

October 2010

Delivering London's energy future

The Mayor's draft Climate Change Mitigation and Energy Strategy
for public consultation



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**Greater London Authority
October 2010**

Published by
Greater London Authority
City Hall
The Queen's Walk
More London
London SE1 2AA

www.london.gov.uk
enquiries 020 7983 4100
minicom 020 7983 4458

ISBN 978-1-84781-395-4

Front cover © iStockphoto – Getty Images

Copies of this report are available from www.london.gov.uk

Contents

	Mayor's foreword.....	5
	Executive summary.....	7
1	Introduction.....	17
2	London's CO₂ emissions.	39
3	Making London one of the world's leading Low Carbon Capitals.....	53
4	Securing a low carbon energy supply for London.....	91
5	London's homes: driving our energy future.....	129
6	Cutting costs and CO₂ in London's workplaces.....	161
7	Building towards a zero carbon London.....	185
8	Moving towards zero emission transport in London.....	199
9	Setting an example through the GLA group.....	231
10	Evaluating and monitoring the success of the strategy.....	253

Mayor's foreword

For a hundred years we have been cashing in on carbon-rich fossil fuels; now we can cash in on getting rid of them. Coal has fuelled much of Britain's industrial development, but we must now look to the same entrepreneurial drive and creative genius in finding more sustainable alternatives.



This draft policy document sets out a comprehensive assessment of how I believe London can unite to grasp the huge benefits that a whole-scale energy transformation will bring. 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 our economy over the next 15 years, and London's climate change mitigation programmes alone could contribute 14,000 jobs per year by 2025.

London is brimming with natural advantages to adapt and thrive in this new era. With nearly eight million people, over three million homes and hundreds of thousands of businesses, we have the serious clout to deliver world-leading programmes at the scale and speed required to address climate change and make them financially viable as investment opportunities. As Mayor, I am championing this dual potential with verve and optimism.

Much activity detailed here is already underway as we start the transformation of the look and feel of our city forever. We are seeking to help people reap the quality of life and financial rewards that flow from taking low carbon, energy efficient choices.

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

I welcome Londoners' views on our plans to ensure we can work in tandem and rise to this challenge.

A handwritten signature in black ink, which appears to be 'Boris Johnson'.

Boris Johnson
Mayor of London

Executive summary

1 Low carbon London: The Mayor's vision for 2025

The Mayor's vision is for London to be the greenest big city in the world, with a thriving low carbon economy. By 2025 it will have left behind its reliance on polluting fossil fuels. Instead it will have highly energy efficient buildings, generate its own low and zero carbon energy, and provide attractive options for low carbon living. London will have the lowest carbon footprint per person of any big city in the world, and people and businesses from across the globe will be drawn to the capital because its low carbon economy makes life financially rewarding. The Mayor's vision is that by 2025:

- **London will be a world-leading low carbon capital** - London will have a burgeoning and highly developed low carbon goods and services sector, creating tens of thousands of new jobs for Londoners.
- **London will have a secure supply of low carbon energy** - London will become its own powerhouse. Over a quarter of London's energy demand will be met from low or zero carbon local sources. Instead of homes and workplaces being heated through old, inefficient and costly boilers, they will be heated through efficient large-scale low carbon heat networks, such as the London Thames Gateway Heat Network, and from onsite combined heat and power plants. Londoners will also be generating their own low carbon energy through extensive micro-renewable technologies like solar panels on their homes or where they work. People's waste will help heat their homes, with all waste either recycled or converted into low carbon energy at London's waste-to-energy plants.
- **London will have some of the most energy efficient buildings of any large city in the world** - The majority of London's existing homes will have had a whole-house energy efficiency refit, making them cheaper to run and more comfortable to live in. Public and commercial sector organisations will meet ambitious carbon dioxide (CO₂) targets and save money on energy bills, with 50 per cent of existing workplaces retrofitted through the RE:FIT programme. New development will be zero carbon, combining energy efficiency with onsite and large-scale low and zero carbon energy generation, making them both cost effective and a pleasure to live and work in.
- **London's transport network will be well on the road to zero emissions** - London's transport network will be the envy of the world with Londoners moving around quickly and easily using a pioneering range of innovative low carbon alternatives, such as one of 100,000 electric vehicles in the capital.

This is a challenging vision but an achievable one. It requires activity across society. Government has already committed to a number of actions to mitigate climate change that will contribute, but much more will need to be done. 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.

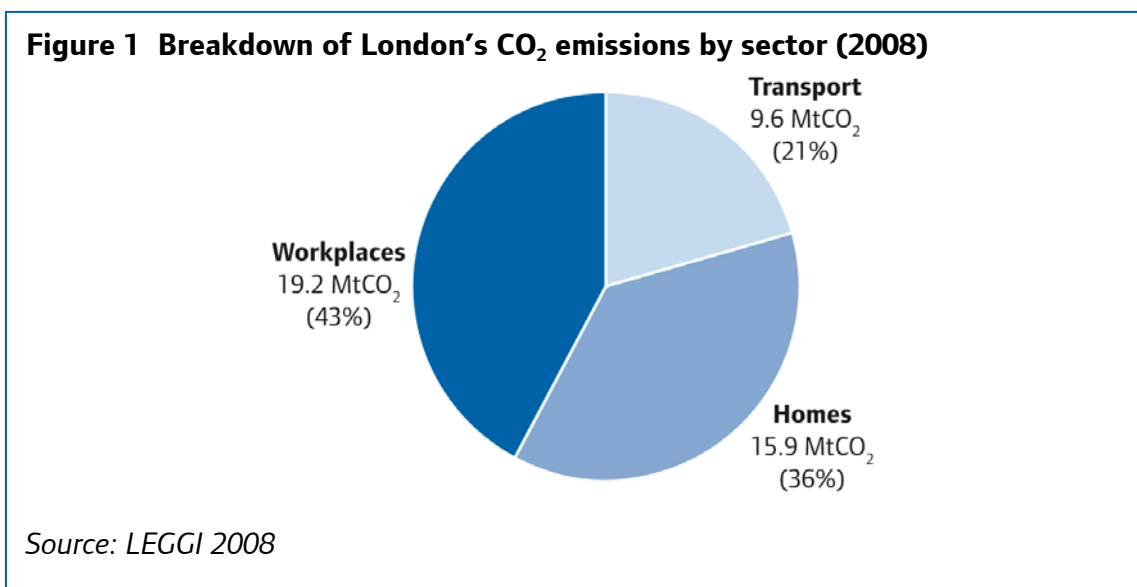
2 Objectives of the strategy

In working to achieve the above vision, the Mayor is addressing four key objectives:

a) To reduce London's CO₂ 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 at least 50 per cent of 1990 levels by 2050ⁱ.

The most recent measurement of London's CO₂ emissions show that in 2008 they were 44.71 million tonnes (MtCO₂)ⁱⁱ. Figure 1 breaks down London's CO₂ emissions by sector.



If no further action was taken to reduce London's CO₂ emissions beyond that already occurring, it is predicted that CO₂ emissions in the capital would fall to ten per cent below 1990 levels by 2025. 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.

b) To maximise economic opportunities from the transition to a low carbon capital

Aside from the compelling environmental case to mitigate climate change, the economic case is also clear. The global market for low carbon environmental goods and services was already worth over £3 trillion in 2007/08, and if global CO₂ emission targets for 2030 are met, the low carbon market could increase by at least £368 billion per year through to 2030ⁱⁱⁱ. If London secured even the equivalent to its global market share of the low carbon market, it could realise £3.7 billion of additional economic opportunities annually through to 2025^{iv}.

As London already has strengths in areas such as financial services, business services, and research and development, this creates a set of fantastic opportunities. Through the Mayor's programmes alone, London could benefit from an estimated annualised average of 14,000 (gross) jobs per year, and £720 million of Gross Value Added (GVA) per year from growth in the low carbon sector.

c) To ensure a secure and reliable energy supply for London

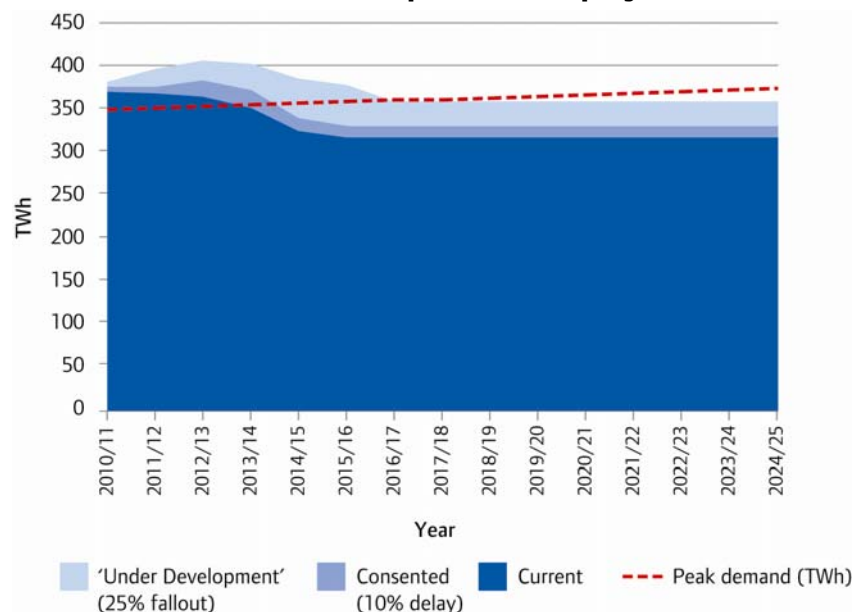
Many of the actions needed to mitigate climate change will help to address another pressing policy challenge: ensuring a secure, low carbon energy supply for London. Production of oil and gas is peaking at the same time as global demand for oil is reaching unprecedented heights. Domestically the UK is once again a net importer of oil and gas, making it increasingly reliant on the relatively few volatile countries with most of the world's oil reserves. As global oil demand continues to increase, the result will be increased oil prices for net importers, posing serious economic risk to the UK^v.

In addition, wide-scale closures are planned for the UK's ageing nuclear plants, and many of the country's biggest coal and gas plants are expected to close over the next decade for falling below the EU's environmental legislative standards. These anticipated closures could seriously jeopardise the UK's ability to meet its gas and electricity demand over the period to 2025.

Compounding this challenge is Ofgem's estimate that a staggering level of investment, up to £200 billion over the next ten years, will be needed to replace the UK's ageing infrastructure to meet the UK's energy needs^{vi}. 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^{vii}. As figure 2 shows, when taking into account current, consented and under development energy capacity, and assuming a ten per cent delay in construction and a 25 per cent fall-out rate for projects which are under development, the risks of an energy gap emerging remain high. Under this scenario London's share of the electricity demand not met by national supply would be around 576,000MWh in 2020.

However the Mayor's energy demand reduction and energy supply programmes have the potential to reduce London's vulnerability to the risks of the energy gap. For example, the Mayor's homes retrofit programme, RE:NEW, has the potential to reduce electricity demand by 756,000MWh in 2020, plugging London's potential energy gap and around ten per cent of the national energy gap.

Figure 2 UK electricity demand and supply (TWh): Existing consented and under development projects to 2025 (assuming 10 per cent delay in construction and a fall-out rate of 25 per cent for projects under development)



Source: GLA modelling

d) To meet, and where possible exceed, national 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. The policy context for climate change and energy policy is rapidly developing at all levels of government. In the past two years the UK has seen the Climate Change Act passed by Parliament, and challenging CO₂ reduction targets enshrined in law. The new coalition government has also begun to set out its policy priorities including announcements on plans to create a new Green Investment Bank and its intention to pass an Energy Security and Green Economy Bill in the next session. Internationally, the EU has committed to a series of targets, including pledges to reduce CO₂ emissions by 20 per cent of 1990 levels by 2020.

The vision for this strategy can only be achieved if government delivers on its ambitions. This strategy therefore sets out the contribution of national policies towards reducing CO₂ 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.

3 CO₂ emissions reduction targets

To achieve the Mayor's vision and objectives set out in this strategy, the Mayor has proposed targets to reduce CO₂ emissions in London, as set out in table 1.

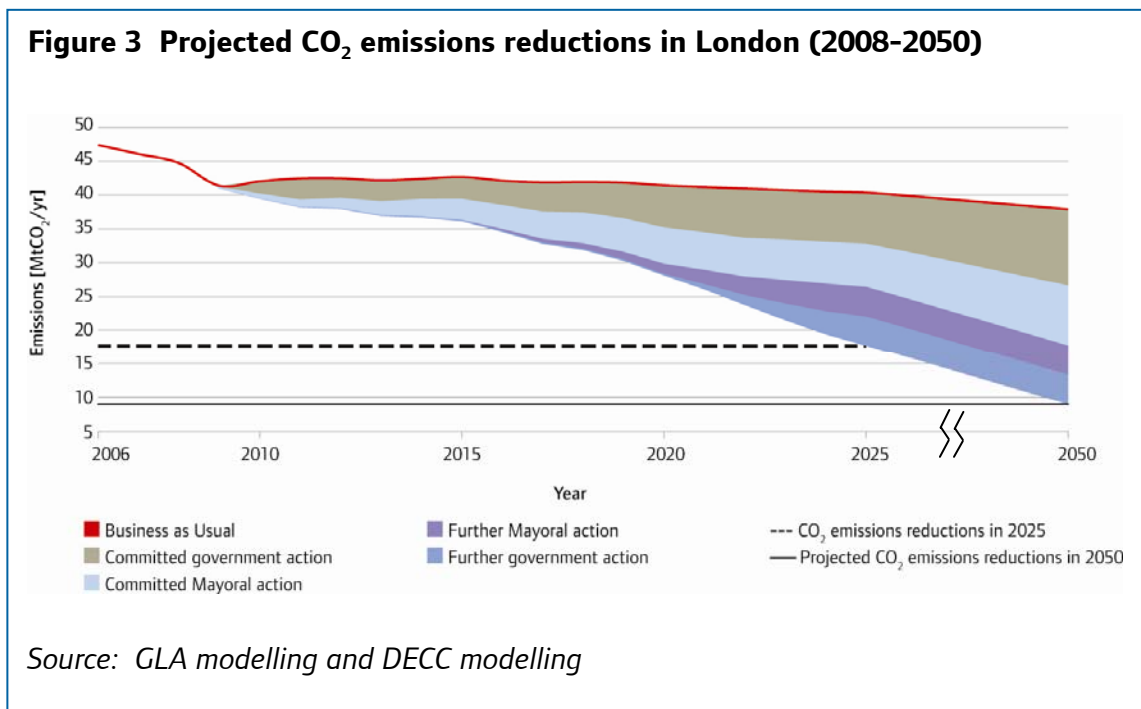
Table 1 The Mayor's CO₂ emissions reduction targets in London

Target year	Target CO ₂ emissions reduction on 1990 levels
2015 (interim target)	20 per cent
2020 (interim target)	38 per cent
2025	60 per cent
2050	At least 80 per cent

4 Delivering the Mayor's targets

This strategy has a positive message on targets. It shows that if policies and programmes that are already in train, whether at national or local level, are scaled-up as per the Mayor's ambitions, London will be well on the way to reaching its target to reduce its CO₂ emissions by 60 per cent against 1990 levels by 2025.

