson Edwardian's campaign achieved a 13 per cent reduction in electricity consumption and saved around 3,000 tonnes of CO_2. In 2010, the hotel chain started providing energy efficiency and environmental awareness training to all employees and introduced environmentally friendly toiletries in guest rooms. Further measures planned include the rollout of food waste and paper recycling.

A Radisson Edwardian hotel

Additional support for SMEs

Energy efficiency support for SMEs in London is currently provided through a number of routes including the London boroughs, RE:CONNECT and ERDF-funded programmes (please see box 6.4). The Mayor is keen to help London's SMEs reduce their CO_2 emissions and energy costs. The Mayor will continue to signpost London SMEs to the most appropriate existing source of energy efficiency support. This will be achieved by working through the Mayor's existing climate change mitigation programmes and by working in collaboration with organisations already offering support, including the Carbon Trust, London boroughs, Chambers of Commerce, CBI, and Federation of Small Businesses.

In addition, and particularly with the closure of Business Link in November 2011, the Mayor will review the provision of energy efficiency support to SMEs in London, identifying areas where further action is required, and developing support in areas where the Mayor can contribute to its quality, availability and accessibility.

Box 6.4 Energy efficiency support for SMEs in London

The Mayor already funds or co-funds, through the ERDF, a number of services to support SMEs to improve their energy efficiency. Projects under this funding are estimated to help SMEs save over 9,000 tonnes of CO_2 per year. Services are delivered through London boroughs and partners, including:

- **Ecovate –** Delivered through the Centre for Environment and Safety Management for Business, this programme gives businesses an environmental review and up to five days tailored support on energy efficiency, including technologies, and brokerage of appropriate service suppliers.

- **URBAN –** Delivered through Climate Energy, this programme is supporting 81 SMEs by delivering personalised climate change action plans on reducing CO_2 emissions from transport, energy use, and by using renewable energy.

- **Energy Savings Through ICT –** Delivered through Global Action Plan, this programme is helping SMEs to reduce their energy use associated with ICT through partnerships and events.

- **Smartworks -** Delivered through Global Action Plan and working with London boroughs, this programme is helping SMEs to become more energy efficient through one-to-one mentoring and networks to raise awareness of energy efficiency.

- **Environmental Performance of Business Improvement Districts –** This programme supports SMEs in Business Improvement Districts to reduce their energy use and improve environmental management through advice sessions and audits.

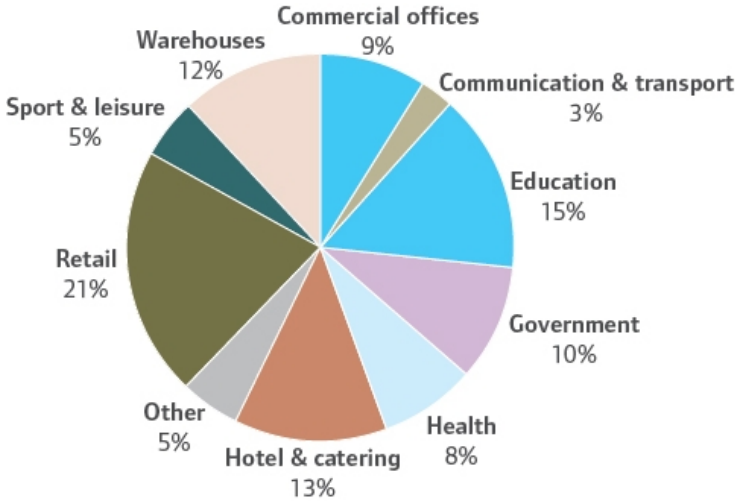
In addition, the Mayor's ten RE:CONNECT low carbon zones provide carbon management support, including metering, audit, and advice to approximately 500 SMEs in London. Delivery varies from zone to zone and ongoing monitoring will allow for learning and best practice to be shared.

Sector-specific support

Organisations within the same sector will often face similar challenges in implementing energy efficiency measures. The Mayor will therefore build on existing sector-specific support and programmes, and identify priority sectors for action, particularly for those sectors that have significant potential to reduce London's CO_2 emissions. Existing work includes the Green Guides developed for London's creative communities, which help organisations collaborate on common carbon-related themes and develop and share solutions with their peers.

Figure 6.4 shows the breakdown of energy use by sub-sector in the service sector in the UK. As the majority of London's economy is in the service sector, this gives a good indication of where potential for energy savings exist. The public sector, including government, education and health is the greatest consumer of energy at 33 per cent. The Mayor's RE:FIT programme is in place to reduce emissions from this sector. The next biggest energy user is the retail sector at 21 per cent, followed by hotels and catering at 13 per cent, warehouses at 12 per cent and commercial offices at nine per cent. Box 6.5 sets out some easy tips for reducing energy use in these sub-sectors.

Figure 6.4 Energy consumption by sub-sector in the service sector



Source: DECC, Energy Consumption in the UK, 2011

Box 6.5 Easy tips for reducing energy use from top energy consuming sub-sectors from the Carbon Trust

Retail, hotel and catering, and healthcare

- **Refrigeration -** Ensure your system is set at the right temperature. Even if it's 1°C lower than needed, your costs could rise by two to four per cent.

- **Lighting -** Switch lights off in empty rooms. You could cut your lighting costs by as much as 15 per cent just by making sure you turn off lights in areas that aren't being used.

- **Heating -** Don't turn up the heating unless you really need to. Try to keep your thermostat at 19°C as your heating costs will increase by eight per cent each time you turn the temperature up by just one degree.

- **Ventilation -** As simple as it sounds, making the most of natural ventilation through correct use of doors, windows and vents is a cost effective way of achieving big savings on your ventilation.

- **Hot water -** In mild or warm weather, you might be able to turn off your boilers because there's no demand for hot water. If you have several floor-standing boilers, it

may be that only one of them provides hot water and the others provide heating. If that's the case, you can switch off the unnecessary boilers. Please note - specialist advice may be necessary.

Government

- **Heating -** Only use heating when it's needed. Make sure that temperature controls are set relative to the space and occupation levels. Different areas of the building will have different heating requirements.

- **Lighting -** Switch off all non-essential lights. Even on winter days, you don't need to have lights on if you are near a window. Label light switches to make it easy for people to be able to control individual rows of lights.

- **Office equipment -** Use plug-in time switches to switch off electrical items such as printers after hours. This is a very cost effective way to save energy.

For more information see the Carbon Trust website at www.carbontrust.co.uk.

c) Encouraging those organisations already taking a lead on CO_2 reduction activities to share best practice and cascade through their supply chains

The programmes mentioned so far are all supporting organisations to reduce their CO_2 emissions, and helping to create a number of leading organisations that can share their best practice. The Mayor will work with large organisations in London that are taking a lead in reducing their CO_2 emissions to spread best practice through their supply chains, encouraging them to:

- measure and disclose CO_2 emissions in their supply chains, in line with existing disclosure schemes such as the Carbon Disclosure Project and Defra's Guidance on Measuring and Reporting Greenhouse Gas Emissions

- procure lower carbon products and services

- support suppliers to reduce their CO_2 emissions, through awareness-raising and practical guidance on how to measure, manage and reduce their energy use and wider CO_2 emissions.

6.7 Reducing CO_2 emissions from London's workplaces through further Mayoral action

The policies and actions in this chapter have set out the Mayor's committed action to reduce CO_2 emissions from workplaces. To reach the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025 will require further activity however. This section therefore sets out further Mayoral action to reduce CO_2 emissions from workplaces. These are not committed actions, and will only be deliverable if there is further support, including funding from government and the private sector.

Firstly there is the potential to promote the RE:FIT model beyond London's public sector, stimulating the market for ESCos and building retrofit programmes amongst the private sector. Assuming an overall level of uptake of 50 per cent across the public and private sectors, it is anticipated that private sector workplaces can save up to 1.94 $MtCO_2$ per year by 2025. In order to facilitate this, the Mayor will explore how best to grow the market, create economies of scale, introduce more competition, and attract investment. The benefits of such a large-scale retrofit programme extend beyond the associated energy and CO_2 savings and will create jobs and investment in London. However, it would require significant investment to expand, tailor and promote RE:FIT to the private sector.

In addition, further opportunities exist to reduce CO_2 emissions from SMEs in London through a RE:NEW-type model. Providing such additional support for 50,000 of London's SMEs could deliver a further 0.5 $MtCO_2$ per year by 2025. Again, to adapt RE:NEW to provide support to SMEs will take considerable investment.

If the combination of actions set out above were to be delivered, emissions from London's workplaces would reduce by a further 2.44 $MtCO_2$.

6.8 Reducing CO_2 emissions from London's workplaces through further government action

The above committed Mayoral and government action, along with further Mayoral action and on top of the BaU, will reduce emissions from London's workplaces by 11.78 $MtCO_2$. However, further government action will also be required to contribute to meeting the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025. It will require government to adopt more ambitious CO_2 emissions reductions, as recommended by the Committee on Climate Change, including reducing the carbon intensity of electricity that supplies London's workplaces to less than 200g CO_2/kwh. If

these recommendations were to be adopted, this would further reduce CO_2 emissions from London's workplaces by 2.29 $MtCO_2$ per year.

6.9 Implementing Mayoral policies and actions

Annex A of this document sets out the projected CO_2 emissions reductions, by source, as a result of activities in the workplaces sector, along with assumptions for expected CO_2 emissions reductions. Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter.

Endnotes

[i] This includes actions the Mayor encourages other bodies or persons to take.

[ii] The most recent CO_2 measurements for London are from the LEGGI 2008.

[iii] GLA, LEGGI (2008)

[iv] GLA, LEGGI (2008)

[v] For more information on London's Business as Usual CO_2 emissions, please see chapter 2.

[vi] This strategy uses the CO_2 emissions reductions from the previous government's Low Carbon Transition Plan for committed government action.

[vii] DECC, EU ETS Phase II National Allocation Plan: 2008-2012 (2009)

[viii] Display Energy Certificates (DECs) are required for buildings with a total useful floor area over 1,000m2 that are occupied by a public authority and institution providing a public service to a large number of persons. The DEC shows the actual energy usage of a building. Energy Performance Certificates are required on construction, sale and rent of other domestic buildings.

[ix] BIS, Energy consumption in the United Kingdom (2009)

[x] UK Committee on Climate Change, Building a low-carbon economy (2008)

[xi] Sustainable Development Commission, Public Sector Uptake of Low Carbon and Renewable Energy Technologies (2009)

[xii] BIS, SME statistics for the UK and the regions (2009)

[xiii] OJEU (The Office of Journal of the European Union) is the publication in which all tenders from the public sector valued above a certain financial threshold, according to EU legislation, must be published.

[xiv] LDA modelling based on ODPM, Commercial and Industrial Floorspace and Rateable Value Statistics (2005)

CHAPTER SEVEN

BUILDING TOWARDS A ZERO CARBON LONDON

SUMMARY

Vision

By 2025, all new buildings are zero carbon, built to the highest energy efficiency standards and supplied in part by low and zero carbon decentralised energy.

The Mayor will contribute towards the achievement of this through the following policy:

- **Policy 9 - Minimising CO_2 emissions from London's new buildings -** The Mayor will minimise CO_2 emissions from new buildings through outcome-based CO_2 emissions reduction targets in the London Plan, achieved through energy efficiency and energy supply measures, and an allowable solutions offsetting mechanism. This will be supported by guidance and best practice, as well as exemplar new developments.

The Mayor's main actions to deliver this are:

- **The London Plan -** This sets out ambitious new incremental CO_2 emissions reduction targets for new development, to support the building industry towards national requirements for zero carbon residential buildings from 2016, and zero carbon non-domestic buildings from 2019.

- **The London Housing Strategy -** This sets minimum sustainability requirements for publicly-funded homes and gives priority to developments that achieve higher levels of the Code for Sustainable Homes. This includes a requirement that all new publicly-funded homes will meet the standards set out in the Interim Housing Design Guide, which includes meeting Code for Sustainable Homes Level 4.

CO_2 emissions from new development in London

- Between 2010 and 2025, policies and actions on new development are expected to save a cumulative total of 2.44 $MtCO_2$.

7.1 Introduction

The last two chapters of this strategy have focused on reducing CO_2 emissions from London's existing homes and workplace buildings. This chapter sets out actions, both underway and proposed, to minimise CO_2 emissions through the design of new buildings. The Mayor's London Plan (the Spatial Development Strategy for London) and the Mayor's London Housing Strategy set out a number of policies to minimise CO_2 emissions from new buildings in London. This chapter summarises the most relevant parts of those strategies.

For the purposes of this strategy, CO_2 emissions from new development are defined as those associated with the use of energy in buildings once they have been constructed and concentrates on regulated emissions. Regulated emissions are those associated with the fabric of a building, including heating, hot water, ventilation and internal fixed lighting[i]. The CO_2 emissions within London associated with the construction of buildings such as the production of building materials, the transport of materials and the use of energy to power machinery to construct buildings are covered in chapters 6 and 8 of this strategy.

7.2 Government action to reduce CO_2 emissions from new buildings

Government has committed to a number of policies aimed at delivering zero carbon residential and non-domestic development by 2016 and 2019 respectively. These include the Code for Sustainable Homes, Building Regulations, and Planning Policy Statements to be succeeded over time by a new National Planning Framework (please see box 7.1 for more information). These supplement the Mayor's proposed actions to reduce CO_2 emissions from new buildings in London.

Box 7.1 Government CO_2 reduction policies and programmes for new development

Government has a number of policies and programmes for reducing CO_2 emissions from new development, including:

- **Zero carbon developments –** Government has stated its intention to introduce zero carbon buildings for residential development from 2016 and for non-domestic development from 2019. In its Plan for Growth, released as a supplementary document to the March 2011 budget, government announced that the zero carbon definition will only apply to regulated emissions as defined by Building Regulations (Part L). Zero carbon will be achieved through a combination of meeting a carbon compliance standard (a reduction in regulated energy use that needs to be achieved onsite), with

the remainder being met by a range of good quality allowable solutions (yet to be determined) which could be achieved offsite. The final proposals for how to meet the zero carbon definition is still being developed, and will be decided by government before it comes into force in 2016.

- **Code for Sustainable Homes –** Government's Code for Sustainable Homes (CSH) provides targets for CO_2 emissions reductions based on improvements beyond Building Regulations. Each level of the CSH requires an incremental improvement for new residential buildings towards the achievement of zero carbon emissions (code level 5 for homes built from 2016.)

- **Buildings Regulations (Part L) –** A revised Part L came into force on 1 October 2010 and requires a minimum carbon emissions reduction of 25 per cent over 2006 Building Regulations (Part L) standards.

- **Planning Policy Statements (PPS) –** PPS are government's statements of statutory provisions and guidance to local authorities and others on planning policy and the operation of the planning system. PPS 1 and PPS 22 set out government's planning policies for sustainable development, climate change and renewable energy, to which planning authorities must have regard when preparing local planning documents and when making planning decisions. The new National Planning Framework will replace these over time. A final version is expected in 2012.

7.3 Opportunities for, and challenges to, reducing CO_2 emissions from new development in London

Although the biggest challenge for London is to improve the contribution of existing building stock (80 per cent of which will still be in use in 2050), the Mayor's policies on new buildings can strongly influence the way in which London responds to climate change. It is generally easier to deliver energy efficient new buildings than to retrofit existing buildings to the same standard. Therefore new development provides opportunities to develop exemplars and models for zero carbon development in the future.

Box 7.2 Planning in London

- **The London Plan –** This is the Mayor's spatial development strategy for Greater London that sets the strategic planning context for the capital. London boroughs' local plans should be in general conformity with the London Plan, and its policies will help guide decisions on planning applications by boroughs and the Mayor.

- **Supplementary Planning Guidance (SPG) –** These documents provide detailed advice on the policies contained within the London Plan, and how they can be met.

- **Opportunity Area Planning Framework (OAPF) –** Opportunity Areas are identified in the London Plan, and are those areas capable of accommodating significant commercial and residential development and catalysing regeneration. They are areas of strategic importance in relation to accommodating London's growth and development. An OAPF is a detailed planning document aimed at identifying cross-borough, strategic opportunities for development. A key part of an OAPF is an energy masterplan.

- **Local Development Frameworks –** These are the London boroughs' local plans and form a set of local development documents that boroughs are required to produce outlining how planning will be managed in local areas.

Three monitoring reports[ii] have been published to assess the impact of London Plan climate change mitigation and energy planning policies between 2004 and 2010. The most recent report looks at every Stage Two planning application determined between 1 January and 30 December 2010 (112 in total) which were reviewed by the Mayor. It includes quantification of the CO_2 savings, based on modelling for planning applications, that will be achieved through the planning process. The main findings of the report are:

- On average, CO_2 savings of 33 per cent over and above those required by 2006 Building Regulations (Part L) were achieved. This included unregulated emissions and is similar to the level of savings in a previous report covering the period 2006-2009.

- On average, CO_2 savings of around 50 per cent in regulated emissions were achieved over and above the minimum requirements of 2006 Building Regulations (Part L).

- Planning applications included proposals for around 27,000 new housing units (96 per cent of all units reviewed) to be supplied by heat networks.

- Planning applications included commitments for six very large[iii] mixed-use developments to establish site-wide heat networks of a scale capable of expanding beyond their boundaries.

- Planning applications included the proposed installation of around 28MW of CHP electrical capacity, equivalent to the energy required to supply 56,000 homes. The total CHP electrical capacity in London is 198MW[iv].

The findings not only show that developers have responded to the CO_2 emissions reduction policies in the London Plan, but also demonstrate the potential for further CO_2 emission reductions from new development. They support the inclusion of CO_2 reduction targets in the London Plan of at least a 25 per cent improvement on 2010 Building Regulations (Part L). For an example of a development that is delivering CO_2 savings well in excess of 2006 Building Regulations (Part L) standards, please see the case study in box 7.3.

7.4 Reducing CO_2 emissions from new buildings in London through committed Mayoral action

The assessment of the impact of the Mayor's energy policies shows the real opportunity in London to reduce CO_2 emissions from new development. The Mayor has significant powers to influence the CO_2 emission levels of new development through planning policy in the London Plan and policy priorities in the Mayor's London Housing Strategy.

The Mayor wants London to remain at the forefront of driving environmental, as well as wider development, standards and is using his new policies for CO_2 emissions reduction targets for new development to build on the success of previous policies in this area. The Mayor is also providing advice and support to meet these targets, and working to deliver exemplar low carbon new developments.

Based on the Mayor's policies on new development, it is estimated that 2.44 $MtCO_2$ will be avoided in total from 2010 to 2025. These savings are included in those accounted for in the homes and workplaces sectors (chapters 5 and 6), so are not shown in a separate chart here.

Box 7.3 Case study - St Andrews

St Andrews is a residential-led regeneration project in Bromley-by-Bow, Tower Hamlets. The London Development Agency (LDA), funded by the Homes and Communities Agency, acquired the former St Andrews Hospital site and entered into a development agreement with Barratt Homes to deliver 964 new low carbon homes, including 50 per cent affordable housing.

The development will be built to an overall Code for Sustainable Homes Level 3 and will include community facilities, retail space and a new Primary Care Trust unit. The scheme is also providing two new parks and easy walking routes to the Bromley-by-Bow Underground station. The developments were designed to deliver CO_2 savings of 37.5 per cent improvement on 2006 Building Regulations (Part L).

The five buildings were designed by three separate architectural firms to create a diverse set of structures within one framework. The first two buildings are completed and the third is nearing completion. There will be green roofs on all five buildings, and a hectare of landscaped public realm, including gardens, courtyards and play areas.

The St Andrews project represents a real success story of cross-public sector working to secure the delivery of much-needed housing despite economic conditions, without compromising on quality of design or on environmental performance. Regular workshops with the LDA and Design for London were held throughout the design of the scheme.

This development will be used to help inform the design and development of high environmental specification housing and mixed-use developments, as London works to drive up the environmental standards of developments.

St Andrews development

POLICY 9: MINIMISING CO_2 EMISSIONS AND ENERGY USE FROM LONDON'S NEW BUILDINGS

Vision

By 2025, all new buildings are zero carbon, built to the highest energy efficiency standards and supplied in part by low and zero carbon decentralised energy.

Vision to policy

The Mayor will minimise CO_2 emissions from new buildings through outcome-based CO_2 emissions reduction targets in the London Plan, achieved through energy efficiency and energy supply measures, and an allowable solutions offsetting mechanism. This will be supported by guidance and best practice, as well as exemplar new developments.

Policy to action

a) Implementing climate change mitigation and energy policies set out in the London Plan

- **Action 9.1 -** The Mayor will set ambitious new CO_2 emissions reduction targets for major new development to be achieved via the Mayor's energy hierarchy: Be lean (use less energy); be clean (supply energy efficiently); and be green (use renewable energy). This is based on a trajectory for all new residential developments to be zero carbon from 2016 and for new non-domestic developments to be zero carbon from 2019.

b) Providing further guidance and best practice support to maximise energy efficiency in new development and ensure low carbon energy supply

- **Action 9.2 -** The Mayor will produce revised Supplementary Planning Guidance on Sustainable Design and Construction that is consistent with the new London Plan. The Mayor will require major new development proposals to meet the minimum standards outlined in the Mayor's Supplementary Planning Guidance.

- **Action 9.3 -** The Mayor will continue to provide advice as part of the assessment of the energy component of planning applications referred to the Mayor.

- **Action 9.4 -** The Mayor will produce a final Housing Supplementary Planning Guidance document to cover aspects of sustainable design and construction for new housing and neighbourhoods that is consistent with the London Plan.

- **Action 9.5 -** The Mayor will require that all new publicly-funded housing meet the standards set out in the Interim Housing Design Guide, which includes meeting Code for Sustainable Homes Level 4.

c) Working to deliver exemplar new development

- **Action 9.6 -** The Mayor will continue to support new build development projects that are exemplars of low carbon development**.**

- **Action 9.7 -** The Mayor will work with the Olympic Delivery Authority, through the Olympics Legacy Masterplanning Framework, to ensure that the 2012 Olympic and Paralympic Games meet London Plan CO_2 emissions reduction targets.

a) Implementing climate change mitigation and energy policies set out in the London Plan
The London Plan has a range of policies to minimise CO_2 emissions from new development in London. Through policy 5.2 of the London Plan, the Mayor has introduced outcome-based CO_2 emissions reduction targets based on improvements on Part L of 2010 Building Regulations (as set out in tables 7.1 and 7.2).

Table 7.1 CO_2 emissions targets for new residential buildings in London

Year	Improvement on 2010 Building Regulations
2010 - 2013	25 per cent
2013 - 2016	40 per cent
2016 - 2031	Zero carbon

Table 7.2 CO_2 emissions targets for new non-domestic buildings in London

Year	Improvement on 2010 Building Regulations
2010 - 2013	25 per cent
2013 - 2016	40 per cent
2016 - 2019	As per building regulations requirements
2019 - 2031	Zero carbon

These target emissions reductions are a move away from prescriptive technology targets for measures, such as reducing CO_2 emissions by 20 per cent through the use of onsite renewables. Instead the Mayor will expect all major new development to meet these targets by applying the energy hierarchy (see below) as appropriate. This will ultimately lead to zero carbon residential buildings from 2016 and zero carbon non-domestic buildings from 2019, in line with government policy.

The Mayor expects that CO_2 emission reductions will be achieved through the sustainable use of energy in accordance with the Mayor's energy hierarchy:

- be lean: use less energy
- be clean: supply energy efficiently, particularly through the use of decentralised energy
- be green: use renewable energy.

Policy 5.2, Minimising carbon dioxide emissions; Policy 5.3, Sustainable design and construction; Policy 5.5, Decentralised energy networks; Policy 5.6, Decentralised energy in development proposals; and policy 5.7, Renewable energy, in the London Plan set out how the Mayor expects spatial planning activity and new development to further contribute to London meeting its CO_2 reduction targets.

The Mayor's new outcome-based approach will deliver greater CO_2 savings from new development in London. It will also allow developers to create tailored and innovative designs that integrate the most economically-viable solutions into the design of their developments from the outset. As part of this process, all major developments will be required to include a detailed energy assessment in their planning application to illustrate how they have used the Mayor's energy hierarchy to inform their design and, consequently, how their development will meet the CO_2 emissions target.

Developments will be expected to meet Part L of 2010 Building Regulations through energy efficiency alone, before moving through the hierarchy to meet the 25 per cent (moving to 40 per cent in 2013-2016) improvement on 2010 Building Regulations (Part L).

In addition to this target, where it is demonstrated that targets cannot be fully achieved through the Mayor's energy hierarchy in an economically viable way, the shortfall in CO_2

savings can be offset. This will enable new development to maximise CO_2 emissions reductions. The offsetting will be managed and delivered at a borough level, where financial contributions will be made directly into a dedicated carbon reduction fund established by the relevant borough. These funds will then be used to support activity that will deliver additional CO_2 savings within the borough, including retrofitting its existing building stock and developing large-scale decentralised energy networks. A framework to inform London borough offsetting funds will be included in the Sustainable Design and Construction SPG**.**

For further information on the implementation of policies in the London Plan on decentralised energy, please see chapter 4, and for those related to reducing CO_2 emissions from the development of new transport infrastructure, please see chapter 8.

b) Providing further guidance and best practice support to maximise energy efficiency in new development and ensure low carbon energy supply
As well as setting the planning framework, the Mayor will provide further guidance and best practice support.

The Mayor has already delivered a training programme for planning officers in London boroughs to improve their knowledge and understanding of energy issues within new development. It showed officers how to ensure that new development commits to appropriate energy performance levels in their planning applications.

The Mayor is continuing to provide advice as part of the assessment of the energy component of planning applications referred to the Mayor, including written guidance for how to complete a development's energy assessment or statement.

Further advice to support the London Plan and the London Housing Strategy is being provided through revised SPG and Best Practice Guidance (BPG). The Mayor intends to revise the existing SPG on Sustainable Design and Construction to support the London Plan. This guidance provides detail on the environmental policies in the London Plan, as well as guidance on how developers can implement the policies. The Mayor will require major new development proposals to meet the minimum standards outlined in the revised Sustainable Design and Construction SPG. Proposals should be able to demonstrate that sustainable design and construction standards have played an integral part in the design of the development.

In addition to the Sustainable Design and Construction SPG, a revised Housing SPG was published in draft in August 2010, to support implementation of the housing policies in the London Plan so that it can more effectively tackle three key issues: development on private garden land; the relationship between housing density and quality; and affordable housing targets.

This SPG is supported by the Mayor's Interim London Housing Design Guide which was also published in August 2010. All new publicly-funded homes in London are expected to meet the standards set out in the guide, which includes meeting Code for Sustainable Homes Level 4. The guide reflects the new standards set out in the London Plan and the London Housing Strategy. It consolidates and simplifies a number of common or emerging design requirements to help bring greater certainty to the development process.

Developments on GLA land or housing schemes that are applying for GLA funding will be required to meet the standards set out in the Mayor's Interim London Housing Design Guide. To support this, the Homes and Communities Agency (HCA) has produced a Design Standards Prospectus, which sets out how HCA London will integrate the Mayor's Interim London Housing Design Guide into their funding processes for the capital. Creating clarity regarding the design standards expected for developments on GLA group land, and greater consistency in implementing them, should increase certainty for developers and reduce costs in the planning process.

The Mayor will publish final versions of both the Housing SPG and the London Housing Design Guide in 2012.

The Mayor is also finalising a Low Carbon Cooling Guide for new development in London that will help inform the design and technology specification of developments to minimise the energy and CO_2 emissions associated with their cooling requirements. It can also be used as an informal guidance document in the consideration of strategic planning applications for the design community.

c) Working to deliver exemplar new development

As well as setting the planning framework and providing support and guidance to meet policies in the London Plan, the Mayor is also committed to delivering exemplar low carbon new development.

The Mayor is already delivering exemplar projects, including:

- **Royal Docks –** The Mayor and the London Borough of Newham are working in partnership to regenerate the Royal Docks in East London. The aim is to not only make this a world-class business location within the knowledge and low carbon economy, but also a location of choice for people to live. There will be high environmental specifications for its wider built environment, as well as high quality public realm with significant amounts of attractive and functional green space.

- **National Sports Centre at Crystal Palace –** Part of the recent refurbishment of the National Sports Centre has included the installation of a new energy centre. It includes a natural-gas-fired CHP plant with a 400 kWe capacity. Existing boilers have also been replaced with a single high-efficiency condensing boiler with a 1,800 kW capacity. The works will install sophisticated monitoring and control systems, ventilation air heat recovery and energy saving pool covers for the four swimming pools at the site. Based on prevailing energy prices, the CHP plant is projected to make financial savings of up to £400,000 a year, equating to savings of 1,850 tonnes of CO_2 per year. The financial savings resulting from the installation of this new energy centre mean that the cost of its installation will be repaid in less than 3.5 years.

- **Carbon positive project –** The Mayor has been working with the C40 and Clinton Climate Initiative to understand and identify opportunities to develop a carbon positive project in London. This is a site that is a net exporter of zero carbon energy.

- **Exemplar housing –** The Innovation and Opportunities Fund within the Targeted Funding Stream has already allocated funds to support exemplary schemes to reach Code for Sustainable Homes Level 5. This additional funding, which recognised the existing financial barriers housing developers face in meeting the higher levels of the code, helped to drive development of new technologies and products along with developing the supply chains needed to achieve cost effective zero carbon residential development in London by 2016.

The Mayor will continue to ensure that development projects are exemplars, delivering low carbon developments with high specifications to address wider environmental issues as well.

The Mayor will also work with the Olympic Delivery Authority, through the Olympics Legacy Masterplanning Framework, to ensure that the Olympic Village meets the London Plan targets for CO_2 emissions reductions. The legacy will include site-wide low carbon

energy provision, buildings constructed to low carbon specifications, and high quality public transport links to central London and beyond.

In addition, the Mayor will use OAPFs to identify and facilitate strategic opportunities for new development. This allows for a greater degree of planning and coordination than would happen if an area was developed on a site-by-site basis. This paves the way for ensuring that large developments include common sustainable design and construction standards, take advantage of the opportunity to undertake area-wide transport planning, and integrate area-wide environmental infrastructure, such as decentralised energy schemes. The Mayor will also use OAPFs to ensure that London's largest regeneration areas are exemplars of low and zero carbon development by identifying opportunities for, and facilitating the delivery of, large-scale energy infrastructure projects.

7.5 Implementing Mayoral policies and actions

Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter

Endnotes

[i] This is in line with government's Building Regulations (Part L), which only focuses on regulated emissions.

[ii]London South Bank University, Review of the impact of the energy policies in the London plan on applications referred to the Mayor (Phase 2) (2007); London South Bank University, Monitoring the London Plan Energy Policies Phase 3, Part 1 Report (2009); GLA, Monitoring the Impact of London Plan Energy Policies in 2010 (2011).

[iii] More than 900 dwellings.

[iv] DECC, Combined Heat and Power in Scotland, Wales, Northern Ireland and the Regions of England in 2009 (2010)

CHAPTER EIGHT

MOVING TOWARDS ZERO EMISSION TRANSPORT IN LONDON

SUMMARY

Vision

By 2025, London's transport system will excel amongst global cities, with low carbon infrastructure and access to ever more low carbon transport options. London is a recognised leader in the mass-market uptake of low carbon transport vehicles and fuels, and is the electric vehicle capital of Europe. Londoners are continuing to move away from private car use to public transport, and London has unprecedented levels of walking and cycling. Freight is moved on the most carbon efficient modes of transport, and individuals, freight operators, and public transport operators are cutting their fuel costs by driving and operating vehicles in the most fuel-efficient ways.

The Mayor will contribute towards this through the following policies:

- **Policy 10 - Minimising CO_2 emissions through a shift to more carbon efficient modes of transport -** The Mayor, through TfL and working with boroughs and partners, will support and incentivise carbon efficient travel behaviour, minimise the need to travel, and encourage a switch to lower carbon modes of transport. For people, this includes walking, cycling and public transport, and for freight it will include water and rail-based movement.

- **Policy 11 - Minimising CO_2 emissions through more efficient operation of transport -** The Mayor, working through TfL and with boroughs and partners, will minimise CO_2 emissions from transport through improving driving techniques on public transport, supporting individuals and freight operators on fuel-efficient driving, and smoothing traffic flows.

- **Policy 12 - Minimising CO_2 emissions from transport through the use of low carbon vehicles, technologies and fuels -** The Mayor, through TfL and working with boroughs and partners, will invest in, incentivise, and encourage the development and use of low carbon vehicles, including electric vehicles, hydrogen-fuelled vehicles, and low carbon buses.

The Mayor's main actions to deliver this are:

- **Creating a cycling revolution in London -** This includes expanding the Barclays Cycle Hire scheme, delivering Barclays Cycling Superhighways and delivering an additional 66,000 secure bike parking spaces.

- **Making walking count -** This includes improving the urban realm, on-street way-finding and route planning facilities for pedestrians through the Legible London scheme.

- **Continuous upgrades of London's public transport system -** This includes delivering a programme of committed investment to expand capacity of public transport, including Crossrail and London Underground upgrades.

- **Enabling and encouraging the uptake of less polluting vehicles -** This includes the aim of 100,000 electric vehicles on London's roads as soon as possible, bringing 300 hybrid buses into service by the end of 2012, and working closely with bus operators and manufacturers to bring down costs of new low carbon buses to maximise the number entering service after 2012. The New Bus for London will also be hybrid, with fuel consumption expected to be nearly 40 per cent better than a conventional diesel double decker bus.

CO_2 emissions from London's transport: 2008-2025

- **Current CO_2 emissions -** In 2008 emissions from London's transport sector were 9.90 $MtCO_2$.

- **Business as Usual CO_2 emissions by 2025 -** Under a BaU situation, London's transport emissions would be expected to reduce to 8.02 $MtCO_2$ per year.