To deliver the Mayor's target 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. If London receives support and funding to extend its programmes even further, and government delivers on its existing commitments and extends its ambitions on decarbonisation of the national grid, London can ensure that it meets its 2025 targets. Figure 2 sets out how these reductions will be achieved.



More than anything else, to achieve these targets requires financing. It is estimated that to deliver the Mayor's target of reducing CO₂ emissions by 60 per cent on 1990 levels will require £40 billion of investment, and to deliver the Mayor's contribution to this will require £14 billion. But this is an investment that pays back. 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.

London's programmes - focussing on large-scale delivery

Given the huge environmental and economic opportunities of reducing London's CO₂ emissions, the pace of delivery of climate change mitigation programmes needs to be much faster. The Mayor is therefore designing and rolling out programmes that deliver real results on the ground and that are ready to be scaled-up rapidly.

The Mayor's programmes are testing and refining proven approaches to engaging consumers, developing low carbon procurement contracts that can be replicated, and business models that are commercially attractive. Working with other cities, London can then rollout these approaches more broadly both within the UK and internationally, through programmes such as RE:FIT and the C40 electric vehicle initiative.

An unprecedented level of investment backs the Mayor's programmes. He has committed over £100 million over three years on direct climate change programmes, and several hundred million more on programmes that have clear carbon benefits, such as hybrid buses, new sustainably-built homes, and cycling. The Mayor is also leveraging funding from government through RE:NEW, and from Europe and the private sector through the £100 million London Green Fund.

The Mayor's programmes include:

- **RE:NEW (formerly the Homes Energy Efficiency Programme)** - This is a truly pan-London programme aiming to retrofit 1.2 million homes by 2015, the largest programme ever of its kind in London. It takes an area-based, door-to-door, hassle-free approach to energy efficiency and is delivered through and with the boroughs. Technical trials and demonstration projects have already taken place in 9,000 homes. The aim is for the programme to be free upfront for all homes through a pay-as-you-save model and to rollout measures to all London homes that want them by 2030.
- **RE:FIT (formerly the Buildings Energy Efficiency Programme)** - London's public sector energy efficiency retrofit programme is delivering £1 million of savings per year for the GLA group from 42 pilot buildings already. The model is being made available to every public sector organisation in the UK and already has over 20 early adopters signed-up. The aim is to make it upfront free and financed through a public-private fund.

- **RE:CONNECT (Low Carbon Zones)** - The Mayor is delivering ten low carbon zones in London, each of which has signed-up to deliver 20.12 per cent CO₂ reductions by 2012. These zones take a novel approach to community engagement and will aim to demonstrate that a low carbon future is a real possibility for London. If successful, the Mayor will explore how to extend these to other neighbourhoods.
- **Decentralised energy including energy-from-waste** - The Mayor is engaged in the first ever energy masterplanning exercise across London and is helping to develop and fund new decentralised energy projects across the city. The proposed London Thames Gateway Heat Network will be the largest new decentralised energy development in Europe. The London Waste and Recycling Board's £73.4 million fund will also be investing in new, clean waste management infrastructure, including energy-from-waste facilities, so that London reduces the carbon footprint of its waste.
- **Electric vehicle rollout** - London has ambitious plans on 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 1,000 vehicles being procured directly into the GLA fleet and new charging infrastructure being rolled out to support the introduction of 100,000 electric vehicles on London's streets.

This list does not include a wide range of other Mayoral programmes and policies including:

- new London Plan measures to make new buildings even more energy efficient and promote low and zero carbon energy generation
- new housing construction sustainability standards through the Mayor's London Housing Strategy
- measures in the Mayor's Transport Strategy to reduce London's transport emissions, including supporting travel by public transport, unprecedented levels of walking and cycling investment, and energy efficiency measures on the London Underground and buses
- low carbon economy programmes, such as the Low Carbon Employment & Skills Programme delivering skills training and jobs to ensure Londoners can benefit from the

economic benefits of the low carbon economy, and the Green Enterprise District, a priority area for investment by low carbon enterprise.

5 Next steps

The Mayor is consulting on this strategy with Londoners until 5 January 2011. An online and Rich Text Format version of the consultation questionnaire can be downloaded from www.london.gov.uk and sent by post to:

Mayor's Climate Change Mitigation and Energy Strategy consultation
 Post Point 19B
 FREEPOST LON15799
 City Hall
 The Queen's Walk
 London SE1 2AA

Following this consultation process the Mayor will consider the responses and make any necessary changes to the strategy before publishing a final strategy in 2011.

Endnotes

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

ⁱⁱ The most recent measurement of London's CO₂ emissions was in 2008.

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

^{iv} Ernst & Young, Prospectus for London, the Low Carbon Capital (2009)

^v Policy Exchange, Running on empty: Coming to terms with UK Gas Dependence (2010)

^{vi} Ofgem, Project Discovery Energy Market Scenarios (2009)

^{vii} Green Investment Bank Commission, Unlocking investment to deliver Britain's low carbon future (2010)

1 Introduction

Low carbon London: The Mayor's vision for 2025

The Mayor's vision is for London to be the greenest big city in the world, with a thriving low carbon economy.

The world needs to change its approach to energy. The economic and lifestyle benefits of doing so are substantial. By tapping into London's expertise and taking advantage of its scale, London can spearhead the journey towards a low carbon society, and make the Mayor's vision a reality.

The view from 2025

What does this new London look like? It has the lowest carbon footprint per person of any big city in the world. And the highest proportion of its economy based in the low carbon and environmental goods and services sector. The London of 2025 has left behind its reliance on polluting fossil fuels. It has highly energy efficient buildings, generates its own low and zero carbon energy, and provides attractive options for low carbon living. People and businesses from across the globe are drawn here because London's low carbon economy makes life financially rewarding, and because it is the greenest big city in the world.

London is a leading low carbon capital

In 2025, London's concentration of passionate, innovative, carbon-aware people and businesses means the city is not only creating wealth with the lowest carbon dioxide (CO₂) emissions of any big city in the world, but also has a burgeoning and highly developed low carbon goods and services sector. The demand for these products and services within London is massive and grows daily. Its economy supplies its own increasing demands and grows with them.

London's key strengths are its financial services sector, its research and development capabilities and the size and scale of its low carbon market opportunity. London's financing mechanisms bring in massive levels of private investment. This supports pioneering work in areas such as building retrofit and decentralised energy. It stimulates the technological innovation that abounds in low carbon districts, led by East London's globally renowned Green Enterprise District. London's world-class research institutions are the ones that blaze the technological trails in areas like energy efficient buildings, and hydrogen and electric vehicles. Low carbon research and development is becoming one of the UK's major sectors and a lynchpin of its knowledge-based economy. As a world-leading low carbon financing centre, London provides much of the investment for

commercialising and rolling out these new technologies across the world. The London Stock Exchange's Environmental Opportunities Index rivals the FTSE 100 and the Dow Jones as the best benchmark index for tracking stock market activity.

London is exporting this expertise to an insatiable global market; every country on earth works hard to tackle climate change. They need London's expert skills, products and services to succeed. Tens of thousands of new low carbon jobs have been filled by Londoners and more opportunities open up every day. People benefit from the low carbon skills and training programmes initiated by the Mayor. The aim back in 2010 was to generate an additional £3.7 billion a year from the low carbon economy. London's actual performance is well in excess of that figure.

London has a secure supply of low carbon energy

Energy supply and usage has changed beyond recognition, and London has become its own powerhouse. Many Londoners get their energy from low or zero carbon sources, which meet over a quarter of London's energy demand, significantly increasing energy security.

Some of London's homes and workplaces, instead of being heated through old, inefficient and costly boilers, are now heated through large-scale low carbon heat networks in areas identified by the Decentralised Energy Mapping Programme. The main network is the London Thames Gateway Heat Network, which runs from the City of London, through the Olympics site and Canary Wharf, then along the north and south banks of the Thames to Barking Riverside. It is due to extend from Barking Power Station eastwards to capture the zero carbon heat from Kingsnorth power station (now fully operational in carbon capture and storage mode).

Other buildings get their electricity and heat from on-site combined heat and power (CHP) and advanced conversion technology plants. These efficient systems use less fuel to produce heat and electricity. People's waste also helps heat their homes. All waste is either recycled or converted into low carbon energy at London's waste-to-energy plants. This system also generates extra revenue for the boroughs; instead of paying to send waste to landfill, they sell it to reprocessing companies and energy plants.

Londoners are generate low carbon energy through extensive micro-renewable technologies, like solar panels, on their homes or where they work. Boroughs, businesses and communities all make increasing amounts of money from energy generation by

selling energy and from the tariffs set up to encourage renewable electricity and heat generation. Boroughs use this money to fund climate change programmes, such as zero carbon energy generation, retrofitting projects and programmes that improve green space and support adaptation to climate change.

London has also got smarter. All buildings have smart meters telling Londoners how much electricity and heat they are using and when. People make conscious decisions about how much energy they consume; they choose energy efficient domestic appliances, and they take advantage of cheap off-peak tariffs. As part of the London-wide smart electricity grid this helps London to meet daily fluctuations in energy demand and helps Londoners to reduce their energy bills.

London's homes produce less CO₂, run more cost-effectively and generate their own energy

London's homes are the most energy efficient of any region in the UK. Most of London's houses have had a whole-house energy efficiency refit, making them cheaper to run and more comfortable to live in. Many households generate their own energy from micro-renewable technologies, including hydrogen and CHP. Previously fuel poor households have insulated lofts and cavity walls.

This has all been achieved through the Mayor's RE:NEW programme which has helped 2.9 million households. It has also helped London meet its water neutrality target, and made London's homes far better adapted to climate change.

RE:NEW is also providing jobs; as it has grown it has taken on more skilled installers to meet demand. It is on track to visit and make an offer of support to all London's houses by 2030.

London's workplaces have saved money and cut CO₂ emissions

London's businesses are gaining acclaim by topping the nation's CRC Energy Efficiency Scheme tables. Public and commercial sector organisations are meeting ambitious CO₂ targets and saving money on energy bills.

Fifty per cent of London's workplaces have been retrofitted through the RE:FIT programme. Having focussed on the public sector, in 2015 the programme was extended to cover commercial organisations, many of which have already enjoyed pay-back times of less than ten years.

London is an attractive proposition for businesses. The expanding number of low carbon commercial buildings encourages low carbon companies to invest and locate in London. This means jobs for Londoners, research and development investment, and opportunities for businesses.

London's new buildings are zero carbon

Many Londoners live and work on zero carbon developments. For over a decade London has been at the forefront of the move in this direction: the London Plan's staggered approach introduced low carbon development ahead of new Building Regulations. The development of these buildings means that no opportunities for cutting CO₂ emissions, on or off-site have been lost. These homes and offices are both cost effective and a pleasure to live and work in. They combine energy efficiency with on-site and large-scale low and zero carbon energy generation.

This progressive approach benefits businesses too; London's development sector has gained an early mover advantage and exports its products and services globally.

London's transport network is well on the road to zero emissions

London's transport network is the envy of the world. Fifteen years ago London had two million registered vehicles running on polluting fossil fuels. This had a detrimental effect on both the climate and air quality. Now Londoners move around quickly and easily using a pioneering range of innovative low carbon alternatives:

- **Electric vehicles** - there are over 100,000 of these low carbon vehicles on the streets of London
- **Walking and cycling** - people use Cycle Superhighways that are integrated with the London Green Grid network and the Central London Cycle Hire scheme
- **London's iconic New Buses** - a greener, cleaner vehicle fused with the best of the old Routemaster is 40 per cent more efficient than old diesel double-decker buses
- **Low carbon buses** - a growing fleet of these serves an increasing number of routes
- **The Underground network** - powered entirely by renewable energy sources developed specifically to supply it.

The way to London 2025

This is a challenging vision but a necessary and achievable one. The next step is to implement the strategy the Mayor has mapped out to take London forward. He has formulated policies, outlined actions and committed to a timetable that will enable London, by 2025, to harness its advantages and achieve all that is set out above. London has the skills, tools and ambition to make the capital a leading low carbon city with a thriving low carbon economy, and to realise the vision of London as the greenest big city in the world.

1.1 Achieving the vision: The Climate Change Mitigation and Energy Strategy

This strategy sets out the action the Mayor is taking and wants others to take to help realise his vision.

Some of the changes in the Mayor's vision may appear ambitious, but decades ago computers took up whole rooms and were only used by big corporations, whereas today most homes have at least one computer and mobile phones increasingly perform the function of computers. The same scale of transformation is needed again globally to address climate change and create a global low carbon economy. London is determined to be one of the drivers and not passengers in this transformation.

London has a unique opportunity but needs to act now if it is to become the greenest big city in the world. Already a global cultural, financial and economic hub, London is ideally placed to become one of the world's leading low carbon capitals feeding off a secure low carbon energy supply. With this transformation will come new jobs and new businesses.

Already a number of factors are coming together to drive the low carbon transition in London. There are rising concerns about energy security, long-term increases in fuel prices, and a growing awareness that global fossil fuel resources are finite. 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 vision requires activity across society. Government has already committed to a number of actions to mitigate climate change that will contribute, but much more will need to be done. 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 in London. It brings together Mayoral actions that are already underway and further proposed measures.

The low carbon landscape is quickly evolving, and this strategy therefore focuses on those actions that will reduce London's CO₂ emissions from 2010 to 2025. However, to ensure that London continues to reduce its CO₂ emissions to meet overall targets, the strategy also sets out how these actions and programmes can be extended to 2050.

The strategy contains 17 policies and supporting actions. To set the context, chapter 2 of this strategy outlines London's past, current and projected CO₂ 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 economy, 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 CO₂ emissions from energy use across London's sectors, including homes, workplaces and transport.