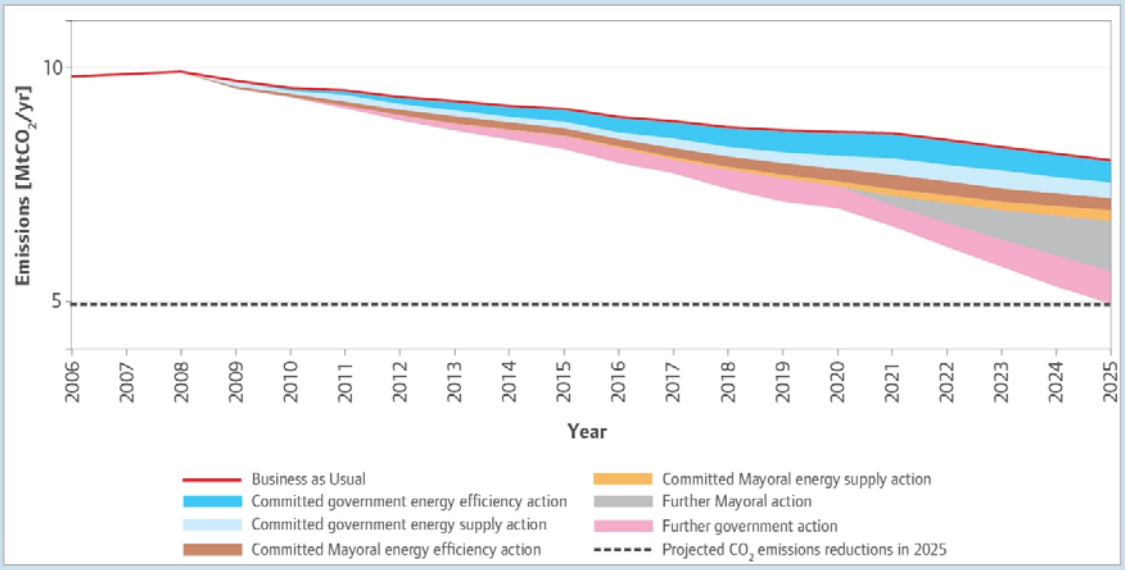
- **CO_2 emissions reductions by 2025 from government and EU action -** Government, EU and international action is expected to reduce London's CO_2 emissions from transport by 0.80 $MtCO_2$ per year.

- **CO_2 emissions reductions by 2025 from committed Mayoral action –** Committed Mayoral action is expected to reduce London's CO_2 emissions from transport by 0.49 $MtCO_2$ per year.

- **CO_2 emissions reductions by 2025 from further Mayoral action -** Further Mayoral, government and borough action could reduce London's CO_2 emissions from transport by 1.07 $MtCO_2$ per year.

- **CO_2 emissions reductions by 2025 from further government action -** If government adopts more ambitious CO_2 emissions reduction scenarios, according to the recommendations of the Committee on Climate Change, it is expected to reduce London's CO_2 emissions from transport by 0.71 $MtCO_2$.

Figure 8.1: Projected reductions in CO_2 emissions from transport in London by 2025



For definitions of each category of CO_2 emissions reductions, please see pages 21-22.

Source: TfL planning and GLA modelling

8.1 Introduction

The previous chapters of this strategy have set out Mayoral policies and actions to reduce CO_2 emissions from London's homes and workplaces sectors. This chapter addresses the final sector of transport. It sets out the relative contribution of London's transport to CO_2 emissions in the capital, and actions currently underway or proposed that will contribute towards minimising them. The Mayor's Transport Strategy was published in May 2010 and was founded on a set of six goals, one of which was to reduce CO_2 emissions in line with the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025. Therefore, the reduction of CO_2 emissions forms a core theme that influences the Mayor's Transport Strategy. This chapter summarises the most relevant parts of that strategy and updates it where appropriate.

As set out in chapter 2 of this strategy, London's CO_2 emissions are measured within the geographical boundaries of Greater London. This means that emissions from transport are calculated only for travel that takes place within those boundaries, as per international reporting guidance. For the purposes of this strategy, CO_2 emissions from transport are defined as:

- those associated with the combustion of fuel for transport purposes, for example CO_2 emissions from petrol and diesel-powered cars, buses, motorcycles, taxis, road freight, and diesel rail in London

- those associated with the electricity used to power transport, including the London Underground, DLR, rail, street lighting and electric vehicles[i]

- those associated with the taxiing, take-off and landing (up to an altitude of 1,000 metres) of aeroplanes at airports within London's boundaries.

This chapter will:

- summarise London's current CO_2 emissions from transport

- summarise London's CO_2 emissions from transport under a BaU scenario

- summarise CO_2 emissions reductions expected as a result of committed government and international action on transport

- set out the challenges and opportunities for London to further reduce its CO_2 emissions from transport

- detail the specific policies and actions that the Mayor has committed to take to reduce CO_2 emissions from London's transport[ii]

- set out further Mayoral action that can be taken to reduce CO_2 emissions from London's transport, and that will be deliverable subject to further support, including funding from government and the private sector

- summarise further action that the Mayor encourages government to take to reduce CO_2 emissions from London's transport, and support the achievement of the Mayor's CO_2 emissions reduction targets.

It is important to note that in London's transport sector, considerable reductions in CO_2 emissions occur under the BaU scenario (15 per cent on 1990 levels by 2025, compared to eight per cent and 11 per cent in the homes and workplaces sectors respectively). This therefore reduces scope for further emissions reductions in comparison to other sectors.

In addition, eighty per cent of transport emissions are derived from vehicle fleets such as aviation, road freight and cars. As the major CO_2 emission reduction drivers, such as vehicle emissions standards and taxation, are set at the national and international level for these, the Mayor has limited powers to reduce these CO_2 emissions. National and international action is therefore particularly effective. This makes further CO_2 emissions reductions from Mayoral action on transport even more challenging. It is therefore vital that government implements its commitments on reducing CO_2 emissions from transport. The Mayor, through TfL, continues to work closely with the EU and government to ensure action is taken.

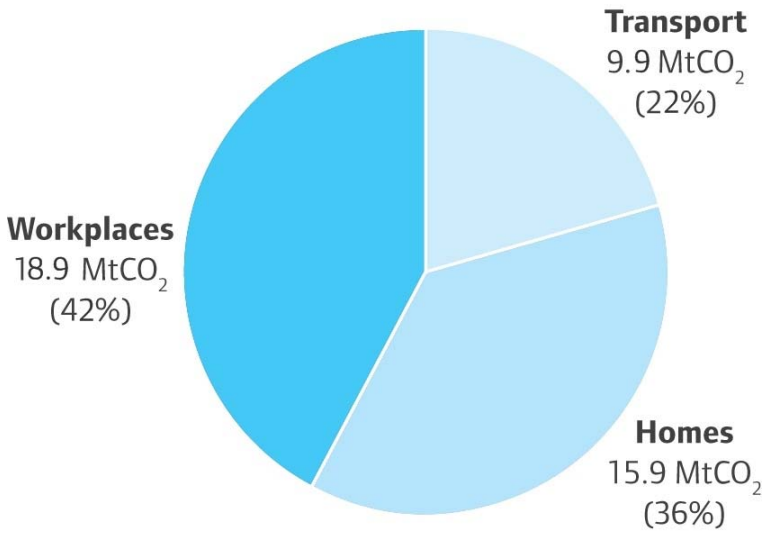
However, the Mayor is committed to using his powers to the utmost to reduce CO_2 emissions from London's transport, and the policies and actions set out in this chapter will address how he will achieve this.

8.2 Current CO_2 emissions from London's transport

As shown in figure 8.2, in 2008[iii] transport accounted for 22 per cent of London's total CO_2 emissions, equivalent to 9.90 $MtCO_2$ per year. These emissions are roughly equivalent to 1990 levels despite increases in population.

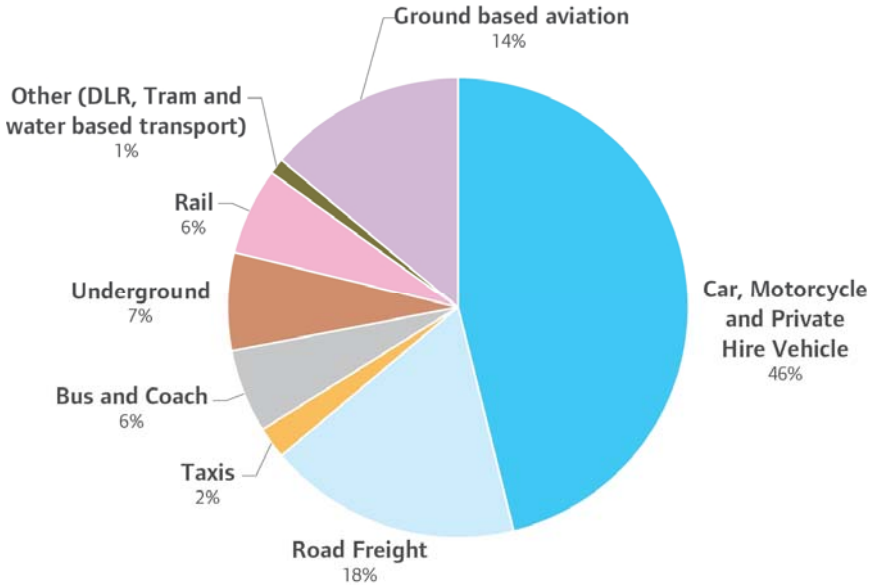
As figure 8.3 illustrates, the majority of these were emitted from cars and motorcycles (46 per cent), with a further 18 per cent from road freight. In total nearly three quarters of London's CO_2 emissions from transport are from road-based modes.

Figure 8.2 The contribution of London's transport to CO_2 emissions in 2008



Source: LEGGI 2008

Figure 8.3 Breakdown of CO_2 emissions from London's transport by source in 2008



Source: LEGGI 2008 and TfL Planning

8.3 Projected CO_2 emissions under a Business as Usual scenario

Based on current legislation and existing Mayoral commitments, it is projected that transport-related CO_2 emissions in London will fall by 15 per cent of 1990 levels by 2025 to 8.02 $MtCO_2$, despite projected population and employment growth in excess of ten per cent. This means a reduction of around 28 per cent per capita. Drivers of this reduction include the ongoing long-term trend of vehicle fuel efficiency improvements, a number of programmes the Mayor has already committed to, and the decarbonisation of London's electricity supply that would happen prior to the measures in government's Low Carbon Transition Plan.

8.4 Projected CO_2 emissions after committed government action

In the Low Carbon Transition Plan, the previous government committed to deliver a number of policies and programmes to reduce CO_2 emissions from transport. These include enforcing EU average emissions targets for new cars, and a programme of rail electrification. In 2011, government produced a Carbon Plan setting out programmes to be continued[iv] (please see box 8.1 for further details on EU and government policies and programmes). However, these programmes will only reduce emissions in London by 0.80 $MtCO_2$ by 2025, so further action will be required to meet the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025.

Box 8.1 Government and EU CO_2 reduction policies and programmes for transport

European Union (EU) policy

In April 2009 the EU adopted legislation that requires average emissions of new cars to be no more than 130g CO_2/km by 2015 (compared to around 150g CO_2/km in the UK in 2008[v]). Manufacturers will be penalised if average emissions from their new car sales do not meet the target. A target of 95g CO_2/km has been set for 2020, and a similar EU directive is under development for vans. The EU is also promoting biofuels through the Renewable Energy and Fuel Quality Directives, which require ten per cent of transport's energy requirement to come from a renewable source by 2020. These directives set sustainability criteria for eligible biofuels that include minimum lifecycle CO_2 emissions reductions and restrictions on types of land use change.

UK government policy

Government set out a number of low carbon transport programmes and priorities in its Carbon Plan in 2011. These include:

- **Support for ultra-low emission vehicles (ULEVs) -** The Spending Review in 2010 confirmed provision of over £400 million to support the development of the ULEVs market. This includes a grant of up to £5,000 to facilitate the purchase of ULEVs. Government has also committed to mandate a national charging network, and set up the Green Bus Fund to incentivise bus operators and local authorities to buy new hybrid and electric vehicles.

- **High speed rail and electrification -** Government supports a network linking London and Birmingham with Manchester and Leeds. The network will include direct links with High Speed 1 and Heathrow. Government has consulted on the strategy and expects to confirm its decision in 2011. Government has committed to electrifying the Great Western Main Line beyond Maidenhead (the Crossrail terminus) to Oxford, Newbury, Bristol and Cardiff. This will allow the majority of Great Western Main Line services running into London Paddington to be electric trains rather than diesel.

- **Sustainable aviation -** The June 2010 Budget included a commitment to explore changes to the aviation tax system, and government will continue preparatory work to include aviation in the EU Emissions Trading System in 2012.

- **Changing behaviour to reduce emissions -** Government's Local Transport White Paper promotes sustainable transport choices at a local level. Government also supports the transfer of freight from road to rail and water, where it is practical and economically and environmentally sustainable to do so. This includes support through grants, such as Mode Shift Revenue Support grants, which are provided to rail and water freight operators to assist where there are higher operating costs of running a rail or water freight service.

8.5 Opportunities for, and challenges to, reducing CO_2 emissions from London's transport

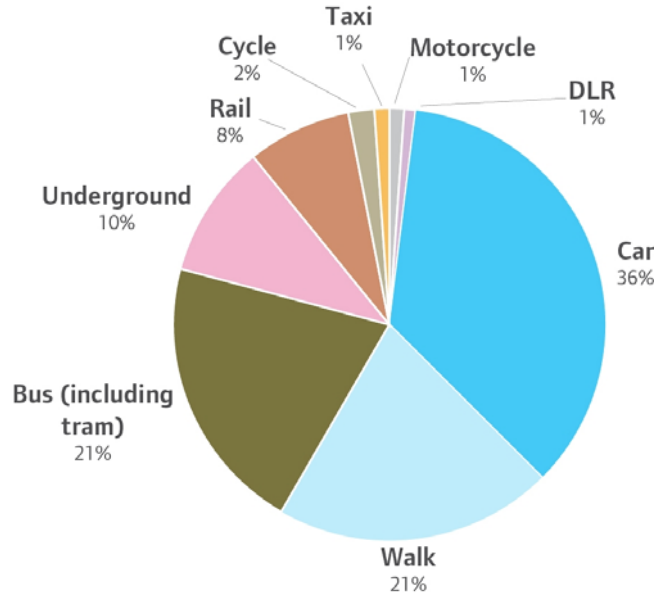
In implementing policies to further reduce CO_2 emissions from London's transport the Mayor, through TfL and working with partners, will address a number of challenges, including:

a) Challenge: The number of trips being made by individuals on high CO_2 emitting forms of transport

Between 2000 and 2009, journey stages by public transport modes increased by seven per cent, and there is an opportunity to continue this trend further. As figure 8.4 shows, at

present a large percentage of journey stages in London are made on high-emitting forms of transport. Thirty-seven per cent of individual journey stages are made by car or motorcycle, equivalent to 46 per cent of CO_2 emissions from ground-based transport in London. This is by far the highest source of transport emissions in the capital.

Figure 8.4 Modal shares of daily journey stages in London in 2008



Source: TfL Planning

Although the mode share of cycling in London has increased considerably since 2000 (it now accounts for two per cent of trips in London, compared to 1.2 per cent in 2000[vi]) it continues to represent a relatively low proportion of travel. As the majority of car journeys by London residents are less than five kilometres (with over ten per cent being under one kilometre, and around a third under two kilometres distance as the crow flies), there is an opportunity to switch these to more carbon efficient forms of travel such as public transport, walking, and cycling. There is significant potential to see more cycling in outer London, with half of all car trips less than two miles in length.

b) Challenge: The amount of freight being moved on high-emitting forms of transport
There have been significant changes in the types of goods and services provided to London, driven by a number of changes in the commercial environment, including the growth of service industries and development of internet shopping. This has resulted in a

reduction in the total amount (in weight) of freight lifted on London's roads but an increase in overall freight miles. The major area of growth has been in van usage, with an increase in mileage of 71 per cent from 1990 to 2007 in the UK as a whole[vii].

The average emissions from vans below 3.5 tonnes are 340g of CO_2e per tonne of freight moved per kilometre (tkm)[viii]. The average emissions from large heavy goods vehicles (HGVs) are 83g of CO_2e per tkm. Rail is much lower at 32g of CO_2e per tkm. Rail and water are only suited to certain types of freight flows, and often have to be used in conjunction with road for collection and delivery. However, given London's relatively dense networks of railways and waterways, there is an opportunity to reduce CO_2 emissions from transporting freight in London.

c) Challenge: The rate of uptake of fuel-efficient vehicles

As well as switching to more carbon efficient modes of transport, there is an opportunity in London to use more fuel-efficient and low carbon vehicles. For example, although average CO_2 emissions from new cars sold in the UK have fallen from around 190g CO_2/km in 1995 to around 150g today, there is significant potential for further reductions.

Hydrogen-powered vehicles and electric vehicles have zero emissions at the point of use. In addition, electric motors are more efficient than conventional motors, achieving typically around 90 per cent conversion efficiency, compared to 20 per cent for combustion engines. When considered over the full lifecycle, in the stop-start driving conditions found in London, electric vehicles result in up to 40 per cent fewer CO_2 emissions than petrol or diesel vehicles based on the current mix used to generate electricity for the UK grid. As the carbon intensity of the national grid continues to fall, lifecycle emissions will fall further.

These emissions will decrease further as the combination of government, EU and Mayoral policies and actions set out in chapter 4 of this strategy will lead to further decarbonisation of electricity supply to 2025. The CO_2 emissions per km for electric cars is expected to be in the region of 40g CO_2/km by 2025.

Currently, however, there are barriers to the uptake of lower emission vehicles in London. These include:

- **Cost -** Hybrid, electric and hydrogen-fuelled vehicles can have a significant upfront price premium over conventional alternatives, although running costs can be many times lower than conventional vehicles.

- **Infrastructure -** Until recently, there has been limited infrastructure, such as public refuelling/charging for the use of electric and hydrogen-fuelled vehicles.

- **Public awareness -** There is a lack of public confidence and information about the increasing variety of electric and other alternative-fuel vehicles that are coming to market, the expanding range and performance of these vehicles, and their charging/refuelling requirements.

The travel patterns and geography of London offer great potential for the use of electric and hydrogen-fuelled vehicles. For example, 95 per cent of motorists travel less than 50 miles per day, well within the range of an electric vehicle. Use of commercial vehicles also represents an opportunity. The use of vans is expected to increase by 29 per cent over the next 20 years. Vans in London generally have shorter duty cycles than elsewhere in the UK, so would be more suited to a switch to electric.

8.6 Reducing CO_2 emissions from London's transport through committed Mayoral action

The following policies and actions set out in this chapter aim to overcome these challenges and make the most of the opportunities in London. The Mayor has developed policies to reduce CO_2 emissions from transport sources he can directly influence, including public transport and cycling. He is also using this influence to catalyse further action, for example by stimulating the market for electric vehicles. These policies aim to empower individuals, businesses, and the public sector to make more carbon efficient travel choices.

For those areas outside of the Mayor's direct influence, such as aviation, the Mayor will seek to work with government to increase its ambition to minimise CO_2 emissions.

The Mayor's contribution to reducing CO_2 emissions from London's transport will be 0.49 $MtCO_2$ by 2025. Although this may appear to be a relatively small contribution to CO_2 reductions, as noted in the introduction to this chapter, this should be seen in the context of a high reduction in CO_2 emissions under the BaU scenario, projected growing population in London, and an increase in the use of public transport. Furthermore vehicle

fleets either directly controlled or regulated by the Mayor, such as the public transport vehicles and taxis, account for only 20 per cent of London's transport-related CO_2 emissions. This therefore significantly reduces scope for further emissions reductions in comparison to other sectors.

POLICY 10: MINIMISING CO_2 EMISSIONS THROUGH A SHIFT TO MORE CARBON EFFICIENT MODES OF TRANSPORT

Vision

By 2025, ever more Londoners are continuing to move away from private car use to public transport, and London has unprecedented levels of walking and cycling. Freight is moved on the most carbon efficient modes of transport, and smart land-use planning has minimised the need to travel.

Vision to policy

The Mayor, through TfL and working with boroughs and partners, will support and incentivise carbon efficient travel behaviour, minimise the need to travel, and encourage a switch to lower carbon modes of transport. For people, this includes walking, cycling and public transport, and for freight it will include water and rail-based movement.

Policy to action

a) Empowering individuals to make a move away from private car use to the use of public transport

- **Action 10.1 -** The Mayor will promote the use of rail and London Underground transport over cars by: seeking to further enhance rail capacity; deliver committed improvements to the rail network, including Crossrail and the London Overground Extension; and by delivering upgrades to the London Underground in a phased programme, including increasing network capacity and refurbishing stations.

- **Action 10.2 -** The Mayor will keep the bus network under regular review to ensure an optimised service and implement bus priority measures where required and feasible.

- **Action 10.3 -** The Mayor will support smarter travel initiatives, including workplace and school travel plans and, working in partnership with boroughs and operators, is

committing around £450,000 per annum to 2012-13 to deliver 600 additional car club bays.

- **Action 10.4 -** The Mayor will use powers under the London Plan to deliver the infrastructure to support further use of public transport, including supporting development that generates high levels of trips only at locations with high levels of public transport accessibility; and continuing to explore opportunities to integrate development with interchange enhancements, particularly around major rail and underground stations.

b) Creating a cycling revolution and making walking count in London

- **Action 10.5 -** The Mayor will empower individuals to cycle by: delivering the Barclays Cycle Hire scheme, which will expand to include an additional 2,000 bikes and 4,200 docking stations in time for the London 2012 Olympic and Paralympic Games; delivering Barclays Cycling Superhighways from outer London to central London; improving cycle infrastructure; delivering free cycle training; working with employers to promote cycling to employees; and, through the London Plan, introducing minimum standards for the provision of cycle parking facilities at new developments in London.

- **Action 10.6 -** The Mayor will encourage more walking trips by improving the quality of the walking environment, and providing better information on walking through further rollout of the Legible London way-finding system.

c) Enabling and encouraging a reduction in freight, and a modal shift of freight from road to rail and water

- **Action 10.7 -** The Mayor will continue to: support Delivery and Servicing Plans and Construction Logistics Plans to reduce the number of freight journeys; adopt planning requirements for Delivery and Servicing Plans and Construction Logistics Plans for major developments; support new rail freight terminals in or near London; and safeguard wharf sites for water freight.

d) Supporting the provision of alternatives to aviation

- **Action 10.8 -** The Mayor will support the expansion of rail-based alternatives to aviation, including the development of a national high speed rail network.

a) Empowering individuals to make a move away from private car use to the use of public transport

The first step to achieve this policy is to encourage a shift to public transport. Progress has already been made and the Mayor will enable individuals to continue to make this shift in the following areas:

Rail and London Underground

The Mayor will promote the increased use of rail-based public transport by seeking further rail capacity and encouraging the Department for Transport (DfT) and Network Rail to deliver capacity improvements to the rail network. This will include Crossrail, the biggest transport project in Europe, which will facilitate easier, faster and, for the first time, direct journeys by public transport from Heathrow to Canary Wharf, as well as London's other central business areas. The Mayor will also seek to deliver upgrades to the London Underground in a phased programme that will result in a step change in service provision, including increasing network capacity.

Bus

To encourage further travel by bus the Mayor, through TfL, will keep the development of the bus network under regular review to cater for changes in population and employment. He will also introduce bus priority at critical locations and implement the Countdown 2 project to deliver expanded access to real time bus information, including developing further integration with digital communications.

Travel plans and car clubs

TfL has pioneered the use of smarter travel to achieve improved CO_2 efficiency, including the widespread uptake of workplace travel plans. These plans now cover around ten per cent of London's workforce and have achieved a cut of 13 per cent in car use at those sites. School travel plans cover 90 per cent of London's schools and have led to reduced car use of more than six per cent at those sites. Smarter travel also provides the opportunity to further explore flexible working patterns and remote working to support measures to reduce the need to travel, especially during peak hours. The Mayor will continue to support the uptake of travel plans.

London is a global leader in the development of car clubs, with a rapidly growing membership of around 140,000 people and 2,500 vehicles. The Mayor will continue to support the expansion of car clubs and, working in partnership with boroughs and operators, is committed to investing around £450,000 per annum to 2012-13 to deliver

up to 600 additional car club bays. The case study in box 8.2 provides an example of a flexible car sharing scheme using low emissions vehicles.

Box 8.2 Case study - car2go

car2go is an innovative car sharing scheme that is running in a number of cities in Europe, Canada and the USA (Ulm, Hamburg, Austin, and Vancouver). Once registered for a one-off fee, members can locate and use spontaneously, or reserve, a car on the street by phone or online and can access the car with a membership card. The car can be dropped off anywhere in the car2go zone, as long as it is legally parked. Members only pay for the time they rent the car and do not need to return it to the same place. Charges are calculated by the minute and include fuel, insurance, maintenance and parking. car2go vehicles are low emission and feature a micro hybrid stop-start drive system which reduces fuel consumption. car2go, along with other flexible car sharing schemes, are looking to extend programmes to London, and offer an opportunity to further increase uptake of car sharing schemes in London.

Integrating transport and land-use planning through the London Plan

Population and employment growth in excess of ten per cent is anticipated in London in the period to 2025. Given the high levels of anticipated growth, it is essential that this is accommodated and the resulting travel demand patterns are catered for in a sustainable manner. Through the London Plan, the Mayor will:

- encourage patterns of development that reduce the need to travel, especially by car
- seek to improve the capacity and accessibility of public transport, walking and cycling, particularly in areas of greatest demand
- support development that generates high levels of trips only at locations with high levels of public transport accessibility
- improve interchange between different forms of transport, particularly around major rail and London Underground stations, especially where this will enhance connectivity in outer London.

For more information on planning policies, please see the London Plan.

b) Creating a cycling revolution and making walking count in London

Creating a cycling revolution

As well as a shift to public transport, the Mayor is also committed to increasing levels of cycling and walking in the capital. The Mayor aims to increase cycling's mode share of transport in London from two to five per cent by 2026, a 400 per cent increase compared to 2000. As part of this, the Mayor launched the Barclays Cycle Hire Scheme in July 2010. This public bicycle-sharing scheme for short journeys in and around central London has 6,000 bicycles available for hire 24/7. There are 400 docking stations located roughly 300 metres apart, with 10,000 docking spaces. The Mayor has announced phase two of the Barclays Cycle Hire Scheme, which will deliver an additional 2,000 bikes and 4,200 docking spaces in time for the London 2012 Olympic and Paralympic Games. TfL is also developing and rolling out a network of 12 Barclays Cycling Superhighways. The first four have launched, with the remaining eight to be introduced by 2015.

Working through TfL with partners, including the London boroughs, the Mayor is raising awareness of the benefits of cycling through smarter travel initiatives, as well as behaviour change measures and information. He is also working with Biking Boroughs. These are outer London boroughs that prioritise cycling in their local transport strategies, working with partners like schools, NHS Primary Care Trusts, and businesses to deliver a package of measures including smarter travel interventions, traffic management and infrastructure. TfL will offer support with programme development and technical expertise in addition to capital funding offered to Biking Boroughs.

In addition, the Mayor will improve cycle infrastructure, initially by adding 66,000 new cycle parking spaces in London by 2012. Using powers in the London Plan, the Mayor will support development that provides cycle parking to an appropriate standard and integrates the needs of cyclists into design. He will also work with TfL, Network Rail, train operators and boroughs to implement minimum standards of cycle provision as part of station redevelopment works and at other stations where possible. In addition the Mayor will deliver road improvements to make cycling easier and safer, and offer cycle training for people of all ages. The Mayor's cycling programme can be found in the Mayor's Cycling Revolution London report, the Cycle Safety Action Plan which sets out 52 separate actions to make cycling safer, and the Cycle Security Plan which sets out how TfL and partners tackle cycle theft and vandalism.

Making walking count

The Mayor is keen to increase levels of walking above the current 21 per cent modal share. This will be achieved by improving the quality of the walking environment, using the guiding principles outlined in Better Streets, the Mayor's vision for improving London's streets.

To help people understand the easiest, quickest and most pleasant way of moving around London, particularly for shorter journeys, the Mayor, through TfL, will improve the quality and provision of information on walking, for example, by working with boroughs and other partners to further roll out the Legible London way-finding system. He will also, through TfL and working with the boroughs, promote walking and its benefits through information campaigns and smarter travel initiatives.

c) Enabling and encouraging a reduction in freight, and a modal shift of freight from road to rail and water

The previous sections have focused on encouraging individuals to switch to more carbon efficient modes of transport. However, as set out earlier in this chapter, there is also an opportunity for freight to shift mode as well.

The Mayor is encouraging organisations to rationalise freight travel through Delivery and Servicing Plans (DSPs) and Construction Logistics Plans (CLPs). DSPs are travel plans that aim to improve the sustainability of freight and servicing by working with suppliers, clients and the freight industry to reduce the number of deliveries required. CLPs have similar overall objectives, but are focused on the design and construction phases of premises. Through the London Plan, the Mayor is adopting planning requirements for DSPs and CLPs for major developments.

The Mayor will also encourage a shift in remaining freight from road to rail and water. To encourage the use of rail wherever possible, the Mayor will support new rail freight terminals in or near London, and support better use of the High Speed 1 (HS1) rail line for international freight.

Water transport is particularly suited to bulk movements of relatively low value cargoes for which speed is less critical; for example aggregates, waste, and bulk liquids. Over 60 per cent of materials have been delivered to the Olympic park by rail or water, equivalent to more than one million tonnes of material, and additional potential uses include major construction projects such as Crossrail and the Thames Tunnel Sewer. Increasing

waterborne freight will depend on the availability of wharf facilities to transfer cargo between land and water. To encourage this shift, the Mayor is seeking to ensure that existing safeguarded wharves are fully utilised for waterborne freight and will look at the potential to increase use of the Thames and London's canal network for freight transport.

d) Supporting the provision of alternatives to aviation

The Mayor's powers to influence CO_2 emissions from aviation are limited. However, in line with the rest of this strategy, the Mayor will include aviation emissions that occur within Greater London's boundaries. In 2008 these emissions (from planes taking off and landing up to the altitude of 1,000 metres and taxiing in London) were 1.39 $MtCO_2$. Continuing patronage growth is anticipated at London's airports which will exacerbate the challenge of reducing emissions from the aviation sector.

The Mayor wishes to see the further development and increased use of communications technology such as video-conferencing to reduce the need to travel. In addition, the Mayor opposes any further runway capacity at Heathrow due to the adverse noise and air quality impacts already experienced by residents and others in the vicinity. However, he recognises the important role of aviation in providing international connectivity vital for London's economy and believes that strict limits on aviation growth in the London area are not tenable, nor would they be effective with demand shifting to competing aviation hubs.

With this in mind, providing viable alternatives to air travel will be crucial in reducing CO_2 emissions to acceptable levels. The Mayor will therefore support the expansion of competitive rail-based alternatives to aviation, such as high speed rail.

In relation to international travel, Eurostar services currently run non-stop or make only one intermediate stop between St. Pancras International and the Channel Tunnel. They do not currently call at Stratford International. Since 2010, EU policies permit competition for international rail services. This may provide an opportunity to encourage more direct rail services to a range of European destinations and utilise Stratford International station.

To encourage use of rail over air for domestic travel, the Mayor supports the development of a national high speed rail network and will work with DfT, Network Rail, High Speed 2 Ltd and other transport stakeholders to ensure that the main London terminal for any new high speed line is centrally located, well connected to the existing public transport network, and widely accessible to maximise access to jobs and London's population. It is

currently considered that Euston best meets these criteria. Further analysis is required to determine what level of additional onward capacity is required at Euston to ensure that the benefits gained from High Speed 2 (HS2) are not offset by longer journey times for onward underground journeys. The Mayor commends the role that Old Oak Common can play in the initial phase in providing a convenient link from HS2 to Heathrow. He is also supportive of the proposals to access Heathrow by a high speed spur upon implementation of Phase 2 of High Speeds (to Leeds and Manchester).

The Mayor also supports further development of the Copenhagen Accord to deliver a binding international agreement to tackle emissions from aviation and shipping.

Policy 10 has set out actions aimed at reducing the need to travel and encouraging a switch to more carbon efficient modes of transport. However, further CO_2 emissions reductions can be made through more efficient operation of transport.

POLICY 11: MINIMISING CO_2 EMISSIONS THROUGH MORE EFFICIENT OPERATION OF TRANSPORT

Vision

By 2025 individuals, freight operators, and public transport operators are cutting their fuel costs by driving and operating vehicles in the most fuel-efficient ways, improving vehicle maintenance, and through smoother traffic flows.

Vision to policy

The Mayor, working through TfL and with boroughs and partners, will minimise CO_2 emissions from transport through improving driving techniques on public transport, supporting individuals and freight operators on fuel-efficient driving, and smoothing traffic flows.

Policy to action

a) Rolling out eco-driving techniques on public transport

- **Action 11.1 -** The Mayor, through TfL, will roll out automatic train operation across the London Underground network.

- **Action 11.2 -** The Mayor, through TfL, will reduce emissions from vehicles over which he has influence by: implementing eco-driving training for bus drivers and GLA

group drivers; introducing by the end of 2011 a requirement that all new taxi drivers must undertake a mandatory eco-driving course before becoming licensed; and working with the private hire vehicle industry to introduce eco-driving training from 2012.

- **Action 11.3 -** The Mayor will make London a no-idling zone for parked vehicles, with a particular focus on buses, coaches, taxis, private hire vehicles and delivery vehicles. He will work with boroughs and other stakeholders to target locations where idling is a particular problem, gathering information on persistent idling vehicles, providing a mechanism for reporting problem idling, and improving enforcement.

b) Enabling Londoners to reduce fuel consumption by raising awareness of the impact of driving style and vehicle maintenance

- **Action 11.4 -** The Mayor will promote smarter travel measures aimed at encouraging eco-driving practices and better vehicle maintenance to all drivers to reduce CO_2 emissions, including by supporting government initiatives such as the Act On CO_2 campaign.

c) Sharing best practice on fuel-efficient freight operations, driving style and maintenance

- **Action 11.5 -** The Mayor will continue to support the Freight Operator Recognition Scheme and aim for 50 per cent of heavy goods vehicles and vans serving London to be members of the Scheme by 2016.