Each chapter from 3 to 9 includes:

- a summary of the policies, key delivery programmes and expected impacts 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
- the Mayor's committed policies and actions to reduce CO₂ 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
 - vision to policy, explaining the Mayor's overarching policy which will achieve the vision

- policy to action, explaining the specific actions that the Mayor will take to achieve the policy.
- further Mayoral action that can be taken and will be deliverable subject to further support, including funding from government and the private sector
- further government action required to reduce London’s CO₂ emissions and support the achievement of the Mayor’s CO₂ emissions reduction targets.

1.2 Key objectives of the strategy

This strategy has been developed with four key objectives: to reduce CO₂ emissions to mitigate climate change; 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.

a) Reducing CO₂ 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 speedⁱ.

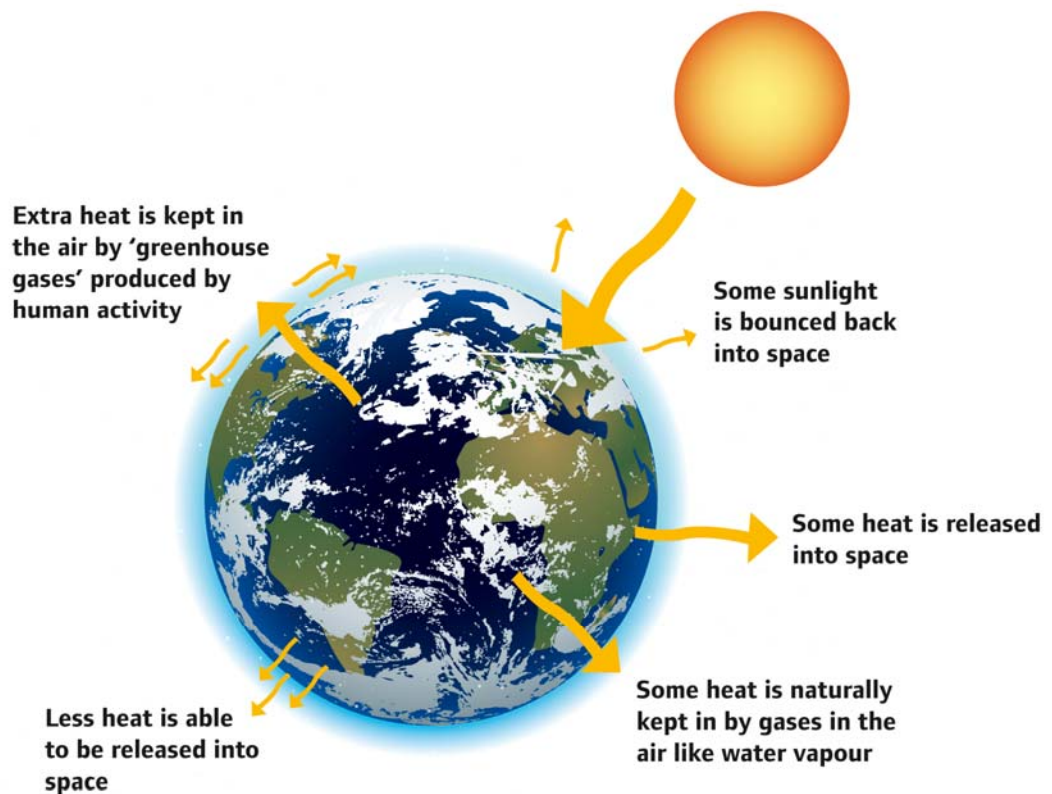
If global emissions of GHGs are left unchecked, average global temperatures could rise by up to 6°C by the end of the century. Regional variations could be even greater. If this happens, the UK will experience progressively warmer and drier summers, wetter and milder winters and more frequent extreme weather. London, in particular, will be very 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 at least 50 per cent of 1990 levels by 2050ⁱⁱ.

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 populationⁱⁱⁱ. Unlocking the capabilities of cities to reduce emissions of CO₂, the principal GHG, will therefore be critical to tackling climate change.

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, CO₂ 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.

Chapter 2 of this strategy gives more detail on London's past, current and projected CO₂ emissions.

CO₂ emissions reduction targets for London

This strategy aims to ensure that, as a world city, London plays its part in minimising CO₂ emissions and takes a lead for the rest of the world to follow. The Mayor has committed to an overall target of reducing London's CO₂ 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 CO₂ at 450ppm.

Table 1.1 The Mayor's CO₂ emissions reduction targets in London

Target year	Target CO ₂ emissions reduction on 1990 levels
2015 (interim target)	20 per cent
2020 (interim target)	38 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 are estimated at between one and two per cent of global GDP by 2050^{iv}.

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 environmental goods and services was already worth over £3 trillion in 2007/08, and if global CO₂ emission targets for 2030 are met, the low carbon market could increase by at least £368 billion per year through to 2030^v.

If London were to secure even one per cent of the forecasted increase in the low carbon market, the equivalent to its global market share of GDP, it could realise an additional £3.7 billion of economic opportunities annually through to 2025^{vi}. As London already has strengths in areas such as financial services, business services, and research and development it is in a good position to realise an even greater share of this expanding global market.

This creates a set of fantastic opportunities for London in particular. Through the Mayor's programmes alone, London could benefit from an estimated annualised average of 14,000 (gross) jobs per year and £720 million of Gross Value Added (GVA) per year from growth in the low carbon sector. This is net economic value creation for London.

The Mayor's approach to making the most of these opportunities 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. An ever-increasing number of experts are pointing to the threat of peak oil; the notion that we have reached, or will soon be reaching, the maximum rate of global oil production, to be followed by a sustained decline in future production. Production is peaking at the same time as the global demand for oil is reaching unprecedented heights, due in large part to the growing energy appetite of developing economies around the world.

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. The diminishing stock of domestic oil and gas means that the UK is becoming increasingly reliant on foreign energy sources. Given the volatility of the

relatively few countries with most of the world's oil reserves, the UK's energy policy is now recognised as a critical foreign policy priority as well^{vii}. Moving towards low carbon energy supply in London will therefore not just help to tackle climate change but will also help protect London and the UK's energy security over the coming decades.

As global oil demand continues to increase, the result will be increased oil 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 would undermine the competitiveness of UK businesses and prove devastating for the poorest members of society, more and more of whom would be unable to afford adequate levels of energy to meet their daily living requirements^{ix}. Investing in domestic low carbon energy solutions would therefore help to protect London's businesses and residents from being held hostage to soaring global energy prices.

The UK's ageing energy infrastructure

The UK's outdated and ageing energy infrastructure offers yet another compelling reason for accelerating the low carbon transition. Without significant investment in infrastructure, 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 shortfall could be as high as 43 Terra Watt hours (TWh) by 2015/16 and there would already be an energy gap affecting peak demand by 2013/14^x.

Wide-scale closures are planned for the UK's ageing nuclear plants, and many of the country's biggest coal and gas plants are expected to close over the next decade for falling below the EU's environmental legislative standards. These anticipated closures could seriously jeopardise the UK's ability to meet its gas and electricity demand over the period to 2025.

By 2015 the closure and decommissioning of many of the UK's oldest nuclear power plants will reduce the total generating ability by 36 TWh (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 running on solid, liquid and gaseous fuels. Under the LCPD many of the UK's coal-fired and oil-fired power plants will fail to meet emissions standards and therefore close by 1 January 2016.

However, new power plants are under construction, with 15 separate wind power projects and a further six gas-fired power stations having received planning consent^{xi}. 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 still be around 30 TWh in 2015/16.

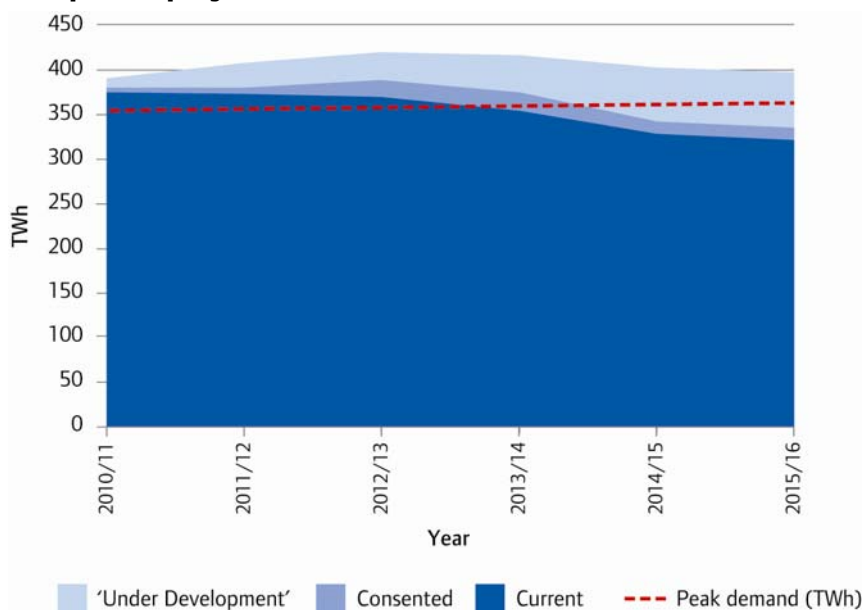
A further 31,000 Mega-watts electricity (MWe) of energy capacity could come on-stream between now and 2015/16 through other projects which are under development but do not have planning consent. This capacity would mitigate the risks of an energy gap emerging over this period. However, the scale of this 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 1.2 shows the mix of current, consented and under development energy capacity to 2016 against DECC's projected peak demand over this period.

[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}. This is a tall order by any standard. 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 our energy infrastructure, many crucial details have yet to be resolved.

Figure 1.2 UK electricity demand and supply (TWh): Existing consented and under development projects to 2016



Source: GLA Economics

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 as compared to alternative investments^{xv}.

Nuclear energy represents another unresolved piece of the national low carbon puzzle. 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 recently declared its commitment to proceed with a new nuclear build programme, but serious questions

remain. The government's support is qualified and relies on no public subsidy of nuclear infrastructure, and it is unclear how this policy position will affect the commercial attractiveness of nuclear to prospective investors. A subsequent challenge will be gaining the buy-in of local communities, a hurdle that has proved quite onerous 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. The new coalition 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.

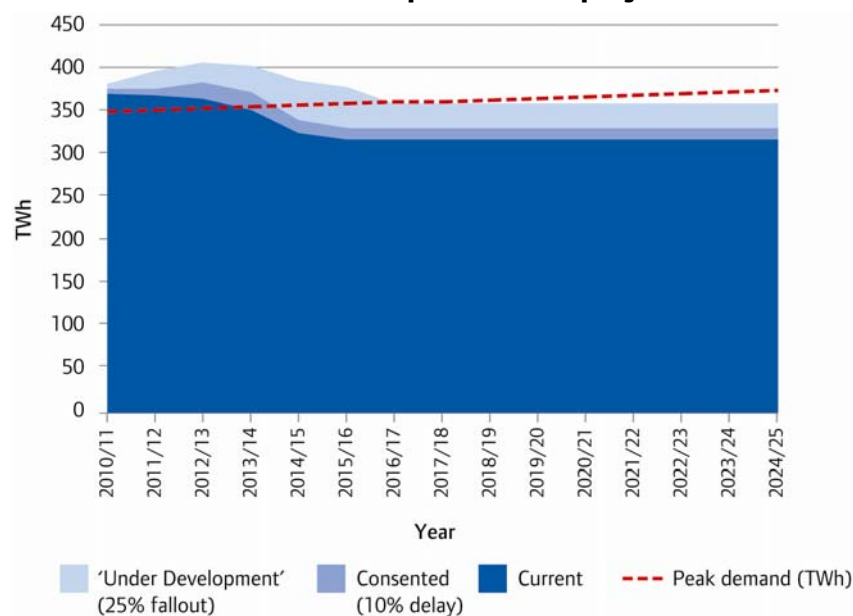
Figure 1.3 shows the same mix of current, consented and under development energy capacity as figure 1.2, but assumes a ten per cent delay in construction and a 25 per cent fall-out rate for projects which are under development. It then extrapolates these demand and supply scenarios forward to 2025. This demonstrates that the risks of an energy gap emerging remain high.

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 1.3, London's share of the electricity demand not met by national supply would be around 576,000MWh in 2020. The Mayor's homes retrofit programme RE:NEW has the potential to reduce electricity demand by

756,000MWh in 2020. On its own it would plug London's potential energy gap and around ten per cent of the national energy gap.

Figure 1.3 UK electricity demand and supply (TWh): Existing consented and under development projects to 2025 (assuming 10 per cent delay in construction and a fall-out rate of 25 per cent for projects under development)



Source: GLA modelling

These risks also reinforce the case for London to lead the way in establishing its energy independence. While London's energy future is to some degree 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 the UK's outdated infrastructure with low carbon alternatives will drastically reduce CO₂ emissions. At the same time, it will reduce the long-term cost of doing business in the UK and attract further investment from industries that would otherwise invest elsewhere^{xix}.

Finally, London can play a valuable leadership role in advancing the UK's climate change agenda. It enjoys the size, resources and expertise needed to demonstrate the commercial viability of low carbon technologies and financing models. Once proved, these solutions will instil the much needed confidence in investors to enable wide-scale implementation.

London's low carbon solutions can then be rolled out to the UK and beyond, providing further economic returns for the city and its residents. In short, upgrading to a 21st century energy infrastructure will go a long way towards improving not just London's environmental performance, but also its economic productivity and international competitiveness.

Chapter 4 of this strategy sets out the Mayor's policies and actions for ensuring a secure and low carbon energy supply for London.

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. However, 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.

The policy context for climate change and energy policy is rapidly developing at all levels of government. In the past two years the UK has seen the Department of Energy and Climate Change (DECC) created, the Climate Change Act passed by Parliament, and challenging CO₂ 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, the previous government produced its initial action plan for meeting these targets in the UK Low Carbon Transition Plan.

The new coalition government has begun to set out its policy priorities for energy and climate change, including in 'The coalition: Our programme for Government' and announcements on plans to create a new Green Investment Bank. The government also announced in the Queen's Speech that the Energy Security and Green Economy Bill will pass through Parliament in the next session. This aims to deliver a national programme of energy efficiency measures to homes and businesses and may also introduce powers to regulate emissions from coal-fired power stations, reform energy markets and put in place a framework to guide the development of a smart grid. In August 2010, government also published the 2050 Pathways analysis and calculator tool, describing different routes to achieving government's target to reduce CO₂ emissions by 80 per cent of 1990 levels by 2050. However, further details of the new government policies are yet to be announced.