- **Action 11.6 -** The Mayor will continue to support the introduction of consolidation centres and break-bulk facilities where appropriate, especially at Strategic Industrial Locations, and encourage more off-peak freight movement.

- **Action 11.7 -** The Mayor will develop the London freight information portal to improve the performance of freight operators, boroughs and TfL.

d) Smoothing traffic flow

- **Action 11.8 -** The Mayor, through TfL, will optimise the operation of traffic signals, provide enhanced driver information, provide effective co-ordination of planned roadworks through the London Permit Scheme and Mayor's Code of Conduct for Roadworks, and progress the development of a lane rental scheme for roadworks.

a) Rolling out eco-driving techniques on public transport
The first way of operating vehicles more efficiently will be through improving driver techniques on public transport. Driving style can have a significant impact on fuel consumption and CO_2 emissions. The Mayor is keen to demonstrate this using the public transport fleet. Through TfL, the Mayor will introduce further automatic train control (a tool that helps drivers to optimise energy efficiency through driving style) across the London Underground network.

In addition, TfL is implementing efficient driver training for bus drivers and operators of GLA group vehicles. TfL will also work with bus operators to promote best practice of monitoring driving performance and emissions, such as through new on-board systems.

The Mayor, through TfL, will introduce by the end of 2011 a requirement that all new taxi drivers must undertake a mandatory eco-driving course before becoming licensed, which can help drivers use their vehicles more economically, at no cost to themselves. The Mayor will work with the taxi trade to encourage and incentivise existing drivers to take such courses and promote efficient driving techniques to reduce emissions. In addition, the Mayor, through TfL, will work with the Private Hire Vehicle (PHV) industry to introduce eco-driving training from 2012 to promote efficient driving techniques to reduce emissions.

The Mayor, working with boroughs, bus operators and other organisations, will also establish a no-idling zone throughout London. Within this zone, there will be a focus on buses, coaches and taxis, as well as particular problem areas such as around schools, transport interchanges and tourist attractions. The Mayor will work with boroughs to raise awareness of the problems associated with vehicle idling, through awareness campaigns and on-street signage, interventions and enforcement.

b) Enabling Londoners to reduce fuel consumption by raising awareness of the impact of driving style and vehicle maintenance
In addition to improving driving techniques on public transport, TfL has run a two-year Smarter Driving campaign to communicate clear, practical methods to improve fuel efficiency. The Mayor is also supportive of measures that encourage eco-driving practices and better vehicle maintenance to all drivers to reduce CO_2 emissions, such as government's Act On CO_2 campaign.

c) Sharing best practice on fuel-efficient freight operations, driving style and maintenance
Although the Mayor, through TfL, will work to encourage the avoidance of unnecessary freight movement and encourage movement by rail and water, most freight will continue to be carried by road[ix]. As freight accounts for 17 per cent of all London's traffic and is the second largest user by mode on London's streets, reducing CO_2 emissions from road freight through more efficient operation is vital.

To encourage this, the Mayor will support the Freight Operator Recognition Scheme (FORS), an industry-led scheme that provides driver programmes promoting safer and more fuel-efficient operations through better driver behaviour. The Mayor will aim for 50 per cent of HGVs and vans serving London to be members of FORS by 2016. FORS members are being encouraged to progress to gold status, which is awarded to freight operators who can demonstrate continuous self-improvement and can deliver mandatory environmental savings and a reduction in safety incidents.

The Mayor will also encourage, in consultation with boroughs, more off-peak freight movement and support the introduction of consolidation centres and break-bulk facilities where appropriate, especially at Strategic Industrial Locations. These are sites where vehicles unload materials and goods (often for retail) to more appropriately-sized vehicles for transport to their final destination.

The Mayor will also work with London boroughs, the freight industry, and other stakeholders to develop the London freight information portal, which will exchange information on encouraging better driver behaviour, reducing freight operators' administrative costs, and enhancing freight journey planning to improve the performance of freight operators, boroughs and TfL.

d) Smoothing traffic flow
The final area of action the Mayor will address to encourage the more carbon efficient operation of vehicles is through smoothing traffic flow. Stop-start traffic conditions and congestion lead not only to unreliable journey times, but also to increased CO_2 emissions. Better management of London's road network and driver information will enable a smoother flow of traffic and ultimately cut CO_2 emissions, for any given volume of road traffic.

The Mayor, through TfL, and working with boroughs, the Highways Agency and other stakeholders is implementing a package of measures to smooth traffic flow and improve

journey time reliability for road users. This includes optimisation of traffic signal timings, a trial of pedestrian countdown at traffic signals, removal of unnecessary signals, a trial of access to bus lanes for motorcyclists, targeted road network improvements, effective 24/7 response to incidents and events, improved planning and implementation of roadworks, and provision of enhanced driver information.

The Mayor will also actively seek to minimise the impact of planned works and events on the road. This will be achieved through measures such as improved coordination, control, and management of roadworks using LondonWorks which shows the location of all works on its roads and the surrounding network. The Mayor's London Permit Scheme (LoPS) that was launched in January 2010 will also help to achieve this. This governs when works can take place, the length of time allocated, and the time of day when roads are available to contractors, as well as specifying penalties for not keeping to the agreed restrictions. Initially covering the roads managed by TfL and 16 London boroughs, two further boroughs joined the scheme in April 2010 and seven more boroughs received approval from the DfT to join the scheme in summer 2011. The Mayor is seeking to extend this permit scheme to the whole of the capital.

In addition, TfL is developing the concept of lane rental charges for organisations undertaking works, to reflect the value of their temporary possession of road capacity (in terms of the cost of delay to the road-user). Any such scheme relies on parliamentary changes and will not commence before Spring 2012.

The previous two policies in this chapter have focussed on switching to more carbon efficient modes of transport and operating vehicles in more fuel-efficient ways. The final policy in this chapter looks at how CO_2 emissions can be reduced through the use of low carbon technologies and fuels.

POLICY 12: MINIMISING CO_2 EMISSIONS FROM TRANSPORT THROUGH THE USE OF LOW CARBON VEHICLES, TECHNOLOGIES AND FUELS

Vision

By 2025, London is a recognised leader in the mass-market uptake of low carbon transport vehicles and fuels, and the electric vehicle capital of Europe. CO_2 emissions are minimised through the use of low carbon vehicles and technology, including electric and hydrogen-fuelled vehicles, and sustainable biofuels.

Vision to policy

The Mayor, through TfL and working with boroughs and partners, will invest in, incentivise, and encourage the development and use of low carbon vehicles, including electric vehicles, hydrogen-fuelled vehicles, and low carbon buses.

Policy to action

a) Working with partners to support and encourage the uptake of ultra-low carbon vehicles in London

- **Action 12.1 -** The Mayor will work with partners to reach the milestone of 100,000 electric vehicles on London's streets as soon as possible. The Mayor aims to lead by example and introduce electric vehicles into the GLA group fleet, and will encourage London boroughs and private fleet operators to follow suit.

- **Action 12.2 -** The Mayor will work with partners, aiming to deliver a network of at least 1,300 publicly accessible charge points by 2013, with the aim of no Londoner being more than a mile from a publicly accessible electric vehicle charge point.

- **Action 12.3 -** The Mayor will catalyse the uptake of electric vehicles by working through the London Electric Vehicle Partnership, the Mayor's Electric 10, and integrating with the nationwide Low Carbon Vehicle Partnership, the global C40 Electric Vehicle Network, and other partners.

- **Action 12.4 -** Through the London Plan, the Mayor will propose minimum levels of charge points in new developments.

- **Action 12.5 -** The Mayor will work with the London Hydrogen Partnership, London boroughs and through the GLA group to deliver the Hydrogen Action Plan. This includes the ambition to deploy up to 150 hydrogen-powered vehicles in the capital by the end of 2012. Delivery of this will be dependent on market conditions.

- **Action 12.6 -** Working through TfL, the Mayor will deliver 300 hybrid buses by the end of 2012, and work with manufacturers and operators to reduce costs of new low carbon buses to maximise the number entering service in London after 2012. The New Bus for London will also be hybrid, with fuel consumption expected to be nearly 40 per cent better than a conventional diesel double decker bus and 15 per cent better than existing hybrid double decker buses.

- **Action 12.7 -** The Mayor will collaborate with the taxi manufacturing industry to develop an affordable taxi capable of zero emission operation by 2020. To this end, the Mayor will work with manufacturers to ensure that all new taxis available by 2015 have 60 per cent better fuel economy than vehicles produced in 2010.

- **Action 12.8 -** The Mayor will support the implementation of pricing differentials, based on vehicle emissions, for resident parking permits and parking charges.

- **Action 12.9 -** The Mayor will encourage the use of low emission vehicles within car clubs, including working with car clubs and boroughs to deliver charge points for car club electric vehicles.

b) Using low carbon technologies to reduce CO_2 emissions from transport infrastructure

- **Action 12.10 -** The Mayor will encourage further investment to complete the electrification of London's rail network.

- **Action 12.11 -** The Mayor will encourage further regenerative braking on London's rail networks and work towards achieving regenerative braking across the entire London Underground network.

- **Action 12.12 -** The Mayor will convert London's traffic signals to Light Emitting Diode (LED) technology and investigate the use of LED and innovative lighting technology within tunnels on the TfL Road Network, as well as within subways and street lighting.

c) Promoting the use of sustainable biofuels

- **Action 12.13 -** The Mayor will promote the use of sustainable biofuels that can demonstrate substantial CO_2 and air quality pollutant emissions savings over fossil fuels, including developing, supporting and promoting partnerships and trials, leading to the advanced development, commercialisation and market penetration of sustainable biofuels.

a) Working with partners to support and encourage the uptake of ultra-low carbon vehicles in London

The Mayor, through TfL, and working with London boroughs and other stakeholders, will enable and support the development and mass-market uptake of ultra-low carbon road vehicles, including electric, hydrogen-fuelled and plug-in hybrid vehicles. This will include delivery of infrastructure required for the distribution of alternative transport fuel sources. The Mayor recognises the rapid evolution of fuel and vehicle technologies, and will continually evaluate the case for different options.

Electric vehicles

There are currently around 2,100 electric vehicles registered for the London electric vehicle congestion charging discount, and over 400 charge points in London. The Mayor is committed to a step-change in the number of electric vehicles and in May 2009 launched the Electric Vehicle Delivery Plan for London. It details his plans to make London the electric vehicle capital of Europe, including an aim to have 100,000 electric vehicles on London's streets as soon as possible. The achievement of this will be dependent upon further market development to bring down the costs of these vehicles.

To catalyse the market for electric vehicles the Mayor is working through the London Electric Vehicle Partnership, the Mayor's Electric 10^{x}, and integrating with the nationwide Low Carbon Vehicle Partnership and the C40 Electric Vehicle Network.

To support the uptake of electric vehicles including cars, vans, motorcycles, scooters, and bicycles the Mayor, through TfL, is aiming to work with partners to deliver at least 1,300 networked, publicly accessible charge points by 2013 at supermarkets, in public car parks and transport hubs, and at retail and leisure facilities. The Mayor's aim is for no Londoner to be more than one mile from a publicly accessible charge point. In February 2011 the Office for Low Emission Vehicles awarded the TfL-led public and private London consortium £9.3 million from the Plugged in Places grant fund to install these charge

points. TfL is also working with businesses and other organisations to promote installation of workplace charge points.

In 2010, the Mayor launched a one-stop website for electric vehicles at www.sourcelondon.net, and in 2011 TfL launched Source London, a new Londonwide scheme to provide a single point of access to the public network of electric charge points. Electric vehicle drivers previously registered in every borough they charged their vehicles in. Source London instead brings together publicly accessible charge points in London into one network. Registered members of Source London are able to use any of the publicly accessible charge points on the network, identified by the Source London brand. One-hundred-and-fifty new charge points were included in the network at its launch and TfL is working with boroughs and the private sector to roll the 250 existing charge points into the new Source London network.

In addition, through the London Plan, the Mayor has proposed requirements for the provision of charge points in new developments, including a requirement for charge points, or wiring for future charge point installation, to be provided. Table 8.1 sets out these requirements for different uses. More information is also available in the London Plan.

Table 8.1: Electric vehicle requirements for new development

Use	Percentage of parking spaces with charge points (installed)	Percentage of parking spaces wired for charge points (passive provision)
Retail	10 per cent	10 per cent
Employment	20 per cent	10 per cent
Residential	20 per cent	20 per cent

Source: London Plan

The Mayor is aware that policies and actions to increase uptake in electric vehicles in London can lead to an increased demand for electricity. However, studies[xi] confirm that the demand generated by electric vehicles can be met without substantial additional generating capacity provided that the demand for charging is managed and targeted at off-peak periods where there is currently surplus capacity. For more information on electric vehicles, please see the case study in box 8.3.

Box 8.3 Case study - Electric vehicles

Electric vehicles have been identified as a particularly promising way to reduce emissions of CO_2, air pollutants, and noise from road vehicles and reduce dependence on fossil fuels.

The inherent advantage of an electric motor is that typically around 90 per cent energy conversion efficiency is achieved, as opposed to around 20 per cent with internal combustion engines. CO_2 emissions associated with electric vehicles are ultimately determined by electricity generation. Currently electric vehicles account for around 40 per cent less CO_2 per kilometre than an equivalent petrol or diesel car when considering the whole lifecycle emissions (which factors the refining and distribution of petrol and diesel). As electricity generation becomes more efficient, the carbon efficiency of electric vehicles will improve further.

Plug-in hybrid, extended range electric, and pure electric vehicles that offer the performance of conventional vehicles will be available on the mass-market in the coming years. Plug-in hybrid and extended range electric vehicles will generally have an electrical range sufficient for a typical household's routine daily use, with the ability to use fossil fuel power on longer journeys. The uptake of electric vehicles in London is a Mayoral priority, not only for CO_2 emissions reduction reasons, but also for air quality benefits.

Electric vehicle on the streets of London

Hydrogen-fuelled vehicles

In addition to electric vehicles, the Mayor is also considering the role of other ultra-low carbon vehicles and fuels. For example, hydrogen-fuelled vehicles have the potential to play an increasingly important role over the longer term. To support this technology the Mayor is working with the London Hydrogen Partnership, London boroughs and the GLA group to unlock funding through the EU Joint Technology Initiative and the private sector for the rollout of hydrogen-related transport applications.

London has already carried out a three-year demonstration of three hydrogen-powered buses, and in 2010, the Mayor launched the first of eight hydrogen buses in the capital. These will all be deployed by the end of 2011, by which point the entire RV1 route will be operated by zero-emission hydrogen technology (please see the case study in box 8.4 for further information).

The Mayor aims to deploy up to 150 hydrogen-powered vehicles in the capital as well as the refuelling infrastructure to support them. The Mayor's ambition is for these vehicles to be deployed by 2012. The achievements of this will be dependent on market conditions, and the Mayor's plans to work with industry and the GLA group fleet to catalyse the market are set out in the London Hydrogen Action Plan.

Low carbon bus fleet

The Mayor also supports hybrid vehicles as a stepping-stone towards vehicles that are zero emission at point of use. Hybrid vehicles are already becoming widely available and can offer CO_2 reductions of about 30 per cent. TfL plans to deliver 300 hybrid buses by the end of 2012, having benefited from three grants totalling £13 million from government's Green Bus Fund. The pace of the rollout of hybrid buses beyond 2012 will be dependent on funding being available and the rate at which vehicle production costs fall as volumes increase. TfL will work closely with bus operators and manufacturers to maximise the number of hybrids introduced after 2012.

In addition, the New Bus for London, expected to be on London's streets in early 2012 will be hybrid. It is predicted that fuel consumption on this bus will be approximately ten miles per gallon (28 litres per 100km), which is nearly 40 per cent better than a conventional diesel double decker bus and 15 per cent better than existing hybrid double decker buses. The version of the New Bus for London that is being tested is only intended to operate on the busy routes through central London, but the potential of its

environmental technology is that if rolled out across the entire fleet of London buses, it could potentially reduce CO_2 emissions in the capital by 230,000 tonnes a year.

Box 8.4 Case study - Hydrogen buses

The Mayor is proving the viability of the next generation of hydrogen buses, with the help of funding from DECC and the European Clean Hydrogen in Cities project. The new hydrogen buses produce only water vapour and no other harmful emissions. They will further enhance what is already one of the cleanest bus fleets in Europe.

The aim is to prove the ability of these hydrogen buses to withstand the demanding rigours of London's bus operations. The buses run 20 hours a day, seven days a week, offering a clean and quiet ride to London's passengers.

The buses travel along London's high-profile RV1 route, which runs from Covent Garden to Tower Gateway. Having a busy central London route running entirely on hydrogen provides a fantastic flagship fleet to demonstrate the massive benefits of this exciting fuel.