Internationally, the EU has committed to a series of 2020 targets that pledge to reduce CO₂ 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). 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 will play a key part in securing cost effective emissions reductions across Europe. At the same time it will lay the foundations for a global trading system that directs funds to cutting emissions most cost effectively. The new coalition government's programme states its support for an increase in the EU emission reduction target to 30 per cent by 2020.

The vision for this strategy can only be achieved if government delivers on its ambitions. This strategy therefore sets out the contribution of national policies towards reducing CO₂ 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 CO₂ emissions by 60 per cent on 1990 levels 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.

To achieve this, the Mayor is kick-starting action through directly funded programmes. These programmes have been designed to catalyse the scale of activity required, 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 is driving 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.
- **Working with boroughs** - The Mayor is working with boroughs on large-scale programmes on the ground, reflecting their role in delivery. To facilitate this the Mayor is utilising the City Charter, a voluntary agreement between London boroughs and the Mayor, which identifies areas for joint action, one of which is responding to climate change in London.
- **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 share best practice on minimising CO₂ emissions with cities in the C40.

The details of the Mayor's climate change mitigation and energy programmes, how they will be delivered and through which organisations, are based on current plans by the Mayor and government. The Mayor's programmes, and through which bodies they will be delivered, will be reviewed and updated to take account of the implications of the Spending Review in autumn 2010 and the review of London governance arrangements. This will be incorporated into the final version of this strategy in 2011.

Annex B of this strategy 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 2007

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 CO₂ 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 document 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 document. 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.

1.5 Other Mayoral strategies

Since 2008, the Mayor has published final strategies, including the Transport Strategy and Economic Development Strategy. A number of other strategies are also in various stages of consultation, including the London Plan, the Climate Change Adaptation Strategy, the Water Strategy, the Municipal Waste Management Strategy and the Air Quality Strategy. The Mayor's Climate Change Mitigation and Energy Strategy will be consistent with relevant policies and proposals in these documents, and likewise, these documents will be updated to reflect the policies and actions set out in this strategy.

1.6 Next steps

The Mayor is consulting on this strategy with Londoners until 5 January 2011. An online and Rich Text Format version of the consultation questionnaire can be downloaded from www.london.gov.uk and sent by post to:

Mayor's Climate Change Mitigation and Energy Strategy Consultation
Post Point 19B
FREEPOST LON15799
City Hall
The Queen's Walk
London SE1 2AA

Following this consultation process the Mayor will consider the responses and make any necessary changes to the strategy before publishing a final strategy in 2011.

Endnotes

- ⁱ The Intergovernmental Panel on Climate Change (IPCC) 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 CO₂, methane and nitrous oxide now far exceed pre-industrial values, and that CO₂ 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.
- ⁱⁱ The Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report (2007)
- ⁱⁱⁱ C40, <http://www.c40cities.org/climatechange.jsp> (2010)
- ^{iv} Stern Review on the Economic of Climate Change (2006)
- ^v UNEP, Global Trends in Sustainable Energy Investment 2009 – Analysis of trends and issues in the financing of renewable energy and energy efficiency (2009)
- ^{vi} Ernst & Young, Prospectus for London, the Low Carbon Capital (2009)
- ^{vii} The UK Industry Task Force on Peak Oil and Energy Security, The Oil Crunch - a wake-up call for the UK economy (2010)
- ^{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 (2010)
- ^{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} Policy Exchange, Delivering a 21st Century Infrastructure for Britain (2009)



2 London's CO₂ emissions

2.1 Introduction

This chapter gives the context and evidence base for this strategy. It sets out London's past, current and projected CO₂ emissions, and summarises the expected impact of policies and actions set out in later chapters of this strategy.

2.2 The scope of CO₂ emissions in this strategy

In defining the scope of London's CO₂ 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

Firstly, 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 CO₂ 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 1,000 metres at London's airports) are included.

b) Source of CO₂ emissions

Secondly, the strategy applies to scope 1 (direct) and scope 2 (energy indirect) emissions of CO₂, measured in line with international reporting guidelines and Defra's Guidance on Measuring and Reporting Greenhouse Gas Emissionsⁱ. Scope 1 emissions refer to CO₂ emissions from the combustion of energy sources within London. Scope 2 emissions refer to CO₂ 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. CO₂ emissions are therefore accounted for at the point of energy use. This avoids double counting of emissions, and savings achieved on them.

Scope 3 (other indirect) 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 (including food), its production of waste, and travel to and from the capital.

There have been a number of estimates of London's indirect CO₂ emissions. In 2009, the London Sustainable Development Commission's Capital Consumption report estimated London's combined direct and indirect emissions at 90 million tonnes of CO₂ (MtCO₂) per year based on 2004 dataⁱⁱ. This compares to 47 MtCO₂ per year in 2004 using the London

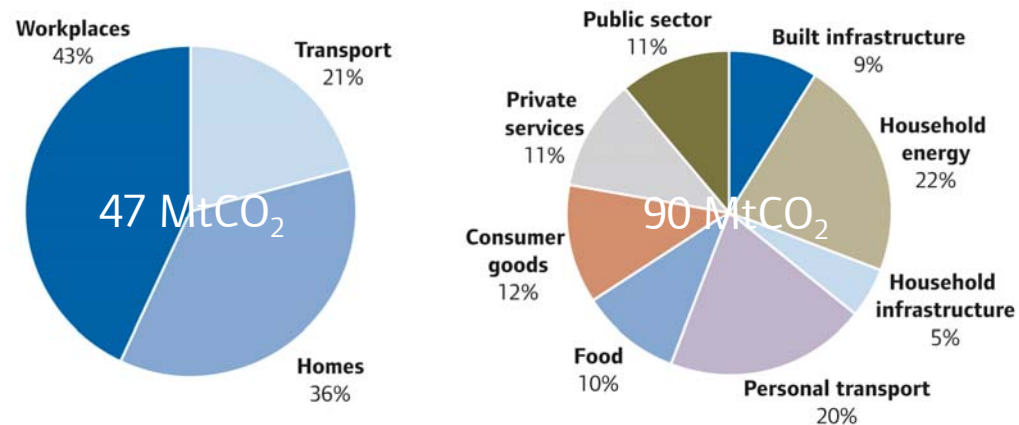
Energy and Greenhouse Gas Inventory (LEGGI) methodology (see box 2.1 for more information) that only calculates scope 1 and 2 emissions (see figure 2.1).

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

The Mayor recognises that scope 3 emissions contribute significantly to London's overall carbon footprint and he is committed to measuring London's scope 3 emissions 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 indirect emissions across GLA strategies and programmes. For example, the Mayor's draft 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.

Figure 2.1 Comparison of LEGGI and Capital Consumption CO₂ emissions for London, 2004



Source: LEGGI 2008 and Capital Consumption

c) Attributing CO₂ emissions to sectors

Thirdly, CO₂ emissions are attributed to different sectors (homes, workplaces, and transport) based on the point of use of energy. For instance the CO₂ 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 CO₂ 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 CO₂ 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 CO₂ emissions from the use of energy.

d) Inclusion of Greenhouse Gases

Finally, this strategy only considers CO₂ emissions, rather than all GHGs and outlines a detailed action plan to reduce these between 2010 and 2025 whilst setting out the Mayor's ambitions to achieve the government's target of an 80 per cent reduction in CO₂ emissions by 2050 from 1990 levels. CO₂ emissions are by far the most significant source of GHG emissions in London, accounting for 99.3 per cent of London's CO₂ equivalent (CO₂e)ⁱⁱⁱ emissions, with methane and nitrous oxide and other greenhouse gases accounting for only 0.7 per cent of total CO₂e. This strategy therefore concentrates on CO₂ emissions.

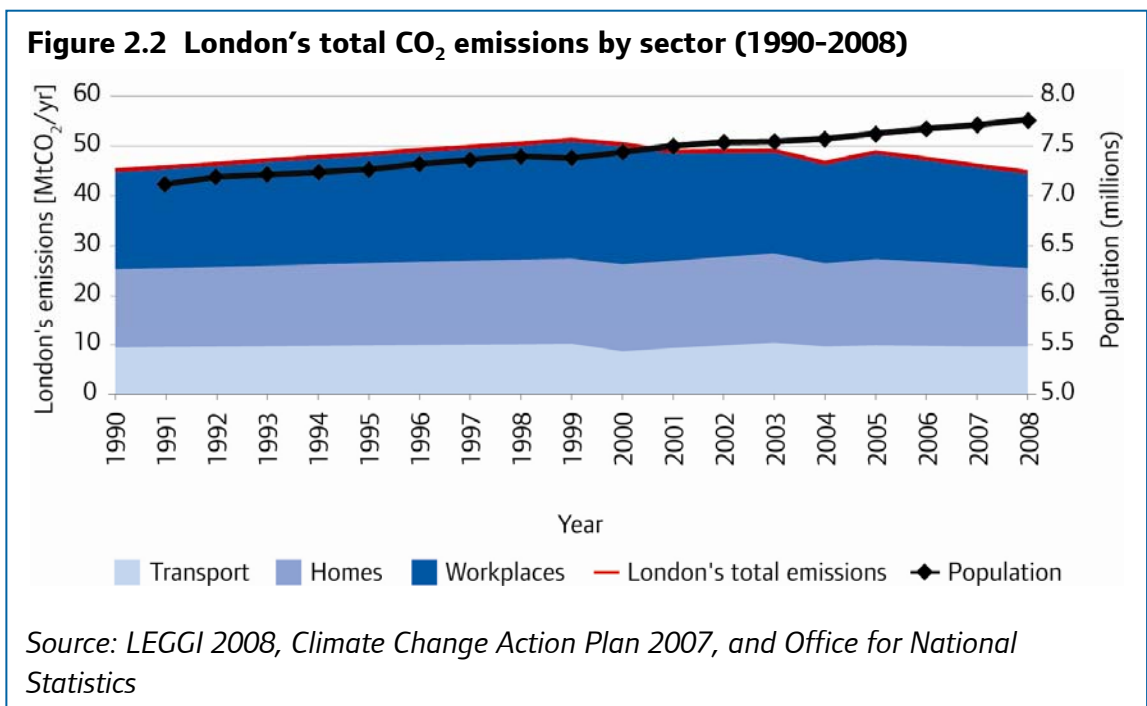
2.3 London's historical CO₂ emissions

London's CO₂ emissions are measured from a baseline of 1990. This is consistent with national and international measurement of CO₂ emissions and targets. Under the Kyoto Protocol, to which the UK is a signatory, the UK set CO₂ 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 MtCO₂ for London's CO₂ emissions, which previous Mayoral CO₂ emissions targets have been baselined against. As figure 2.2 shows, between 1990 and 2000 London's CO₂ emissions increased by 12 per cent to 50.31 MtCO₂. 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.

However, from 2000 to 2008 the capital's annual emissions dropped by 11 per cent to 44.71 MtCO₂ despite continued economic growth and population increase^{iv}. 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.



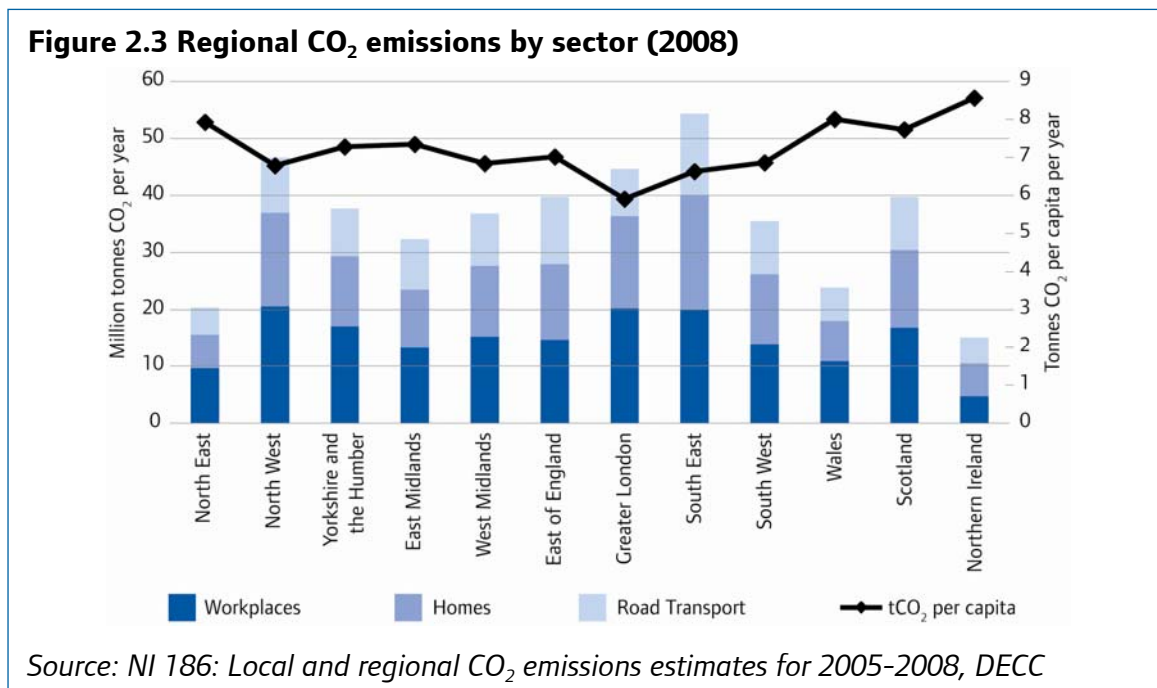
Box 2.1 The London Energy and Greenhouse Gas Inventory (LEGGI)

The LEGGI is a database of geographically referenced datasets of energy consumption within the Greater London area. It estimates the quantity of resulting GHGs - CO₂, methane (CH₄), nitrous oxide (N₂O), 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.

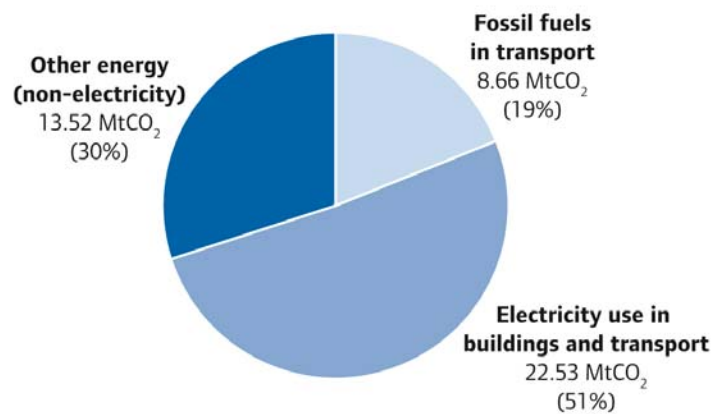
2.4 London's current CO₂ emissions

The most recent measurement of London's CO₂ emissions is the LEGGI 2008. It shows that in 2008 London's CO₂ emissions were 44.71 MtCO₂, or 8.4 per cent of the UK's total CO₂ emissions^v. This represents a drop below 1990 levels of 45.05 MtCO₂ for the first time since LEGGI was set up in 2002. On a regional basis London has the lowest per capita direct CO₂ emissions in the country at 5.9 tonnes CO₂ per person per year, well below the UK average of 7.0 tonnes^{vi} as figure 2.3 illustrates. This is in part due to the capital's efficient and popular public transport network and the greater reliance on private cars for transport outside of London. For more information on the LEGGI, see box 2.1.