One of the new hydrogen buses running on route RV1 in London

Cleaner taxis

The Mayor believes that London's taxi fleet can and should lead the world in moving towards a zero emission future. He will work with the trade and manufacturers to create a viable road map to this end. The taxi must be affordable for drivers and enhance the passenger experience. The aim is to produce a taxi with a 60 per cent improvement in fuel economy by 2015 (based on current levels) and capable of zero tail pipe emission operation by 2020.

There are a variety of promising propulsion and power technologies which could see hybrid, plug-in electric, full electric, and fuel cell taxis on London's roads in the future. The Mayor will work with the vehicle manufacturing industry to develop zero emitting vehicles that are suitable as PHVs by 2020.

Incentives

The Mayor, through TfL, has exempted low emission vehicles from the central London Congestion Charge Zone. To offer further incentives to switch to lower carbon vehicles, the Mayor will work with boroughs to encourage the implementation of pricing differentials, based on vehicle emissions, for resident parking permits and parking charges.

With London a national leader in the development of car clubs, and with a rapidly growing membership of more than 140,000 people, the Mayor will encourage the introduction of ultra-low carbon vehicles to their fleets and, through TfL, will work with car clubs and boroughs to deliver charge points for car club electric vehicles.

b) Using low carbon technologies to reduce CO_2 emissions from transport infrastructure

In addition to the use of low carbon vehicles, CO_2 savings can also be made through use of low carbon infrastructure and technologies.

The majority of London's rail-based public transport networks are electrified. To cut CO_2 emissions further, the Mayor will call for additional investment to complete electrification of London's rail network, including the Gospel Oak to Barking line. The decarbonisation of the electricity supplying this network (as explained in chapter 4 of this strategy) will further reduce CO_2 emissions.

The Mayor, through TfL, will also work with Network Rail and the DfT to provide further regenerative braking on London's rail networks and across the entire London Underground network. Regenerative braking transfers electricity produced while braking to the power supply network for other trains to use. Regenerative braking typically provides around 15 per cent CO_2 savings, is a feature on a number of recently introduced rail fleets, and is now standard on all new electric-powered rail rolling stock.

In addition to the approximately 100 sets of traffic signals already operating Light Emitting Diode (LED) technology, TfL will convert all traffic signals to LED technology. TfL is also investigating the use of LEDs in street lighting. In June 2011, LEDs were installed in the Upper Thames Street tunnel, cutting CO_2 emissions from the lighting by

more than 60 per cent compared with conventional systems and delivering a potential annual saving of at least £40,000. The innovative lights are also expected to last for 20 years as opposed to the existing system's two-year life span, significantly reducing the need for maintenance closures. The lights are also designed to improve visibility for cyclists and motorists to boost safety.

TfL will closely monitor the LED lighting system over the coming months to validate the new technology, while investigating where else LED and innovative lighting technology could be introduced within the other 12 tunnels on the TfL Road Network, as well as within subways and street lighting. Subject to funding, it is hoped that further schemes can be developed across London, delivering further benefits to road users across the capital.

TfL will also actively seek to reduce CO_2 emissions from street lighting, traffic signals and transport infrastructure where practicable and cost effective through the specification of energy efficient products and materials with low embodied carbon.

c) Promoting the use of sustainable biofuels
Biofuel use has been widely promoted as a measure that will reduce CO_2 emissions, and national and European legislation has been enacted to encourage its use (please see box 8.1). However, there are still concerns over the sustainability of sources of the raw materials used to produce biofuels, the potential for negative economic, social and environmental impacts from their production, and the lifecycle emissions associated with their production and use.

In its fourth carbon report, the UK Committee on Climate Change advocated limited biofuel adoption rates, as recommended by the Gallagher Review, with biofuels complementing other alternative fuels, such as electric vehicles, by 2020 rather than displacing them[xii].

In recognition of this, the Mayor is supporting the use of sustainable biofuels that:

- can demonstrate substantial CO_2 emissions and air quality emissions savings over fossil fuels

- represent the best and most cost effective means of reducing transport CO_2 emissions and improving air quality

- exceed the minimum requirements set out by UK and European legislation, including the UK government's Renewable Transport Fuels Obligation and the sustainability criteria that apply to biofuels and bioliquids within the Renewable Energy Directive and the GHG saving requirements of the Fuel Quality Directive

- do not bring about harmful land-use change, and promote sustainable use of land and other resource

- avoid negative economic, social and health impacts and harms.

A number of biofuels currently exist and are at various stages of development. At present, in addition to electric vehicles and hydrogen-fuelled vehicles, biodiesel has potential applicability across all transport modes, with biomethane also a potential for some modes and uses. As these fuels, and other fuels, are in early stages of development, the Mayor's approach is not to prescribe specific biofuels or to rule out specific alternative fuels from being considered at any point up to 2020.

Instead the Mayor will develop, support, and promote partnerships and trials leading to the advanced development, commercialisation, and market penetration of sustainable biofuels. The Mayor's action, support and promotion will focus on biofuel pathways that deliver practical, prompt, cost effective, tangible and long-term benefits.

The Mayor is already using this criteria to support biofuel pilot projects through the Food Waste to Fuel Alliance. The Alliance is a brokerage service that seeks to bring together technology providers, energy companies and food waste producers in cross-sector delivery partnerships to develop new food waste treatment infrastructure, including projects that can provide renewable transport fuel. The Alliance includes representatives from LWaRB, TfL, British Airways, BAA, Sainsbury's and Keystone Distribution.

The Alliance is developing a number of projects. One example is a waste-to-biojet fuel project by British Airways and their partners Solena. The project involves the conversion of 500,000 tonnes of waste feedstock (including food waste) into jet fuel. If the project is successful in being taken forward, 16 million gallons of fuel could be produced per year, enough twice over to fuel all of British Airways' flights from London City Airport. It would also generate 20MW of surplus energy and showcase London as a leader in an airline emissions solution.

The Alliance is also supporting a used-cooking-oil-to-fuel project by a London-based courier and taxi company. The company's ambition is to be able to collect oil free-of-charge from London businesses, process the oil and then use all the oil produced within one or more of their service fleets.

In addition, the Mayor is supporting a trial of biomethane fuel for refuse collection vehicles developed by the London Borough of Camden, Veolia Environmental Services Ltd, Iveco and Gasrec (please see box 8.5 for further details).

Box 8.5 Case study - Biomethane trials in the London Borough of Camden

Over 2008 and 2009, the London Borough of Camden conducted desk-based research and field trials in partnership with Veolia Environmental Services Ltd, Iveco and Gasrec on the use of biomethane gas in one of Veolia's compressed natural gas refuse collection vehicles. The trial investigated the performance of the biomethane-fuelled vehicle in comparison with existing vehicles running on compressed natural gas, and compared air pollution emissions. The project demonstrated that biomethane gas is a commercially competitive and environmentally-sound fuel that can be directly substituted for natural gas. As a result of the positive outcome of the trial and research project, the London Borough of Camden introduced 15 compressed biomethane vans in December 2010 manufactured by VW Caddy and Mercedes Benz. The Mayor is now working with the London Borough of Camden to see how their efforts can be built upon to fulfil the potential for London to use this fuel more widely.

8.7 Reducing CO_2 emissions from London's transport through further Mayoral, borough and government action

The policies and actions in this chapter have set out the Mayor's committed action to reduce CO_2 emissions from London's transport. However, reaching the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025 will require further activity. This section therefore sets out further Mayoral, government, and/or borough action to reduce CO_2 emissions from transport. These are not committed actions, and will only be deliverable if there is further support, including funding from government and the private sector. Opportunities include:

- Encouraging government to continue to invest in London's public transport, cycling and walking infrastructure beyond the current committed investment programmes to ensure a continuing shift to sustainable modes of transport.

- Encouraging early adoption of the EU target of an average 95g CO_2/km for new cars by government, and encouraging the EU to implement similarly stretching levels for vans and other vehicle types.

- Reviewing the option of road-user charging and/or regulatory demand management measures to influence a shift to more carbon efficient private and commercial road vehicles and to lower carbon travel options such as walking, cycling and public transport. The Mayor has made clear his view that he does not envisage carrying out this review during his term of office.

- Encouraging government and other stakeholders to establish a package of integrated incentives across national, regional and local government to ensure low carbon road vehicles are priced competitively with conventional technology, and therefore overcome the upfront financial barriers to uptake. The five-year exemption of electric vehicles from company car tax, and the grant of up to £5,000 to facilitate the purchase of ULEVs was a welcome step, but more will be required to achieve a mass-market shift to low carbon vehicles by private buyers. Government funding for the purchase incentive for electric and plug-in hybrid vehicles, and for the introduction of a comprehensive network of charging facilities, needs to be significant enough to encourage a sufficient uptake of low carbon vehicles. Despite initial higher purchase costs of electric vehicles being offset by running costs in the lifecycle of the vehicle, the gap in the cost of a standard vehicle and an electric alternative is a very significant obstacle to market development.

- Encourage government to take active steps towards ensuring a standard for electric vehicle charging infrastructure, in order to ensure access to, and inter-operability between, charge points installed across the UK.

- Introduction of Zero Emission Zones. These would be areas where intensive measures are introduced. This would include reducing the need to travel by careful land use planning, and highly integrated with public transport provisions. Extensive cycling facilities would be introduced and a pedestrian-friendly public realm. Provision for cars would be limited except for electric vehicles, with large numbers of charge points.

The Mayor's Transport Strategy set out a 2025 target range for reducing London's emissions from transport to between 4.6 and 5.3 $MtCO_2$. Assuming that a mid-point in

this range is delivered, London's CO_2 emissions from transport will be reduced by 1.07 $MtCO_2$ by 2025.

8.8 Reducing CO_2 emissions from London's transport through further government action

The above committed Mayoral and government action, along with further Mayoral action and on top of the BaU, will reduce emissions from London's transport by 3.81 $MtCO_2$. However, further government action will also be required to contribute to meeting the Mayor's target to reduce London's CO_2 emissions by 60 per cent of 1990 levels by 2025.

It will require government to adopt more ambitious CO_2 emission reductions, as recommended by the Committee on Climate Change. This includes reducing the carbon intensity of electricity from the grid that supplies London's transport to 200g CO_2/kwh, and increasing the uptake of electric vehicles. If these measures were to be adopted, they would further reduce CO_2 emissions from London's transport by 0.71 $MtCO_2$ per year.

8.9 Implementing Mayoral policies and actions

Annex A of this document sets out the projected CO_2 emissions reductions, by source, as a result of activities in the transport sector, along with assumptions for expected CO_2 emissions reductions. Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter.

Endnotes

[i] The 2008 LEGGI currently includes CO_2 emissions from the use of electricity associated with transport in the workplaces sector. For the purposes of this strategy, these emissions have been transferred to the transport sector to reflect their source and also the policy areas that can reduce them.

[ii] This includes actions the Mayor encourages other bodies or persons to take.

[iii] The most recent CO_2 measurements for London are from the LEGGI 2008.

[iv] This strategy uses the CO_2 emissions reductions from the previous government's Low Carbon Transition Plan for committed government action.

[v] Society of Motor Manufacturers and Traders, New Car CO_2 Report 2010 (2010)

[vi] TfL, Travel in London Report 3 (2011)

[vii] UK Committee on Climate Change, Meeting carbon budgets - the need for a step change (2009)

[viii] Defra (2009)

[ix] Eighty-nine per cent of freight is lifted by road and is likely to remain so, due to fragmentation of supply chains, for example just-in-time internet shopping and door-to-door delivery.

[x] The Electric 10 consists of a working group of organisations in London already using electric fleet vehicles on a daily basis in the capital, which have agreed to work with the Mayor to promote the uptake of commercial electric vehicles. Although the group was originally ten strong, membership is growing and currently sits at 19.

[xi] UK Committee on Climate Change (2010)

[xii] UK Committee on Climate Change, The Fourth Carbon Budget - Reducing emissions through the 2020s (2011)

CHAPTER NINE

SETTING AN EXAMPLE THROUGH THE GLA GROUP

SUMMARY

Vision

By 2025, the GLA group is continuing to take a lead on reducing CO_2 emissions. It is setting an example for the rest of London's public sector, minimising CO_2 emissions from the use and supply of energy in existing and new buildings, and minimising CO_2 emissions from its use of transport. It is actively stimulating markets for low carbon products and services through its procurement choices, and taking a lead on reducing its indirect CO_2 emissions. Through this it is demonstrating to the rest of the public sector that major savings can be made in ambitious timescales.

The Mayor will contribute towards the achievement of this through the following policies:

- **Policy 13 - Setting challenging CO_2 emissions reduction targets, and measuring and publicly reporting CO_2 emissions -** The GLA group will measure and set targets to reduce its CO_2 emissions, as well as publicly reporting progress against its targets.

- **Policy 14 - Minimising energy use and CO_2 emissions from GLA group buildings -** The Mayor will work with the GLA group to retrofit existing buildings with energy efficiency measures, construct new buildings to high CO_2 emissions reduction standards, and utilise decentralised energy supply, including becoming heat customers for locally developed projects.

- **Policy 15 - Minimising CO_2 emissions from transport in the GLA group -** The Mayor will work with the GLA group to avoid unnecessary travel, use the most carbon-efficient modes of transport, improve the operational efficiency of its fleets and procure low emission vehicles.

- **Policy 16 - Minimising indirect emissions and stimulating markets for low carbon goods and services -** The Mayor will work with the GLA group to measure CO_2 emissions in its supply chain, procure low carbon products and services, share best practice on procurement, and support organisations in its supply chains to reduce their CO_2 emissions.

CO_2 emissions from the GLA group

- Current emissions from the GLA group are around 224,000 tonnes of CO_2 per year.

9.1 Introduction

The previous chapters in this strategy have addressed how CO_2 emissions across London's sectors will be minimised. This chapter focuses on how the GLA group is taking a lead across these sectors by minimising CO_2 emissions from its own operations. This includes CO_2 emissions from the use of energy in its buildings, its use of transport, and its purchasing decisions. Whilst the CO_2 impact of the GLA group is small in the context of London overall, it provides an opportunity to set an example and encourage the public, private and third sectors to follow its lead.

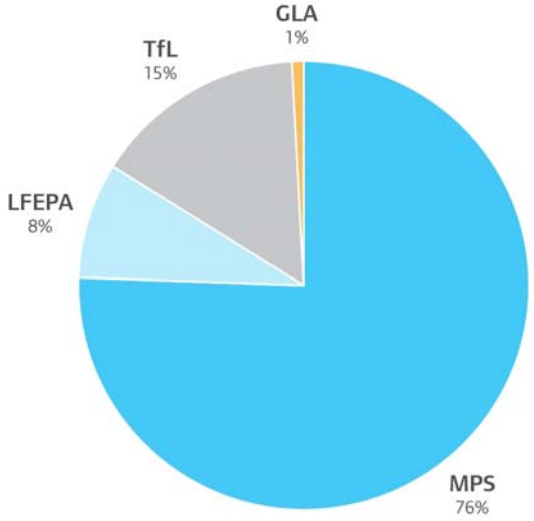
9.2 Current CO_2 emissions from the GLA group

The GLA group comprises the Greater London Authority and its four functional bodies: Transport for London (TfL), The London Development Agency[i] (LDA), the London Fire and Emergency Planning Authority (LFEPA) and the Metropolitan Police Authority (MPA) (to which the Metropolitan Police Service is accountable[ii]). As the LDA will cease to exist from 1 April 2012, its operations are not included within the scope of this chapter. However, it is the Mayor's aim that any future bodies that fall within the GLA group will be subject to the policies and actions in this chapter.

The GLA group functional bodies are diverse in their operations, size and in what they deliver. In total, the GLA group employs around 87,000 staff, occupies over 1,000 buildings with a combined floorspace of around 1,400,000 m^2, and has nearly 7,000 vehicles in its fleet. The GLA group emitted around 224,000 tonnes of CO_2 per year in 2009-10, a reduction of around 4 per cent on 2008-09 levels across the group.

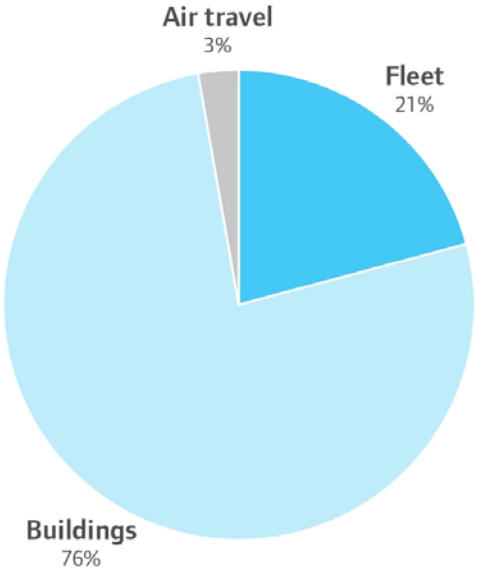
The contribution to the GLA group's overall CO_2 emissions by each of the functional bodies, as shown in figure 9.1, broadly reflects differences in the number of employees, size of estates, and vehicle fleet size, although differences in the operational activities of the organisations also play a role. The CO_2 emissions associated with the operation of public transport, taxis and private hire vehicles are not included within TfL's CO_2 emissions as they are accounted for in chapter 8 of this strategy.