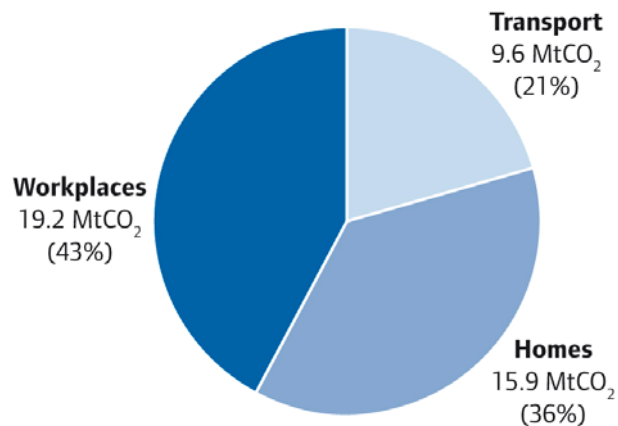
When looking at the source of CO₂ emissions in London, figure 2.4 shows that the supply and use of electricity and other fossil fuels in buildings is the primary source. The LEGGI attributes CO₂ emissions to three sectors in London, based on where the use of fuel occurred and, in the case of electricity, where it was consumed. Figure 2.5 shows that the greatest source of CO₂ emissions in London is workplaces, at 19.2 MtCO₂ in 2008. Homes account for 15.9 MtCO₂ and the transport sector 9.6 MtCO₂^{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. The source of emissions within each of the sectors is set out at the beginning of the following chapters, as well as policies and actions to reduce them.

Figure 2.4 Breakdown of London's CO₂ emissions by source (2008)



Source: LEGGI 2008

Figure 2.5 Breakdown of London's CO₂ emissions by sector (2008)



Source: LEGGI 2008

2.5 London's projected CO₂ emissions: Business as Usual (BaU)

If no further action were taken to reduce London's CO₂ emissions beyond those already occurring, a BaU scenario, it is predicted that CO₂ emissions in the capital would fall to 40.34 MtCO₂ by 2025 (figure 2.6), a ten per cent reduction on 1990 levels.

The BaU scenario is based on the Updated Energy Projections (UEP) Base Case projected emissions scenario outlined in the previous government's Low Carbon Transition Plan, and

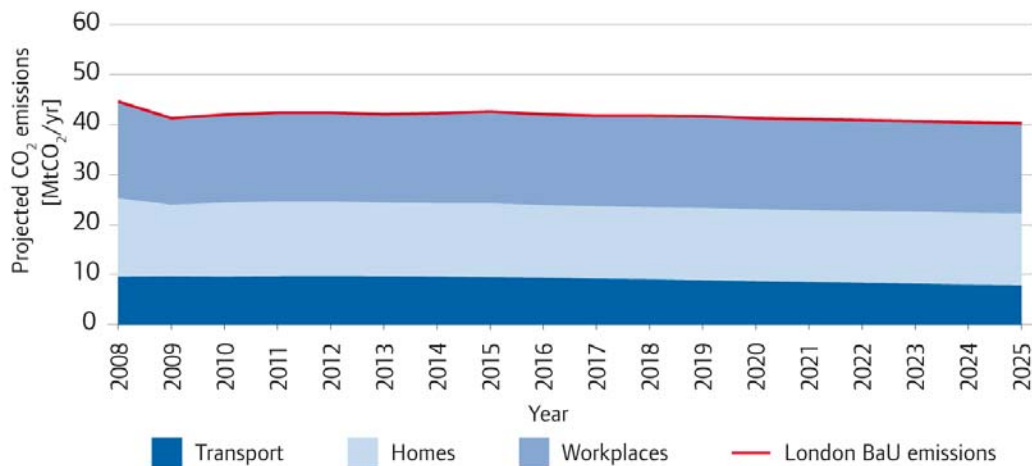
includes CO₂ emissions reductions from programmes which were announced prior to the publication of the Low Carbon Transition Plan. These include decarbonisation of the national grid through the renewables obligation, climate change agreements, building regulations and energy efficiency obligations on energy suppliers.

A dip in overall CO₂ emissions is projected between 2008 and 2010^{viii}. 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 CO₂ emissions relative to 1990. Transport sector emissions would be expected to decrease by 16 per cent by 2025, mainly as a result of market-driven improvements in vehicle efficiency. The corresponding BaU reduction for workplaces is projected to be ten per cent less.

BaU predictions are important because it is against these that future CO₂ savings are made. If BaU projections indicate that CO₂ emissions will grow considerably, this increases the relative savings required to achieve the Mayor’s target to reduce CO₂ emissions by 60 per cent by 2025, based on 1990 levels.

Figure 2.6 Projected Business as Usual CO₂ emissions in London (2008-2025)



Source: GLA modelling and DECC modelling

2.6 Reaching the Mayor's CO₂ reduction target

To meet the Mayor's CO₂ emissions reduction target of 60 per cent on 1990 levels by 2025, five sources of emissions savings are considered in this strategy:

- **BaU reductions** - These CO₂ 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 CO₂ emissions will fall to 40.34 MtCO₂.
- **Reductions through committed government policy** - In July 2009, the previous government published the UK Low Carbon Transition Plan that set out a range of policies to reduce the UK's CO₂ emissions. This strategy includes the CO₂ emissions reductions that are projected to result from this Plan in London, a total of 7.49 MtCO₂ 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 policy** - This strategy sets out a range of policies and actions that the Mayor, working through the GLA group and encouraging action by others (including London boroughs and the private sector), will implement to reduce CO₂ emissions in London. These are set out as committed mayoral actions. By 2025 it is expected these committed policies and actions will reduce London's emissions by 6.40 MtCO₂ 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 CO₂ savings in areas such as workplaces, transport and decentralised energy. 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 4.40 MtCO₂ per year by 2025.

The combination of committed government and Mayoral activity, and further Mayoral activities, on top of BaU savings, will reduce London's CO₂ emissions to 22.05 MtCO₂ per year by 2025, a fall of 51 per cent on 1990 levels. A further 4 MtCO₂ of savings will therefore be required to meet the Mayor's CO₂ emissions reduction target of 60 per cent on 1990 levels by 2025. The Mayor cannot achieve this alone. It will require government to go further, and adopt an extended ambition for reducing CO₂ emissions, as recommended by the Committee on Climate Change.

- **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 the government's target to reduce CO₂ 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 CO₂/kWh by 2025, and an increase in the uptake of electric vehicles. If adopted this would reduce London's CO₂ emissions by a further 4.36 MtCO₂ per year by 2025, achieving a 60 per cent CO₂ emissions reduction against 1990 levels.

Table 2.1 sets out how the projected CO₂ emissions reductions achieved through each of the above five areas will contribute towards meeting the Mayor's CO₂ emissions reduction target. It shows that the majority of savings will come through committed and further Mayoral policy, 40 per cent. Government policy will contribute 27 per cent to the 2025 target. The BaU delivers 17 per cent, and a further 16 per cent can be delivered through further government action.

Table 2.1 Proposed CO₂ emissions reductions for London

Source		Total savings by 2025 (MtCO ₂ per year)	Proportion of total savings (per cent)	Contribution to 60 per cent reduction target
BaU		4.71	17.2 per cent	10.5 per cent
Committed government action		7.49	27.4 per cent	16.6 per cent
Mayoral	Committed action	6.40	23.4 per cent	14.2 per cent
	Further action	4.40	16.1 per cent	9.8 per cent
Further government action		4.36	15.9 per cent	9.7 per cent
Total		27.36	100 per cent	60.7 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. On average, from 2026-2050, Mayoral action in this

strategy, combined with government action, will reduce London's emissions by an additional 0.25 MtCO₂ year-on-year.

Beyond 2025, the Mayor will seek to put in place policies and actions to reduce CO₂ emissions to 80 per cent of 1990 levels by 2050. This will bring London's CO₂ emissions down to 9 MtCO₂ per year, contributing 7.6 per cent to the UK's overall CO₂ 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^{ix}. However, the low carbon agenda is quickly evolving due to changes in European 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.

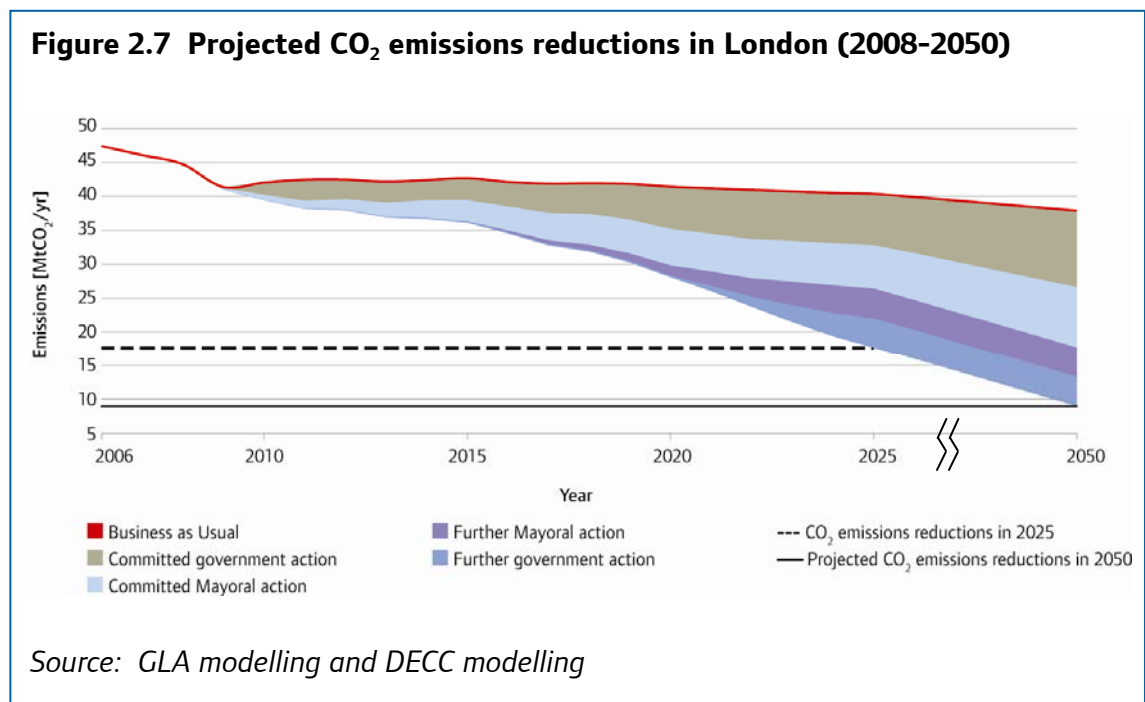


Figure 2.8 looks at CO₂ emissions savings by 2025, and breaks them down by sector. The workplaces sector sees the greatest total savings, with a reduction of 13.65 MtCO₂ by 2025, (31 per cent of 1990 levels), largely due to it being the largest consumer of electricity. It benefits most from CO₂ reductions achieved in energy supply through decarbonisation of the grid electricity, and further implementation of decentralised energy in London. The domestic sector also delivers significant savings with a reduction of 9.19

MtCO₂ by 2025 (42 per cent of 1990 levels), the majority of which comes from Mayoral programmes. Emissions from the transport sector reduce to 4.95 MtCO₂ by 2025 (52 per cent of 1990 levels). This is within the context of a projected increase in the use of public transport within London. However, these savings could be even greater. This relies on significant action on the part of the EU and government and actions that are outside of the scope of the Mayor’s powers.

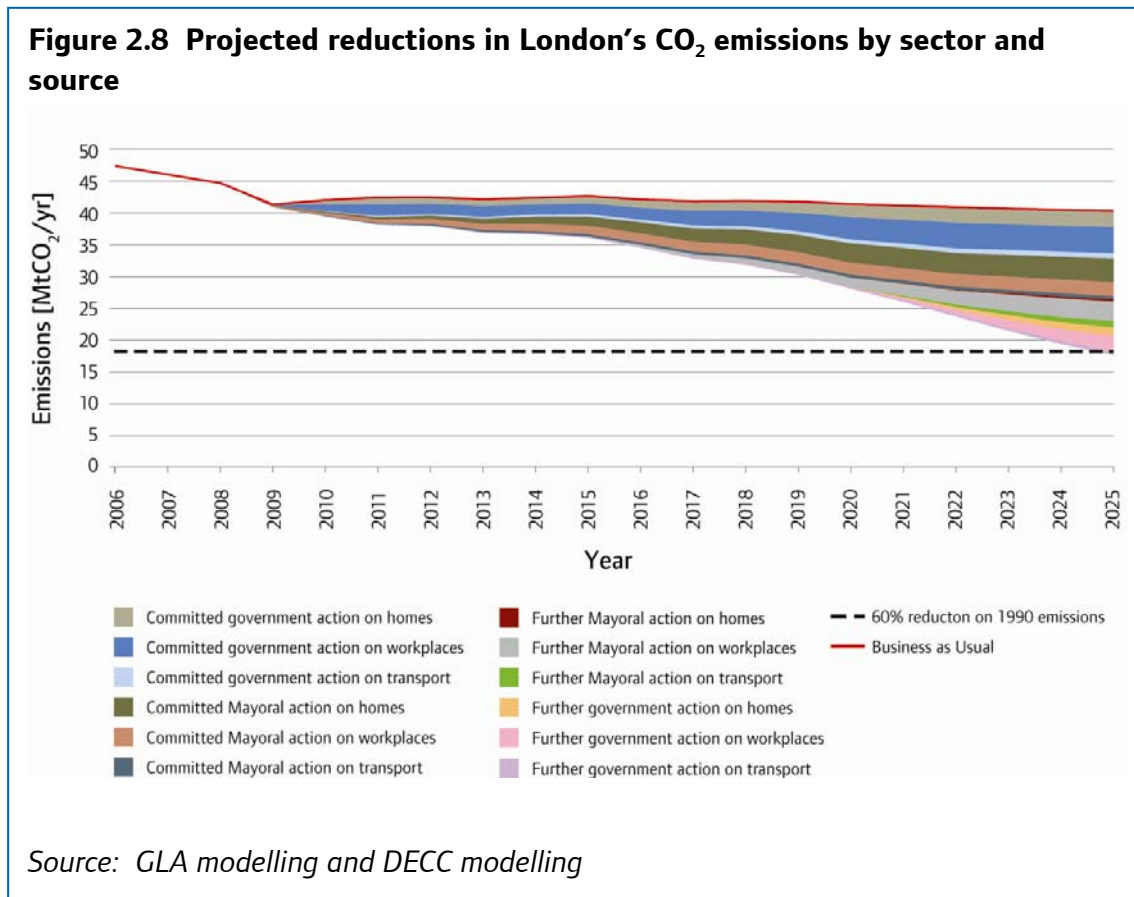
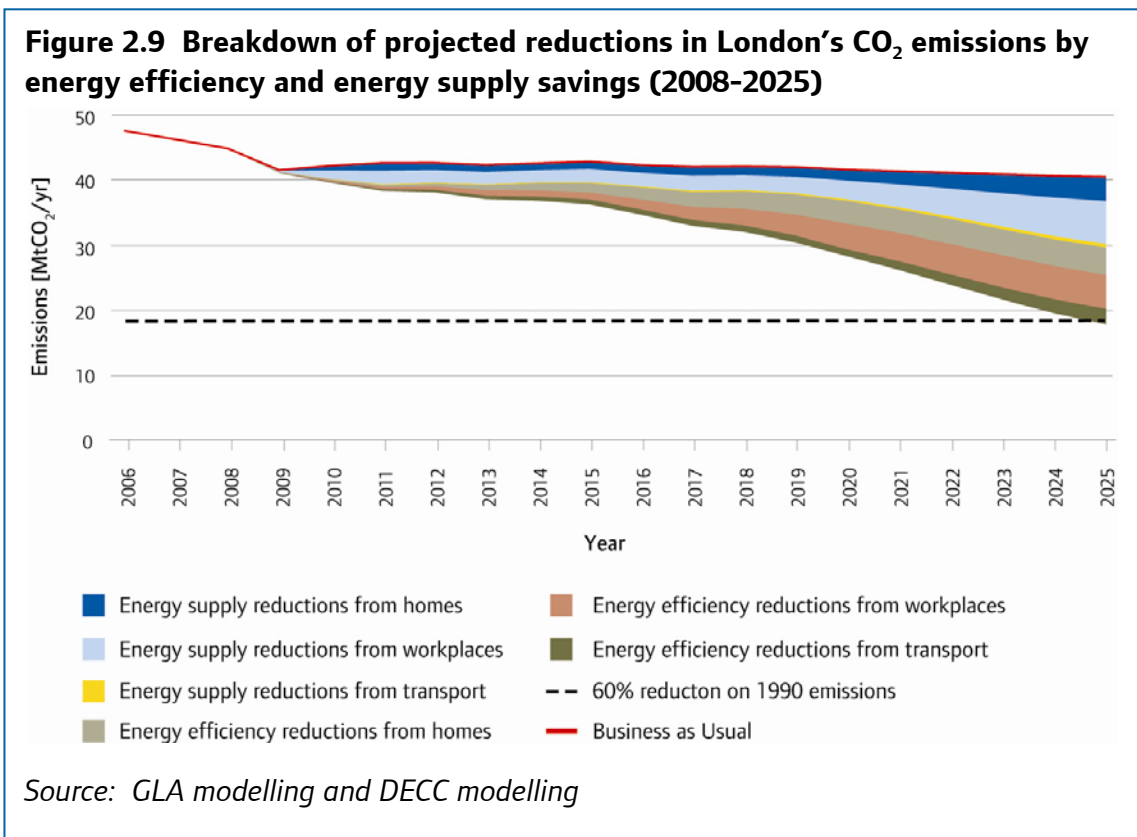


Figure 2.9 compares the savings achieved through decarbonisation of energy supply to those achieved through energy efficiency measures in each sector. Excluding BaU savings, the homes sector has the highest percentage of energy efficiency savings at 53 per cent. Energy supply savings are more significant in the workplaces sector, at 56 per cent of savings. In the transport sector energy efficiency savings are high at 81 per cent, largely due to the expected growth in electric vehicles. Overall, the split between energy

efficiency savings and energy supply savings are expected to be roughly equal at 11.8 MtCO₂ per year by 2025 and 10.8 MtCO₂ per year by 2025 respectively.



2.7 Reducing London's CO₂ 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 CO₂ emissions by 60 per cent of 1990 levels by 2025, secure a low carbon energy supply for London, maximise the economic opportunities, 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 London Sustainable Development Commission, Capital Consumption: the transition to sustainable consumption and production in London (2009)
- ⁱⁱⁱ 'CO₂ equivalent' is used to compare GHGs, based upon their global warming potential.
- ^{iv} GLA, Focus on London (2009)
- ^v Defra, e-Digest Statistics about: Climate Change (2009)
- ^{vi} DECC Statistics, Local and regional CO₂ emissions estimates for 2005-2008 (2010)
- ^{vii} The LEGGI attributes CO₂ 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} DECC, Low Carbon Transition Plan (2009)
- ^{ix} To achieve the 80 per cent target by 2050 shown in figure 2.7, government is expected to deliver an additional 0.15 MtCO₂ each year between 2025 and 2050, whilst the Mayor will deliver an additional 0.1 MtCO₂ each year. Savings from further government action are predicted to remain constant and will deliver no additional savings beyond that achieved in 2025.



3 Making London one of the world's leading Low Carbon Capitals

Summary

Aim

By 2025, London will be one of the world's leading Low Carbon Capitals and the world's leader in low carbon finance. It will provide opportunities for businesses, inward investors and Londoners to participate in the global low carbon economy, and generate jobs and create wealth for London and the UK economy.

The Mayor will contribute towards this through the following policies:

- **Policy 1 - Combining London's existing economic strengths and institutions with its influence and capacity to drive demand and attract inward investment in the low carbon economy** - By leveraging London's existing economic strengths, driving inward investment and fostering innovation, the Mayor will help to create the right conditions to stimulate demand for low carbon growth.
- **Policy 2 - Helping Londoners to gain the skills and experience needed to participate in the low carbon economy** - By understanding the skills needed to support the low carbon sector in London, creating appropriate jobs and training opportunities through the Mayor's programmes, coordinating the requirements for low carbon skills training and employment support, and encouraging government to provide the right policy framework, the Mayor will ensure that Londoners have the skills and awareness to participate in the low carbon economy.

The Mayor's main programmes to deliver this are:

- **The London Green Fund** - This is currently 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.
- **The Green Enterprise District** - The Green Enterprise District, covering six boroughs in east London, is the flagship project to help London become a world-leading Low Carbon Capital. It will promote clusters of low carbon activity and will draw in large-scale investment for innovative low carbon technologies ranging from energy generation and distribution to waste management, creating up to 6,000 jobs.
- **The Low Carbon Employment and Skills Programme** - A suite of projects that will ensure the most disadvantaged Londoners are able to secure sustainable employment within the low carbon economy. In addition to this programme, the Mayor will also work with London's largest existing environmental employers to ensure that the skills and training they offer meet anticipated demand for low carbon goods and services.

3.1 Introduction

This chapter builds on the evidence set out in chapter 2 on the scale of CO₂ emissions reductions that will be required to achieve the Mayor's CO₂ emissions targets. It details the economic transition that will be required to meet these targets, the opportunities for London within the low carbon economy, and the key policies and actions the Mayor will pursue to realise these opportunities.

The drive for low carbon economic growth cuts across the entire economy, not just the environmental and clean technology sectors. Creating a low carbon economy will require the existing economy to continue to operate and grow whilst reducing the carbon intensity of the activity that drives it. The expectation is that by making the transition to a low carbon economy in the most cost effective way, London will reduce its reliance on activities that generate CO₂ and seek to promote more efficient and sustainable systems. This transition forms a fundamental part of the Mayor's approach to meeting London's 60 per cent CO₂ reduction target.

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. For example, a number of businesses have already expressed interest in locating to the Green Enterprise District.

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

Before setting out how London will make this transition, it is important to understand London's current position. The global low carbon environmental goods and services sector was estimated to be worth over £3 trillion in 2007/08. This sector was made up of three distinct sub-sectors: the environment sector, the renewable energy sector and the emerging low carbon sector. The UK market was estimated at £106 billion of which London made up just under £21 billionⁱ.

London's market was made up as follows: £3.8 billion in the environment sector, £6.4 billion in the renewable energy sector and £10.7 billion in the emerging low carbon sectorⁱⁱ. This market was split approximately equally between businesses involved in direct activity in London and those involved in supply and value chain activity outside of London.

The previous government began to define the landscape of the low carbon economy in the UK in documents such as the Low Carbon Transition Plan and the Low Carbon Industrial Strategy. These policy statements identified specific sectors and sub-sectors in a global low carbon marketplace where the UK has or could develop a competitive or commercial advantage.

The new coalition government is yet to take an overall view on how to transition the UK to a low carbon economy, but has made a number of announcements. In the June 2010 budget statement, it announced proposals to reform the climate change levy in order to provide more certainty and support to the carbon price. Details of this are due to be published in autumn, and following consultation, government intends to bring forward relevant legislation in the Finance Bill 2011. The new coalition government has also announced its intention to publish detailed proposals on the creation of a Green Investment Bank, following the Spending Review, to help the UK meet the low carbon investment challenge. The Green Investment Bank Commission has submitted its set of recommendations to government for the scope and structure of the bankⁱⁱⁱ.

3.3 The opportunities and challenges in becoming a world leading Low Carbon Capital

Although current and planned government activity will assist in growing London's low carbon economy, more will need to be done to transform it into a world-leading Low Carbon Capital. There are a number of challenges that London will need to overcome, along with a number of opportunities that it will need to maximise, 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 CO₂ emission targets are to be met. If London were to secure even one per cent of the forecast global spend on 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^{iv}.

There is also a growing recognition that fossil fuels are finite, and will become an increasingly costlier source of energy as time goes on. This recognition 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 Conference in Copenhagen, a number of countries have started providing detail on their position on CO₂ reductions. For example the European Union has set a target of a 20 per cent reduction in CO₂ emissions by 2020 and China set a 'binding goal' to cut CO₂ 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 have committed significant resources to delivering low carbon growth. For example:

- China has allocated more to green investment than any other country; approximately 38 per cent of China's Yuan 4,000 billion (£368 billion) economic stimulus package is allocated to green themes^v.
- The US administration passed America's Reinvestment and Recovery Act (ARRA), which includes US\$94 billion (£58 billion) in green stimulus funding. Activities include support for electric vehicles and their supply chains.
- In South Korea, the Green New Deal has been expanded to a five-year growth plan with total planned expenditures of KRW107t (£57.2 billion), about two per cent of the country's GDP. It aims to create 1.5 to 1.8 million jobs by 2013 and economic value of KRW182t (£97.3 billion) to KRW206t (£110 billion).
- The French government is dedicating €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 has 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 CO₂ 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 all 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 and 388,000 businesses and enterprises. 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^{vi} 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.
- **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.
- **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 across the capital as a leader 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.

- **Leadership** - London has committed to ambitious targets for CO₂ 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.

Table 3.1 gives an indication of where London stands across a range of measures compared with other major European cities. The Scroby Sands case study in box 3.1 illustrates how London is already using its strengths to generate economic activity.

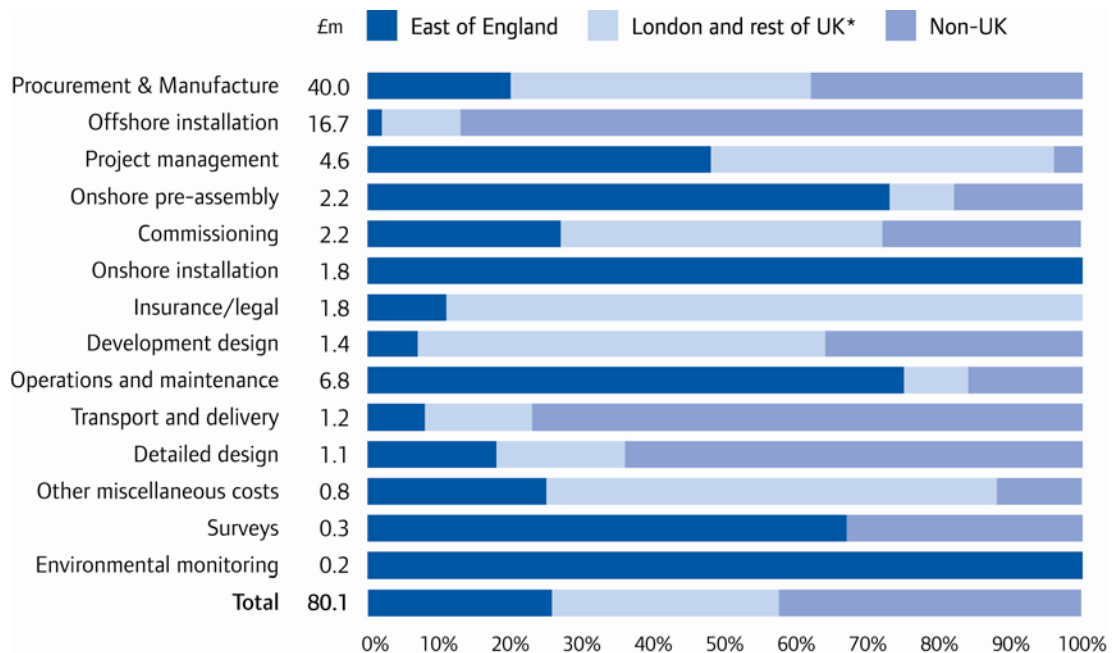
Table 3.1 London's strengths versus other cities to attract inward investment

City/ Ranking	Green Credentia l	Size of Local econ- omy	Global Brand	Infra- structure	Skills (Work- force)	R & D	Commerc- ialisation	Finance	Business Services	Manufa- cturing
	Carbon footprint per capita, emission target	GDP per capita, population	No. of global firms, Global city brand power	Internet & broad-band access per 1000 population, length of motorway per vehicle, airfreight disem-barked and embarked per 1000 population	Labour productivity, Gross monthly earnings, Managers per 1000 employees	Per capita spend on R&D, Per capita spend on R&D by public sector, Per capita spend on R&D by private sector, Employ-ment in R&D per 1000 population	No. of patents registered per million population, Private equity \$ per capita	World's best financial cities index ranking, Global Financial Centres Index	Employ-ment in business services sector per 1000 employees	Employ-ment per 1000 in Auto- motive industries, Hi-tech manufac-turing and machinery and equipment manufac-turing
London	=2	=1	1	2	1	3	=3	1	1	4
Paris	=2	=1	2	3	2	1	=3	2	2	3
Stock-holm	1	2	4	1	3	2	1	=3	5	2
Munich	=2	=3	5	5	4	4	2	=3	4	1
Madrid	3	=3	3	4	5	5	4	4	3	5

Source: Ernst & Young

Box 3.1 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 7GW 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. The chart below demonstrates, through the bars in light blue, 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 and other miscellaneous costs.