Figure 9.1 Breakdown of CO_2 emissions by GLA group body[iii]



Source: GLA group

Figure 9.2 Breakdown of total CO_2 emissions from the GLA group by source



Source: GLA group

9.3 Reducing CO_2 emissions from the GLA group through Mayoral action

The Mayor's approach is to use the operations of the GLA group to demonstrate the viability of large-scale climate change programmes, and to set an example to the rest of the public sector on reducing CO_2 emissions. As noted in chapter 6 of this strategy,

research shows that households and SMEs are reluctant to take action on installing energy efficiency and microgeneration measures without seeing that government is taking action on it first[iv]. Reducing public sector emissions will therefore help government and local authorities to be credible in leading programmes to reduce CO_2 emissions in other sectors.

The following policies and actions demonstrate how the Mayor will work with the GLA group to minimise CO_2 emissions from their operations.

POLICY 13: SETTING CHALLENGING CO_2 EMISSIONS REDUCTION TARGETS, AND MEASURING AND PUBLICLY REPORTING CO_2 EMISSIONS

Vision

By 2025, the GLA group leads the public sector on the reporting of CO_2 emissions, setting targets to reduce them, and making its annual CO_2 emissions levels publicly available.

Vision to policy

The GLA group will measure and set targets to reduce its CO_2 emissions, as well as publicly reporting progress against its targets.

Policy to action

The Mayor will work through the GLA group to:

- **Action 13.1 -** Set interim CO_2 emissions reduction targets up to 2025 in line with those set in this strategy.

- **Action 13.2 -** Use a comparable methodology for measurement and reporting of CO_2 emissions across the GLA group.

- **Action 13.3 -** Measure and publicly report CO_2 emissions from energy use through the CRC Energy Efficiency Scheme.

- **Action 13.4 -** Investigate how carbon is considered in internal decision-making.

The first step for large organisations, such as those in the GLA group, to effectively manage and reduce their CO_2 emissions is to measure them and understand their sources. The following list provides examples of the significant progress that each functional body has made in this regard:

GLA

- measures its CO_2 emissions
- reports its CO_2 emissions through the GLA website
- achieved the Carbon Trust Standard for measuring, managing and reducing CO_2 emissions and committing to reducing them year-on-year.

LFEPA

- measures its CO_2 emissions
- reports its CO_2 emissions through annual public sustainable development reports
- achieved the Carbon Trust Standard (and was one of the first 12 organisations to pilot the Standard)
- reduced its CO_2 emissions by 22 per cent since 1990.

MPS

- measures its CO_2 emissions
- reports its CO_2 emissions through public environment reports
- achieved a 6.4 per cent reduction in carbon emissions in 2010 against a 2005 baseline.

TfL

- measures its CO_2 emissions
- reports its CO_2 emissions through public environment reports
- head offices and London Underground have achieved the Carbon Trust Standard (London Underground was the first public transport operator to do so).

In order for the GLA group to make its fullest contribution to the Mayor's target to reduce CO_2 emissions by 60 per cent of 1990 levels by 2025, the Mayor has set interim CO_2 emissions targets for the GLA group up to 2025 and expects them to publicly report progress against them.

The targets have been set on the following principles:

- The target applies to each functional body separately.

- The target applies to scope 1 and scope 2 CO_2 emissions[v], as well as those from air travel. This is to reflect the GLA group's ability to reduce direct CO_2 emissions. This does not include TfL's public transport fleet, taxis or private hire vehicles, as these are already accounted for in the transport section of this strategy. Therefore only TfL's support fleets and head office operations, stations, and garages, will be included. The scope of the emissions target will be reviewed and updated in line with national and international guidelines as appropriate.

- Targets are absolute. However, to reflect potential growth of services, the GLA group will also report normalised CO_2 emissions to give context to the overall achievement of its targets.

- The targets mirror the CO_2 emissions targets set in this strategy for the whole of London. These challenging targets reflect the GLA group's leading role in acting as a pilot for exemplar low carbon programmes, and in driving demand for low carbon products and services.

- Targets will be reviewed at least every five years, in line with the publication of this strategy, any successor strategies, and business planning cycles, and will reflect changes in government and Mayoral policy.

- The GLA group will report progress against targets annually in environment and sustainability reports and/or on their websites.

- To reflect that carbon reduction is a fast-changing area, with technological developments and cost implications changing regularly, finalised targets will only be set for five years ahead. However, indicative targets will also be set for ten and 15 years ahead to demonstrate expected progress to be made.

Based on these principles table 9.1 sets out the targets for the GLA group.

Table 9.1 CO_2 emissions reductions targets for the GLA group to 2025

	2015	2020	2025
	20 per cent	**40 per cent**	**60 per cent**
Percentage CO_2 emissions reductions[vi]	10 per cent delivered through GLA group action 10 per cent through government action	25 per cent delivered through GLA group action 15 per cent through government action	37 per cent delivered through GLA group action 23 per cent through government action

These targets are set on current committed government and Mayoral policy in London, as well as further reductions recommended to government by the Committee on Climate Change. For more information on these recommendations and expected government action, please see chapter 2 of this strategy.

To reflect the varying responsibilities for reducing CO_2 emissions, the targets are separated into CO_2 emissions reductions that are within the control of the GLA group, and those that are dependent on government action. To achieve these will therefore require government to deliver on its commitments to decarbonise the National Grid at the required scale, and also adopt the Committee on Climate Change's recommendations to decarbonise the grid further.

The Mayor will work with the GLA group, as part of its business planning cycles going forward, to align and deliver these targets. This will include working to align baselines for targets.

The Mayor recognises that delivery of these targets will depend upon a number of factors including the amount of CO_2 emissions reductions that have already been delivered by individual functional bodies, and their operational requirements going forward. The Mayor also recognises that this action can incur upfront costs. He will therefore work with the GLA group to understand how CO_2 emissions can be reduced across the group, and how these can be financed on an ongoing basis, including by attracting private sector funding.

For example, to contribute to achieving the GLA group targets at its stations, London Underground will be dependant upon the embedding of the outputs from the Low Carbon Station initiative within its station programme, the enhancement of its traction level metering to enable more accurate differentiation between traction and non-traction energy, and the roll out of Automatic Meter Reading (AMR) to all stations.

To support these targets the GLA group is also working to ensure comparability in the measurement and reporting of their CO_2 emissions. The group will adopt government guidance for the measuring and reporting of CO_2 emissions. As well as measuring scope 1 and scope 2 emissions, the group will also commit to measuring scope 3 emissions from air travel.

The Mayor is also continuing to work with the GLA group to investigate how carbon is taken into account in internal decision-making. This will include how the public sector assesses CO_2 and wider environmental impacts as part of investment decisions on major capital projects.

To support the achievement of the GLA group targets, the Mayor has set three policies:

- minimising energy use and CO_2 emissions from GLA group buildings
- minimising CO_2 emissions from transport in the GLA group
- minimising indirect emissions and stimulating markets for low carbon goods and services.

POLICY 14: MINIMISING ENERGY USE AND CO_2 EMISSIONS FROM GLA GROUP BUILDINGS

Vision

By 2025, the GLA group is leading the public sector by minimising CO_2 emissions from the use and supply of energy in existing and new buildings, demonstrating to the rest of the public sector that major savings can be made in ambitious timescales.

Vision to policy

The Mayor will work with the GLA group to retrofit existing buildings with energy efficiency measures, construct new buildings to high CO_2 emissions reduction standards, and utilise decentralised energy supply, including becoming heat customers for locally developed projects.

Policy to action

a) The Mayor will work with the GLA group to continue to lead by example in reducing energy use from existing GLA group buildings, including:

- **Action 14.1 -** Retrofitting GLA group buildings with energy efficiency measures, including through involvement in RE:FIT, conducting regular carbon audits, and implementing recommendations from the audits.

- **Action 14.2 -** Strengthening and further developing environmental awareness programmes for employees to help them use buildings in more energy efficient ways.

- **Action 14.3 -** Reviewing the energy efficiency of equipment as part of building equipment replacement programmes and contract renewal, focusing on energy-intensive equipment where the greatest savings can be delivered.

- **Action 14.4 -** Completing Display Energy Certificates for all GLA group buildings.

b) The Mayor will work with the GLA group to reduce the CO_2 emissions associated with the energy used in, and supplied to, new GLA group buildings and GLA group buildings undergoing major refurbishment, including:

- **Action 14.5 -** Adopting the LDA's Sustainable Design and Construction Standards for new buildings and for major retrofitting of GLA group buildings.

- **Action 14.6 -** Exceeding carbon reduction targets set out in the London Plan for new development, working towards national requirements for zero carbon non-domestic buildings from 2019.

c) The Mayor will work with the GLA group to minimise CO_2 emissions from energy supplied to existing buildings in the GLA group, including:

- **Action 14.7 -** Examining the potential for low and zero carbon microgeneration technologies within existing buildings.

- **Action 14.8 -** Investigating the potential to catalyse local multi-development and area-wide decentralised energy schemes by committing existing buildings to become heat customers for locally developed projects, offering land for energy equipment, and providing assistance, where possible, in project development.

a) Working with the GLA group to continue to lead by example in reducing energy use from GLA group buildings

The GLA group has already undertaken a number of activities to reduce the energy used in its buildings. Fifty-two GLA group buildings have taken part, or are in the process of taking part, in the RE:FIT programme (see chapter 6 for more details) and the functional bodies have undertaken a wide range of additional energy efficiency measures beyond the pilots. A sample of the GLA group's energy efficiency achievements is set out below:

GLA

- installing voltage optimisation technology and smart metering at City Hall
- runs environmental champion challenges for all staff.

LFEPA

- Already retrofitted ten buildings under RE:FIT, reducing CO_2 emissions by 27 per cent in those buildings. Work is now progressing on the next ten which are expected to deliver over 23 per cent savings.
- Installed a variety of energy efficiency measures in addition to RE:FIT, including:
  - lighting controls at 90 per cent of sites
  - high efficiency light fittings at 95 per cent of stations
  - thermostatic radiator valves at 55 sites
  - controllers for drying room dehumidifiers at 113 sites
  - automatic meters to all gas and electricity supplies.

- Set up an energy efficiency revolving fund to recycle utility budget savings into more energy efficiency schemes.

- Provided staff with environment induction training and has over 200 Green Champions.

MPS

- implemented energy efficiency measures at ten RE:FIT pilot sites including photovoltaic (PV) arrays, CHP and building management system upgrades, resulting in annual savings of 2,100 tonnes of CO_2, representing an average reduction of 24 per cent across ten sites

- installing automatic meters to better understand energy use and target savings

- set up an energy revolving fund to support the implementation of further energy efficiency projects

- has developed an organisation-wide environmental awareness campaign including a network of 80 environment champions that is being rolled out further during 2011-12.

TfL

- Undertaken 70 energy efficiency projects in 22 office buildings as part of the RE:FIT programme, saving £555,000 per year and reducing CO_2 emissions by 2,500 tonnes per year. Projects have included:

  - draught-proofing and insulation

  - voltage optimisation

  - new lights with motion and daylight sensors

  - enhanced heating ventilation and cooling and controls.

- A range of energy efficiency measures across TfL's buildings monitored by an extensive network of automated remote utility meters.

- Created "Destination Green", an employee engagement brand for its environmental campaigns. It also sought feedback on the environmental performance of individual

buildings and London Underground stations, and runs a successful environmental champions programme for over 250 employees.

The GLA group will continue to reduce the energy use of its existing buildings, aiming to commit at least 100 buildings to the RE:FIT programme and conducting regular carbon audits and implementing recommendations from the audits (please see chapter 6 for further details on RE:FIT).

To reduce the energy used to power equipment and appliances used in buildings, the GLA group will also review the energy efficiency of equipment as part of building equipment replacement programmes and contract renewal, focusing on energy intensive equipment where the greatest savings for investment can be delivered.

To further reduce unnecessary energy use, the Mayor will work with the GLA group to continue to run environmental awareness programmes for employees, to help them use buildings and equipment in more energy efficient ways.

Finally, to ensure that the GLA group continues to provide a lead to the public sector, the GLA group will complete Display Energy Certificates for all GLA group buildings, including those that fall below the mandatory threshold.

b) Working with the GLA group to reduce the CO_2 emissions associated with the energy used in, and supplied to, new GLA group buildings and GLA group buildings undergoing major refurbishment

The GLA group has already begun to implement high environmental design standards for new buildings and for major refurbishments. Below are examples of some of that activity:

LFEPA

- a new standard Station Design Brief aims for all new fire stations to be BREEAM excellent rated; the new fire station at Harold Hill has achieved this rating

- won a CIBSE Low Carbon Performance Award for Refurbishment of the Year 2009 for its refurbishment of Croydon Fire Station, and a London Borough of Islington Giant Green award for CO_2 reduction.

MPS

- implemented sustainable design guidelines as part of its construction and refurbishment process since 2006

- Croydon custody centre has achieved a BREEAM excellent rating.

TfL

- achieved new build BREEAM excellent rating for Pier Walk building

- achieved BREEAM Excellent ratings for refurbishments at Palestra and Oxford Circus House

- placed runner-up in the Chartered Institute of Building Services Engineers (CIBSE) Low Carbon Performance Awards for Refurbishment of the Year 2009.

To ensure that GLA group buildings are built and refurbished to the highest energy efficiency standards, the Mayor will work with the GLA group to adopt the LDA's Sustainable Design and Construction Standards (and any successor standards) for new buildings and for major retrofitting of GLA group buildings.

The Mayor will also work with the GLA group to exceed carbon reduction targets set out in the London Plan for new development, working towards national requirements for zero carbon non-domestic buildings from 2019.

c) Working with the GLA group to minimise CO_2 emissions from energy supplied to existing buildings in the GLA group

The GLA group has already begun to utilise decentralised energy on its sites. Some examples of this are:

GLA

- installed PVs on the roof of City Hall.

LFEPA

- as a matter of course, installs renewables and CHP during all refurbishments and new builds wherever practical

- installed 27 PV systems with a total installed capacity in excess of 300kWp and 30 micro-CHPs, providing the capacity to generate over six per cent of its electricity from CHP and renewables.

MPS

- the MPS programme to deliver borough-based custody centres includes the implementation of low carbon microgeneration technologies such as ground source heat pumps, hot water solar panels, and PV panels

- achieved 20 per cent renewable energy supply for Leyton, Croydon, and Wandsworth custody centres.

TfL

- installed an innovative fuel cell at Palestra, the largest hydrogen fuel cell CHP system in a UK building, which is expected to reduce CO_2 emissions by over 30 per cent

- installed a wind turbine at West Ham Bus Garage, which will be the largest of its kind in inner London (37 metres), and is expected to reduce CO_2 emissions by 41 tonnes per year

- installed two PV arrays and five solar thermal systems at Head Office sites.

The Mayor will work with the GLA group to continue to maximise the use of decentralised energy by examining the potential for low and zero carbon microgeneration technologies within existing buildings, and investigating the potential for catalysing multi-development and area-wide decentralised energy schemes. This will be achieved by committing to become heat customers for locally-developed projects, offering land for energy equipment, and providing assistance, where possible, in project development.

In late 2011, TfL will set up a framework of suppliers for the installation of solar panels on a number of its properties. The Feed-in Tariff will enable it to benefit from renewable energy at no capital cost. The first installation programme is forecast to be completed by the end of March 2012. In addition, TfL is actively pursuing opportunities to deliver large-scale low carbon energy directly to its network, and is engaged in a procurement exercise which will identify immediate opportunities as well as possible longer-term developments. TfL aims to initiate implementation of the immediate opportunities before the end of 2011-12.

POLICY 15: MINIMISING CO_2 EMISSIONS FROM TRANSPORT IN THE GLA GROUP

Vision

By 2025, the GLA group is leading the public sector in minimising CO_2 emissions from its use of transport.

Vision to policy

The Mayor will work with the GLA group to avoid unnecessary travel, use the most carbon-efficient modes of transport, improve the operational efficiency of its fleets and procure low emission vehicles.

Policy to action

a) The Mayor will work with the GLA group to encourage travel to be reduced where possible, and to switch to more carbon-efficient modes of transport, including:

- **Action 15.1 -** Minimising business car and air mileage.
- **Action 15.2 -** Avoiding all unnecessary air travel and offsetting any remaining air travel.
- **Action 15.3 -** Ensuring the provision of cycle parking facilities in all buildings where practical.

b) The Mayor will work with the GLA group to encourage the use of low emission vehicles in its fleets, including:

- **Action 15.4 -** Working with existing GLA suppliers and reviewing supplier contracts to increase the use of low carbon vehicles.
- **Action 15.5 –** Working through TfL, and in collaboration with London boroughs, stakeholders, and major fleet operators in the GLA group to promote CO_2 standards for vehicles to reduce emissions from existing and new vehicles.

c) The Mayor will work with the GLA group to encourage employees to drive vehicles in a fuel-efficient manner, including:

- **Action 15.6 –** TfL and GLA group employees who drive for work will undergo eco-driver training.

- **Action 15.7 –** Promoting national and regional vehicle maintenance campaigns, such as the Act On CO_2 campaign, to GLA group employees.

a) Working with the GLA group to encourage travel to be reduced where possible, and to switch to more carbon-efficient modes of transport

The Mayor is committed to reducing CO_2 emissions from travel from the GLA group's operations. As a first step, the Mayor will continue to support the GLA group to reduce unnecessary travel and switch to more carbon-efficient modes of travel. Example of how the GLA group has already begun to encourage employees to travel less and to use more carbon-efficient modes of transport include:

GLA

- provides secure cycle parking facilities and showering facilities for employees, as well as a Dr Bike service to repair bikes to promote cycling

- offsets CO_2 emissions associated with air travel.

LFEPA

- has a Travel Plan which aims to encourage more sustainable forms of transport

- promotes sustainable travel such as walking and cycling by linking to national and London-based campaigns such as Walk to Work Week

- encourages employees to cycle by supporting the bike-to-work scheme (which has had over 2,400 orders to date), increasing the number of cycle racks by more than 450, providing showering facilities for employees, and offering a Dr Bike service to staff to repair bikes

- is reviewing car schemes to reduce emissions with a proposal undergoing consultation that would reduce emissions from these vehicles by around 12 per cent.

MPS

- the MPS fleet includes around 2,000 bicycles for use by its officers and staff
- over 6,000 MPS Police Officers and Police Community Support Officers are cycle-trained
- established a national rail booking service to provide easier booking of rail to avoid air travel
- promotes sustainable travel such as walking, cycling and public transport above use of vehicles for business travel and commuting through its environmental awareness activity
- provides free travel for officers on public rail, tubes and buses
- offsets carbon associated with overseas travel and feeds the income generated into an energy efficiency revolving fund to finance MPS energy retrofit projects.

TfL

- has a travel policy which encourages staff to use the most sustainable modes (walking, cycling, and public transport) when travelling on business
- added expenditure controls to its travel policy so that proposed business flights are approved by the Commissioner personally
- has a Travel Plan, analyses employee travel, and promotes flexible working
- offers bike purchase loans, bike servicing, secure cycle parking, and showers
- is making increasing use of video and skype conference calls.

The Mayor will work with the GLA group to minimise business car and air mileage year-on-year. Where air travel is unavoidable, the Mayor will work with the GLA group so that CO_2 emissions associated with those flights can be offset. To encourage the use of more carbon efficient modes of transport, the GLA group will continue to ensure the provision of cycle parking facilities in buildings where practical.

b) Working with the GLA group to encourage the use of low emission vehicles in its fleets
As well as trialling ultra low carbon vehicles, such as electric vehicles, the GLA group is already taking measures to procure lower carbon vehicles into their fleets. Examples of this include:

LFEPA

- specifying that all cars must be within EU emission band B when renewing fleet contracts
- continuing to identify and test opportunities to introduce electric vehicles into the fleet.

MPS

- committed to investing in a clean efficient fleet, including:
  - replacing vehicles with vehicles meeting the latest Euro standards
  - setting emissions limits on general purpose and response/specialist vehicles (120g and 225g CO_2/km, respectively)
  - procuring lower carbon vehicles, such as its fleet of 116 hybrid vehicles.
- led on a feasibility study on behalf of the GLA group to introduce electric vehicles into the GLA group fleet
- engaged in developing the framework for procuring and funding electric and alternatively-fuelled vehicles in London.

TfL

- sets stringent CO_2 limits for all new cars and vans entering the support fleet of 110 g/km in 2011-12, and reduces this limit by 5 g/km each year
- currently runs around 50 petrol-electric hybrid support vehicles
- is a partner in the Department for Transport's Low Carbon Vehicle Procurement Programme and procured four electric vans in 2011, and four electric cars, five plug-in hybrid cars and three plug-in hybrid vans in 2010.

To further stimulate the market for low emission vehicles, the GLA group will work with existing suppliers and review supplier contracts to increase the use of low carbon vehicles in its fleets. The Mayor, through TfL, and working with London boroughs and other stakeholders, will also promote CO_2 standards for vehicles procured by the Mayor and GLA group to reduce emissions from existing and new vehicles.

c) Working with the GLA group to encourage employees to drive vehicles in a fuel-efficient manner

The GLA group is helping employees and contractors to drive vehicles as fuel efficiently as possible. For example, bus drivers and other staff at TfL have undergone the Energy Saving Trust smarter driving course and TfL is looking at further opportunities to roll out training to other members of staff. In addition, the MPS is trialling a bespoke vehicle telemetric system that monitors individual driving styles, behaviours, vehicle performance and use.

To further encourage this, TfL and GLA group employees who drive for work will undergo eco-driver training to both reduce emissions and develop safer driving behaviour. This will initially be targeted at those for whom driving is the primary task in their job. The Mayor will also work through the GLA group to promote national and regional vehicle maintenance campaigns, such as the Act On CO_2 campaign, to employees.

POLICY 16: MINIMISING INDIRECT EMISSIONS AND STIMULATING MARKETS FOR LOW CARBON GOODS AND SERVICES

Vision

By 2025, the GLA group is actively stimulating markets for low carbon products and services through its procurement choices, and taking a lead on reducing its indirect CO_2 emissions.

Vision to policy

The Mayor will work with the GLA group to measure CO_2 emissions in its supply chain, procure low carbon products and services, share best practice on procurement, and support organisations in its supply chains to reduce their CO_2 emissions.

Policy to action

a) The Mayor will work with the GLA group to measure the CO_2 emissions in its supply chains, including:

- **Action 16.1 -** Expanding the number of suppliers included in future measurements of the GLA group's scope 3 emissions.

b) The Mayor will work with the GLA group to source low carbon goods and services, including:

- **Action 16.2 -** Implementing the climate change elements of the GLA group's responsible procurement policy.

- **Action 16.3 -** Stimulating demand for recycled and low carbon products through the Mayor of London's Green Procurement Code.

- **Action 16.4 -** Using the central responsible procurement team to explore the availability of low carbon technologies and products being developed by London-based businesses.

c) The Mayor will work with the GLA group to share best practice on procuring low carbon products and services, including:

- **Action 16.5 -** Making available the contract models that have been developed for procurement of low carbon services through RE:FIT and the electric vehicle programme to the wider public and private sector to significantly increase the ease with which they can procure similar services.

- **Action 16.6 -** Working with the London boroughs, the wider UK public sector, and internationally through partners such as Eurocities, ICLEI and the C40 to actively promote best practice on low carbon procurement, including through the responsible procurement website.

d) The Mayor will work with the GLA group to continue to work with organisations in its supply chain to signpost to best practice, including on energy efficiency by:

- **Action 16.7 -** Continuing to signpost GLA group suppliers to Mayoral climate change mitigation programmes and the Mayor of London's Green Procurement Code.

The GLA group has a spend of over £8 billion[vii] and over 7,000 significant suppliers, from catering and energy suppliers through to transport and construction suppliers. There is therefore potential to reduce CO_2 emissions associated with these supply chains and stimulate demand for low carbon products and services. The GLA group has begun to undertake a number of activities to stimulate the low carbon economy in London. This includes:

- To create the necessary financing models to fund energy efficiency and low carbon transport measures, the MPS and LFEPA have set up revolving funds that recycle financial savings from energy efficiency projects back into future projects. These models can be replicated by other organisations in London to fund their own carbon reduction programmes, helping to overcome barriers associated with cost.

- Through the central responsible procurement team, the GLA group is leading pan-European workstreams on encouraging innovation in sustainable construction through whole-life costing and procurement processes as part of the Sustainable Construction and Innovation (SCI) Network. The SCI Network is part of the European Commission's Lead Markets Initiative to stimulate innovation in member states.

In addition, the GLA group offer further examples of responsible procurement activities:

LFEPA

- working with the Association of Procurement Practitioners in the Fire Service to promote responsible procurement, including leading on the development of sustainable procurement training for other fire and rescue services.

MPS

- acts as the Association of Chief Police Officers' national lead on responsible procurement across UK police forces

- developed a responsible procurement toolkit specifically for the police

- trains key staff on responsible procurement

- chairs the national Police Environment Advisory Group to share best practice and improve the environmental performance of UK police forces.

TfL

- Follows the Mayor's Responsible Procurement Policy and, where it is relevant to contracts, requires that suppliers take measures to reduce CO_2 emissions from the operations they undertake for TfL. For example, some of the contractors delivering Highways maintenance works on TfL's red routes are measuring their carbon footprints and using electric vehicles in their support fleets.

The Mayor aims to continue and grow this activity in the following areas:

a) Working with the GLA group to measure the CO_2 emissions in its supply chains
In addition to measuring scope 1 and 2 emissions, in 2010, the GLA responsible procurement team led a review of scope 3 emissions from some of the GLA's key suppliers, working with the Carbon Disclosure Project. In future, the Mayor will aim to expand the number of suppliers included in future measurements of its scope 3 emissions.

b) Working with the GLA group to source low carbon goods and services
To continue to stimulate demand for low carbon products and services, the GLA group will follow the group's responsible procurement vision, which includes a commitment to promoting greater environmental sustainability through ensuring procurement is low carbon, resource efficient, and environmentally responsible.

The GLA group will also be signatories of the Mayor of London's Green Procurement Code, and will use the central responsible procurement team to explore the availability of low carbon technologies and products being developed by London-based businesses with applicability to its, and London borough, supply chains.

In addition the Mayor will investigate using the procurement power of the GLA group to increase the supply of low carbon energy to London. For example, London Underground is looking to stimulate new low carbon decentralised energy generation in London through engaging in long term energy procurement contracts with suppliers and developers.

c) Working with the GLA group to share best practice on procuring low carbon products and services
As set out in previous chapters of this strategy, the GLA group is acting as a pilot for a number of the Mayor's climate change mitigation programmes, and procuring low carbon goods and services, including electric vehicles and buildings retrofit services. The contract models that have been developed for procurement of low carbon services through RE:FIT

and the electric vehicle programme will be made available to the wider public and private sectors to significantly increase the ease with which they can procure similar services.

Working with the London boroughs, the wider UK public sector, and internationally through the C40, the GLA group will also actively promote best practice on low carbon procurement, including through the responsible procurement website and engagement with networks and partners.

d) Working with the GLA group to continue to work with organisations in its supply chain to signpost to best practice, including on energy efficiency
To help organisations in its supply chains reduce their energy use, the GLA group's central responsible procurement team will continue to signpost key GLA group suppliers to the Mayor's climate change mitigation programmes, the Mayor of London's Green Procurement Code, and other sources of support to assist them in reducing their CO_2 emissions.

9.4 Implementing Mayoral policies and action

Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter.

Endnotes

[i] The London Development Agency is to be abolished on 1 April 2012 under proposals in the Localism Bill.

[ii] The CO_2 emissions quoted in this chapter relate to the MPS only, rather than the MPA and MPS.

[iii] All figures are for 2009/10.

[iv] Sustainable Development Commission, Public Sector Uptake of Low Carbon and Renewable Energy Technologies (2009)

[v] For more information on scopes of emissions, please see chapters 2 and 10 of this strategy.

[vi] Reductions are based on a 1990 baseline for LFEPA and 2005 for the rest of the GLA group.

[vii] 2010-11 figures.

CHAPTER TEN

EVALUATING AND MONITORING THE SUCCESS OF THE STRATEGY

POLICY 17: MEASURING LONDON'S CO_2 EMISSIONS

Vision

By 2025, London continues to be one of the world's leading cities in measuring and reporting its direct and indirect CO_2 emissions, and for assessing the progress of the Mayor's climate change mitigation programmes on an annual basis.

Vision to policy

Working with partners and the GLA group, the Mayor will develop and maintain an up-to-date emissions inventory covering London's direct and indirect CO_2 emissions in order to assess the progress of climate change mitigation programmes in London, and assess the potential for further programmes.

Policy to action

- **Action 17.1 -** The Mayor will continue to publish the London Energy and Greenhouse Gas Inventory online every year.
- **Action 17.2 -** The Mayor will produce an annual report on London's progress on meeting its CO_2 emissions reduction targets, including annual estimated CO_2 emissions, and progress on Mayoral climate change mitigation programmes.
- **Action 17.3 -** The Mayor will measure London's scope 3 indirect CO_2 emissions.

The Mayor recognises the importance of monitoring and evaluating the effectiveness of this strategy so that it has the best possible chance of achieving both its interim and ultimate targets.

London's annual scope 1 and scope 2 GHGs are monitored and published in the form of the LEGGI and this will form the primary mechanism for evaluating London's performance in reducing its CO_2 emissions, alongside government's updated baseline figures (please see box 10.1 for an explanation of scope 1-3 emissions). The LEGGI 2008 is published online at the London Datastore at data.london.gov.uk, and the Mayor will continue to publish the LEGGI online every year using the most up-to-date data available.

Box 10.1 Definition of GHG emission scopes

The most widely accepted approach to measuring and reporting GHGs is to identify and categorise emissions-releasing activities into three groups (known as scopes). The definitions below have been adapted from Defra's 2009 Guidance on How to Measure and Report your Greenhouse Gas Emissions. The three scopes are:

- **Scope 1 (Direct emissions) -** These are as a result of activities that release emissions straight into the atmosphere at point of use. Examples of scope 1 emissions include emissions from the combustion of fuel in homes, workplaces and vehicles.

- **Scope 2 (Energy indirect) -** These are emissions that are released into the atmosphere associated with the consumption of purchased electricity, heat, steam and cooling. The emissions occur at sources that are not owned or controlled by the consumer.

- **Scope 3 (Other indirect) -** These are emissions that are a consequence of activities which occur at sources that are not owned or controlled by the consumer and which are not classed as scope 2 emissions. Examples of scope 3 emissions include those associated with the production and disposal of material goods.

In addition, the strategy will be monitored and evaluated on an annual basis and this information will be brought together into a short annual summary. The summary reports will illustrate how effectively the strategy is working towards the interim and 2025 (60 per cent reduction in CO_2 emissions on 1990 levels) targets. The report will include information on the progress and estimated CO_2 emissions reductions from major projects in the Mayor's climate change mitigation programmes including RE:NEW, RE:FIT, RE:CONNECT and operational decentralised energy projects.

Furthermore, the Mayor will seek to measure scope 3 emissions in order to get a thorough understanding of London's overall CO_2 emissions and inform how best to include these in future updates of this strategy.

Calculating scope 3 emissions provides a more complete understanding of London's total emissions and potential exposure to climate risks. Scope 3 emissions are, however, also harder to measure than scope 1 and 2 emissions because the data and tools needed are often not available. As a result there is likely to be a higher degree of estimation and extrapolation and therefore lower levels of accuracy.

The strategy will be continually appraised and reviewed to ensure that it is providing the framework within which London will be able to meet its CO_2 reduction targets. When the Localism Bill (2011) becomes law, a new London Environment Strategy will replace this strategy and amalgamate it with the other statutory strategies and plans concerning the environment that the Mayor is required to publish under the GLA Act 1999.

Other formats and languages

For a large print, Braille, disc, sign language video or audio-tape version of this document, please contact us at the address below:

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Greater London Authority
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The Queen's Walk
More London
London SE1 2AA

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Chinese

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Hindi

यदि आप इस दस्तावेज की प्रति अपनी भाषा में चाहते हैं, तो कृपया निम्नलिखित नंबर पर फोन करें अथवा नीचे दिये गये पते पर संपर्क करें

Vietnamese

Nếu bạn muốn có văn bản tài liệu này bằng ngôn ngữ của mình, hãy liên hệ theo số điện thoại hoặc địa chỉ dưới đây.

Bengali

আপনি যদি আপনার ভাষায় এই দলিলের প্রতিলিপি (কপি) চান, তা হলে নীচের ফোন্ নম্বরে বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Greek

Αν θέλετε να αποκτήσετε αντίγραφο του παρόντος εγγράφου στη δική σας γλώσσα, παρακαλείστε να επικοινωνήσετε τηλεφωνικά στον αριθμό αυτό ή ταχυδρομικά στην παρακάτω διεύθυνση.

Urdu

اگر آپ اِس دستاویز کی نقل اپنی زبان میں چاھتے ھیں، تو براہ کرم نیچے دئے گئے نمبر پر فون کریں یا دیئے گئے پتے پر رابطہ کریں

Turkish

Bu belgenin kendi dilinizde hazırlanmış bir nüshasını edinmek için, lütfen aşağıdaki telefon numarasını arayınız veya adrese başvurunuz.

Arabic

إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى الاتصال برقم الهاتف أو مراسلة العنوان أدناه

Punjabi

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ ਲਿਖੇ ਪਤੇ 'ਤੇ ਰਾਬਤਾ ਕਰੋ:

Gujarati

જો તમને આ દસ્તાવેજની નકલ તમારી ભાષામાં જોઈતી હોય તો, કૃપા કરી આપેલ નંબર ઉપર ફોન કરો અથવા નીચેના સરનામે સંપર્ક સાધો.

GREATER LONDON AUTHORITY