Source: Ernst & Young

* London is the primary provider with the exception of Manufacturing, Pre-assembly and Other Misc

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

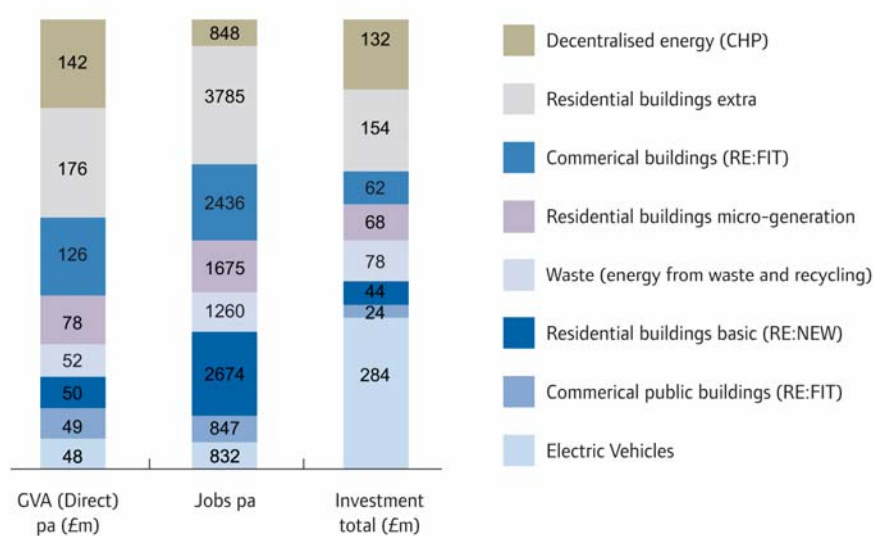
The Mayor's programmes as set out in this strategy will help London build on these strengths.

Implementation of the Mayor's climate change mitigation programmes will act to stimulate further private sector investment in London – a type of 'green new deal' for

London. Under a ‘most likely’ scenario these programmes alone will require an annualised average of £845 million investment per annum through to 2025. This investment would not only result in an estimated annualised average of 14,000 (gross) jobs per annum and £720 million per annum in gross value added to the UK economy, but would at the same time deliver part of the activity and infrastructure required to meet London’s 2025 CO₂ reduction target.

Figure 3.1 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. The majority of the opportunity lies in the ‘manufacturing’ and the ‘construction and installation’ sectors. As this activity will take place in London, this represents a considerable opportunity for London’s businesses. There are also a range of opportunities for London in light of the strengths that have been identified in this chapter especially in the areas of ‘research and development’, ‘financial services’ and ‘business services’.

Figure 3.1 Projected Gross Value Added, investment and jobs through the Mayor’s climate change mitigation programmes by 2025

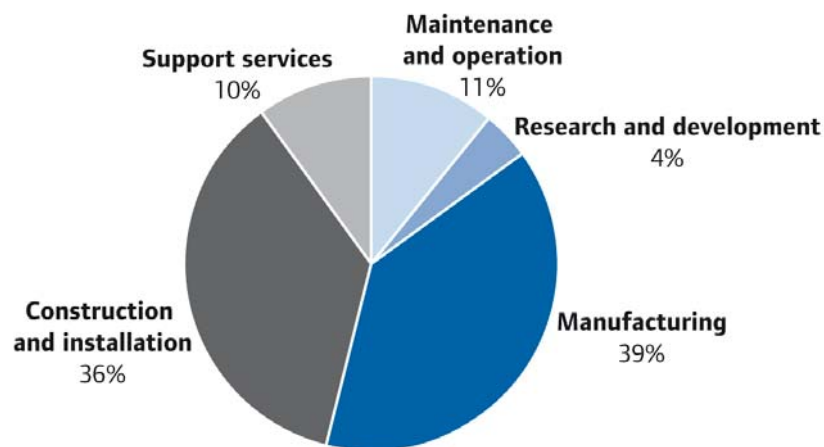


Source: Ernst & Young, Prospectus for London, the Low Carbon Capital, 2009

Figure 3.2 breaks this down further, looking at where opportunities exist for London's businesses in the value chain of the Mayor's climate change mitigation programmes.

A significant portion of the opportunities identified in figure 3.2 will be delivered through large-scale retrofitting activity. The following proportions of GVA by source are anticipated to come through Mayoral retrofitting programmes alone: 27 per cent of 'research and development' 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 60 per cent CO₂ reduction target.

Figure 3.2 GVA by source from the Mayor's climate change mitigation programmes



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

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 that 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 in London that will attract the leading international companies to invest here, and not 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^{vii}.

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/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.

3.4 Mayoral action to position London as a world leading Low Carbon Capital

The previous sections have set out the current status of the low carbon economy in London and the opportunities and challenges to building on this. 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 priority low carbon sectors identified by government where the UK can take a global lead such as energy efficiency, carbon capture and storage, wave and tidal energy, off-shore wind, nuclear and low carbon vehicles; by identifying where London's strengths lie in the value chain of each of those sectors
- 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 market place
- create the conditions that drive low carbon growth and stimulate demand for, and market opportunities in, the low carbon economy.

Over the past year, the Mayor has commissioned research across the public, private and third sectors to explore the barriers, the enablers and the 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^{viii}. These areas are closely inter-related, aligned to the Mayor's ambitions for London, and will work 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.
- **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.
- **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.

- **Establishing London as a low carbon innovator and exporter of low carbon solutions** - Optimising London's existing low carbon R&D strengths by improving coordination and knowledge transfer, increasing awareness of existing sources of funding and creating a clearer connection between private sector demand and low carbon R&D.
- **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.
- **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.

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

Policy 1 Combining London's existing economic strengths and institutions with its influence and capacity to drive demand and attract inward investment in the low carbon economy

Vision

London will have the right policy, fiscal and regulatory environment to attract low carbon investment, drive demand for low carbon growth, and support London's transition to a low carbon economy. London will harness and develop its inherent strengths and resources to respond to this market opportunity and become one of the world's leading Low Carbon Capitals.

Vision to policy

Working with partners and through the LDA, the Mayor will ensure that London uses its economic and academic strengths whilst capitalising on its size to create real market demand for low carbon goods and services. This will create the market conditions that will drive innovation and entrepreneurship whilst enabling low carbon growth and London's low carbon economy to prosper.

Working with partners and through the LDA, the Mayor will ensure that his climate change mitigation programmes drive demand for low carbon goods and services through developing and proving new business models.

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.
- **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.

b) Showing the way and setting the standard

- **Action 1.3** - 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, for example through the London Plan and Economic Development Strategy as well as this strategy.
- **Action 1.4** - The Mayor will work with public and private sector partners to develop networks that share and develop approaches to stimulating demand for low carbon goods and services.
- **Action 1.5** - The Mayor, through the LDA, will work with the National Physical Laboratory and National Measurement Office to pursue their goal of setting up 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 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 develop London's capacity to generate low 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** - The Mayor will promote existing programmes that support the development of Research & Development activity, such as the London Technology Network, and work with partners to develop or restructure programmes that will further accelerate commercialisation of London's research.
 - **Action 1.10** - Working with partner organisations, such as universities, the Mayor will investigate the opportunity to develop a low carbon technology competition for London's students with a prize for the best new ideas.
 - **Action 1.11** - The Mayor will work with London's financial exchanges and financiers to explore additional sources of financing for businesses to develop low carbon innovation and research activity.
- e) Attracting the green pound*
- **Action 1.12** - The Mayor will work with London's inward investment agencies to promote the Low Carbon Capital and Green Enterprise District programmes and to co-ordinate activity aimed at attracting inward investment for the low carbon economy.
 - **Action 1.13** - The Mayor, through the LDA, 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 1.14** - The Mayor will work with partners from the public sector to investigate further how London can use joint procurement to stimulate demand for low carbon products 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 and academic institutions, and in its ability to offer venture capital and clean technology funding. The

Mayor will provide 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.

Together, London's carbon trading strength, the LSE, the FTSE environmental markets index series and the AIM combine 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 will:

- work with the London Stock Exchange to promote the Environmental Indices, starting with their re-launch in September 2010
- support FTSE in promoting the Indices to pension funds and institutional investors

- network with venture capital firms to raise awareness of the Environmental Indices as an investment and exit route
- encourage government to ensure London's leadership is protected, including exploring the need for tax incentives to attract further investment.

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 status brings together a range of projects that are being undertaken in London to improve the energy efficiency of the existing building stock. It will aim 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. It will then work to share its expertise with other regions of the UK to support them in delivering leading-edge retrofitting programmes.

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 programme. The project is capturing the learning from an extensive range of research and demonstration projects 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.

The Centre for Efficient and Renewable Energy in Buildings (CEREB) case study in box 3.2 illustrates how low carbon building solutions are already being shared in London.

Box 3.2 Case study - Centre for Efficient and Renewable Energy in Buildings (CEREB)

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 new London South Bank University K2 teaching facility, the centre brings together innovative technologies built into the centre itself. The centre 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 it 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.

Identifying future strengths

The Low Carbon Skills for London research^{ix} has 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 and these are:

- carbon finance
- geothermal
- wind
- alternative fuels
- building technologies.

The Mayor, through the LDA, will use this, along with 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 focussed 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. The Mayor will act to promote London as a leader in the low carbon economy by presenting the best of London's local and innovative low carbon policies to government. 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 pan-London programmes. This will provide the level of certainty that the private sector needs to encourage investment. Specific recommendations are contained within the sector chapters 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, including lobbying for tax breaks for green industries and incentivising low carbon investment.

Whilst this strategy is primarily aimed at reducing London's direct emissions, the Mayor recognises that to drive the low carbon economy in London will require reductions in both direct and indirect CO₂ emissions. This will result in real market opportunities for businesses that are active in reducing CO₂ emissions within sectoral or individual business supply chains. The Mayor is therefore working towards a methodology to measure London's CO₂ emissions, and identify existing and proposed programmes for specific sectors in London that are designed to reduce the CO₂ emissions related to their supply chains. For more information on measuring London's indirect CO₂ emissions, please see chapter 10.

To stimulate demand further, the Mayor will work with public and private sector partners to develop networks that share and develop approaches to stimulating demand for low carbon goods and services.

Finally, the Mayor, through the LDA, will work with the National Physical Laboratory and National Measurement Office to pursue their goal of setting up a London-based Centre for Carbon Measurement, demonstrating London's leadership in this area.

c) Making London's size count

The investment required to meet London's 60 per cent CO₂ reduction target by 2025 has been estimated to cost in the region of £40 billion. This creates a major low carbon investment opportunity for the private sector.

To attract private sector investment the Mayor will work to stimulate and aggregate demand for large-scale climate change mitigation programmes. By creating this scale of investment opportunity and working in partnership with partners, the Mayor will create investment models and mechanisms that can attract the levels of private sector investment required to deliver this low carbon transition.

In addition to stimulating investment, the Mayor's programmes will also create demand for suppliers of retrofitting products and services and thereby employment opportunities, including for Energy Service Companies (ESCOs) and their supply chains. More detail on these programmes is laid out in chapters 4, 5 and 6.

The London Green Fund

Mayoral programmes to reduce CO₂ emissions, if rolled out and financed as proposed, will create investment opportunities in excess of £14 billion^x. This turns entirely on creating and delivering viable public-private financing models by proving the business case for investing in climate change programmes.

As stated in chapter 1 of this strategy, the Mayor will increasingly use public sector money to make investments in, not grants to, carbon reduction 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 already putting unprecedented levels of funding into climate change programmes with over £100 million being invested over the next four years (of which £71 million is from the LDA).

The Mayor's mechanism for attracting further investment is the London Green Fund. This has been established by using the Joint European Support for Sustainable Investment in City Areas (JESSICA) mechanism for delivering European Regional Development Funding. 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 will initially invest in waste facilities, decentralised energy and energy efficiency programmes. 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 London Green Fund has been established as a Holding Fund with an initial value of £100 million. This Holding Fund is being managed by the European Investment Bank and is made up of £50 million from the European Regional Development Fund (ERDF) and £50 million in match funding from the LDA and London Waste and Recycling Board (LWaRB). The fund will have two 'Urban Development Funds' (UDFs) from mid-2011. The energy efficiency UDF has a provisional allocation of £50 million and the waste infrastructure UDF of £36 million. The remaining £14 million will initially be held in the Holding Fund before being allocated to the UDFs for investment before 2015.

These UDFs will be 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, the LDA 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. The Waste UDF is already in the process of procuring a fund manager and the energy efficiency UDF procurement process started in the middle of September 2010.

The medium-term aim is that the fund will leverage further funding from other government sources, development banks, sovereign funds and infrastructure funds to achieve a fund size upwards of £500 million.

Government has recently announced its intention to create a Green Investment Bank (GIB) to provide the financial support to enable the UK to make the scale of investment that is required over the next 40 years to meet the UK carbon reduction target of 80 per cent by 2050. The Green Investment Bank Commission has published proposals relating to how the Bank will work. Government is expected to announce details of how it will operate later this year. (Please see box 3.2 for more information on the commission's report).

The Mayor will actively encourage government to ensure that the Green Investment Bank is established quickly and that it supports his climate change priorities. In the capital, it will be those initiatives prioritised by the London Green Fund. It will also support and complement the activities of the London Green Fund.

Box 3.3 The Green Investment Bank Commission Report

The Green Investment Bank Commission, the independent group brought together by the Chancellor of the Exchequer and the Minister for Climate Change, has published a report making recommendations to government on how the UK can make the transition to a low carbon economy most cost effectively.

The GIB is the vehicle that has been identified to unlock the investment needed and address the numerous market failures and investment barriers that have prevented financing of low carbon infrastructure investment at the speed and scale required.

The GIB would facilitate investment in low carbon projects, which the commission estimates requires infrastructure investment of up to £550 billion between now and 2020.

The commission has proposed that the GIB could help catalyse low carbon investment in some of the following ways:

- Unlocking project finance by equity co-investment or risk mitigation products for low carbon technologies and infrastructure.

- Creating green bonds to access capital markets. These would fit with the long-term investment horizons of pension funds and life insurance companies and could channel significant sums into the low carbon transition.
- Developing Green ISAs that would be an important and visible way for retail investors to make a contribution to the funding of green infrastructure.
- Using the potential rationalisation of quangos and their funds to radically improve government support for low carbon innovation and commercialisation.

The commission also called on government to appoint a 'shadow' board to lay the groundwork for the new bank while the Comprehensive Spending Review is being prepared and a GIB Bill is drafted and taken through Parliament.

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 and tends to be concentrated in proven technologies. There is a risk that key low carbon technologies could be developed elsewhere and pull highly-skilled people to these centres.

The LDA already supports a number of projects that enable businesses and R&D institutions to invest in innovation and product development. 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 work with partners in the public and private sector to assess the existing provision of support for innovation and technology development from concept through to market, in order to understand the support that already exists and where the gaps are. This will include a review of the LDA's own programmes and looking at potential low carbon innovation investment funds to address those gaps in the commercialisation journey where funding is not available. 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, both the direct and indirect CO₂ emissions.

Existing support will then be actively promoted 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 education and business partners, including universities, to establish a competition that will encourage London's students to get involved in designing innovative new products and processes for the low carbon market. The Mayor will provide a prize for the best new ideas.

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.

As an example, the Mayor, through the LDA, 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 will also actively promote 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 to build on the 'Prospectus for London, the Low Carbon Capital' as well as the Green Enterprise District study.

The Mayor will work with London's inward investment agencies to use the Low Carbon Capital and Green Enterprise District programmes to promote London's initial low carbon investment priorities and co-ordinate activity aimed at attracting inward investment for the low carbon economy.

In addition, the Mayor will promote London's low carbon opportunity through the clustering of businesses involved in the same or related sector to create areas of inherent sectoral strengths and opportunities for innovation and partnership working.

London has had significant success historically in encouraging sector agglomeration, for example in the creative and cultural industries, and the legal and financial sectors, in which London is a global leader. 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 Sustainable Industries Park. 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 Green Enterprise District, in east London, has been identified as a priority area for investment by low carbon enterprise. The LDA has also completed the Green Enterprise District study that 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, through the LDA, will implement 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 (the 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 km² of land across six east London boroughs. The district's boundaries do not imply exclusion. However cross-boundary initiatives will be encouraged wherever practicable in an effort to achieve wider carbon reductions and solidify London's standing as a leading Low Carbon Capital.

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). The district is already home to innovative new green projects such as the Sustainable Industries Park, and the London Thames Gateway Heat Network. The recently announced 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 will also be located there.

The district is building on the momentum from these initial successes. London's inward investment agencies are working with a pipeline of cutting-edge companies interested in establishing a presence within the district. Over 15 businesses have already showed potential interest in locating to the district, bringing with them the potential of over 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 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. The Mayor is keen to work 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.

London's boroughs alone are responsible for a supply chain worth over £9 billion. 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 GLA group are fully 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.

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
- drive down London's CO₂ emissions
- stimulate low carbon R&D by demonstrating and de-risking low carbon purchasing solutions.

Actions for change

- identify priority areas and strategic goals for public sector low carbon procurement
- evaluate international models of best practice and consider replicating successful models in London

- identify and support lead boroughs and steering groups to champion research into new low carbon category business cases and tests
- consider establishing a panel of private sector and leading London research institutions to work with the public sector to develop and bring to market low carbon solutions
- establish a way of recognising best practice and innovation in municipal procurement of low carbon technologies.

Policy 2 Helping Londoners to gain the skills and experience needed to participate in the low carbon economy

Vision

Londoners will be employed in a range of sectors linked to the expanding low carbon economy.

Vision to policy

The Mayor, through the LDA and working with partners, will ensure that Londoners are able to develop the skills and knowledge required by businesses operating in the emerging low carbon economy, in order to compete effectively for the jobs created in the low carbon economy.

Policy to action

a) Establishing a clear and consistent evidence base on the employment and skills activity needed to support the low carbon sector in London

- **Action 2.1** - The Mayor will clarify the current employment position, future projections for the low carbon sector in London, and the skill sets and occupations necessary to ensure a transition to a Low Carbon Capital through the Low Carbon Skills for London Research and the OECD International Research.
- **Action 2.2** - The Mayor will identify the existing skills provision available in London and identify gaps both for current demand and future projected demand for the sector through the Low Carbon Skills Forum.

- **Action 2.3** - The Mayor will develop a programme that capitalises upon the skills and employment opportunities created through the Mayor's climate change mitigation programmes, particularly in relation to the long-term workless and existing workforce.
- **Action 2.4** - The Mayor will work with London's largest existing environment employers to develop an understanding of the range, nature and level of skills required to ensure that London can build on its existing strengths.

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

- **Action 2.5** - The Mayor will deliver the Retrofit Employer Accord Project – a pilot to support workless Londoners to access the jobs and training opportunities arising from RE:NEW and RE:FIT.
- **Action 2.6** - 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 2.7** - The Mayor will develop the Low Carbon Employment and Skills project as part of the 2011-13 European Social Fund Programme, delivering sustained employment opportunities in the low carbon sector for London's workless population.

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

- **Action 2.8** - The Mayor will set up the Low Carbon Skills Forum, with members from across the public, voluntary, and private sectors to ensure London's low carbon skills gaps are understood and future provision is stimulated to meet the emerging requirements of the sector.
- **Action 2.9** - The Mayor will deliver a Regional Skills Priorities Statement for London via the London Skills and Employment Board. This will identify and articulate the skills requirements for the low carbon economy and influence future provision in the capital.

To ensure that Londoners can capitalise on the economic opportunities of the low carbon economy will require them to have the necessary skills and experience. This policy will

therefore look at how the Mayor will ensure that Londoners have these skills and the experience.

The Low Carbon Employment & Skills Programme is the response by the Mayor, through the LDA, to ensure skills and training requirements are integrated into the Mayor's emerging strategy for how London and Londoners will benefit from the economic opportunities associated with making the transition to a low carbon economy.

The Low Carbon Employment & Skills Programme comprises three elements:

- creating a clear and consistent labour market evidence base
- creating jobs and training opportunities through the Mayor's programmes
- working with London partners to ensure the provision of skills and employment support to meet the emerging requirements of the low carbon sector.

The following actions set out how the Mayor will deliver these three elements.

a) Establishing a clear and consistent evidence base on the employment and skills 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 will therefore undertake a programme of activities to map London's future low carbon skills requirements and training provision, and identify the most practical and cost effective ways of meeting London's needs.

The LDA is working alongside BIS and DECC, sector skills councils, the London Skills and Employment Board, the Homes and Communities Agency, 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. Particular emphasis has been placed on those growth sub-sectors of the low carbon economy that can provide employment opportunities for

London's workless population. This has been published on the LDA website www.lda.gov.uk.

The key findings of this research are:

- In 2008/09 approximately 100,000 people were employed in the low carbon sector in London. Applying growth assumptions to the labour market, it is estimated that the low carbon sector will deliver 18,000 net jobs by 2012-2013.
- The skills profile is characterised by high skills with more than one in two employees having a degree or above. However, a quarter of all jobs are at level 2 and below suggesting opportunities exist for low-skilled and workless Londoners.
- Higher education (HE) provision is well developed and likely to generate an excess supply of low carbon graduates.
- In contrast the further education (FE) sector has yet to fully respond to the potential of the low carbon economy.
- London and Londoners are well placed to benefit from the transition to a low carbon economy. If harnessed correctly it may be possible for all Londoners to benefit from the direct and indirect benefits of a Low Carbon Capital, and specifically for low-skilled and workless Londoners to play a part in enabling London's transition to a low carbon economy.

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 will compare national strategies on employment, economic and workforce development between London and other parts of the world, and will provide an avenue to demonstrate and disseminate best practice. This will be completed by March 2011.

Building on this research, the Mayor will also work with London's largest existing environmental employers to identify skills and training that they offer, and ensure this both meets expected demand for low carbon goods and services and that Londoners are aware of existing and emerging opportunities.

This research will form the basis of the Mayor's programmes to create jobs and training opportunities through his programmes.

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

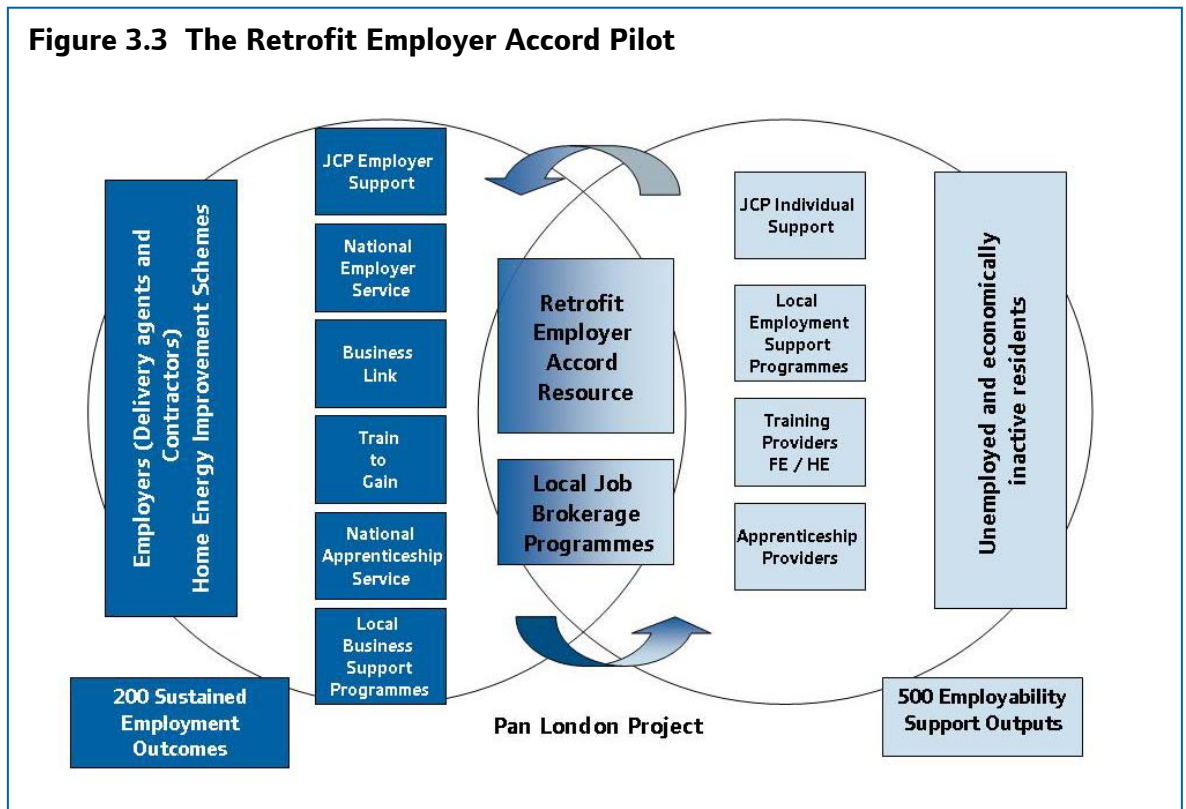
Between 10,000 and 15,000 average annualised jobs (gross) could be created each year by 2025 through the delivery of the Mayor's climate change mitigation programmes^{xi}. These potential jobs will occur in sectors, such as energy efficiency and energy supply, waste-to-energy and low carbon transport, where existing programmes are stimulating demand and creating market opportunities for businesses that supply low carbon goods and services.

To support Londoners to develop the skills and expertise to benefit from these opportunities, as part of the Low Carbon Employment and Skills Programme, the LDA is delivering the Retrofit Employer Accord Pilot (REAP), a pilot aimed at testing a brokerage delivery model which will link the skills and employment opportunities arising from the RE:FIT and RE:NEW programmes to London's long-term workless.

The REAP project is a one year pilot aimed at identifying the volume and level of jobs created via the Mayor's home and public sector building retrofit programmes. Six separate projects are delivering a brokerage model across London whereby an employment broker works with the contractors delivering retrofit activity and identifies suitable workless candidates to fill new positions. The project will deliver 200 sustained jobs by 2012 and support 500 people through training and employment support. Figure 3.3 illustrates how REAP works.

The LDA is also developing a procurement approach for its infrastructure investment such as RE:FIT and RE:NEW that will require local employment, training and apprenticeships throughout the supply chain.

In addition to the above, the LDA is currently developing a new programme of investment in low carbon employment as part of the 2011-13 Adult European Social Fund (ESF) Employability Programme. This has the benefit of leveraging additional funds to support this programme and a co-ordinated approach across London as the programme is being developed in close collaboration with the other co-financing bodies in the capital.



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

In addition to brokerage and collecting an evidence base, the Mayor, through the LDA, has established the Low Carbon Skills Forum to help implement London's programme for low carbon skills. The Forum brings together key London stakeholders, including London Councils, the LDA, Learning and Skills Council, Jobcentre Plus, employer representatives and the education and training providers, 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:

- establish and disseminate London's skills and employment needs if it is to make the transition to a low carbon economy
- identify and co-ordinate any action that is required to ensure that the employment and skills system can effectively support this transition

- identify and coordinate any action required to ensure that these skills and employment opportunities are effectively opened up for the benefit of the London economy.

The Low Carbon Skills Forum will provide information and recommendations to the London Skills and Employment Board via its Employer Programme Board and will seek to ensure that:

- Regional skills and employment priority statements and strategies take into account the emerging needs of the low carbon economy.
- The Higher Education Funding Council for England, higher education and further education colleges, Sector Skills Councils, trade bodies and employers work together to develop cross-sector low carbon skills programmes which respond to employers' needs. This will develop consistent cross-sector low carbon vocational qualifications and increase the profile of low carbon career opportunities in London.
- Employment and training providers, including the third sector, support the long-term unemployed into skills training and sustained employment in the low carbon economy.

3.5 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 INNOVAS, Low Carbon and Environmental Goods and Services: an industry analysis (2009)

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

ⁱⁱⁱ Green Investment Bank Commission, Unlocking investment to deliver Britain's low carbon future (2010)

^{iv} Ernst & Young, Prospectus for London, the Low Carbon Capital (2009)

^v HSBC Climate Change Global, A Climate for Recovery – the colour of stimulus goes green (2009)

^{vi} City of London Global Financial Centres Index

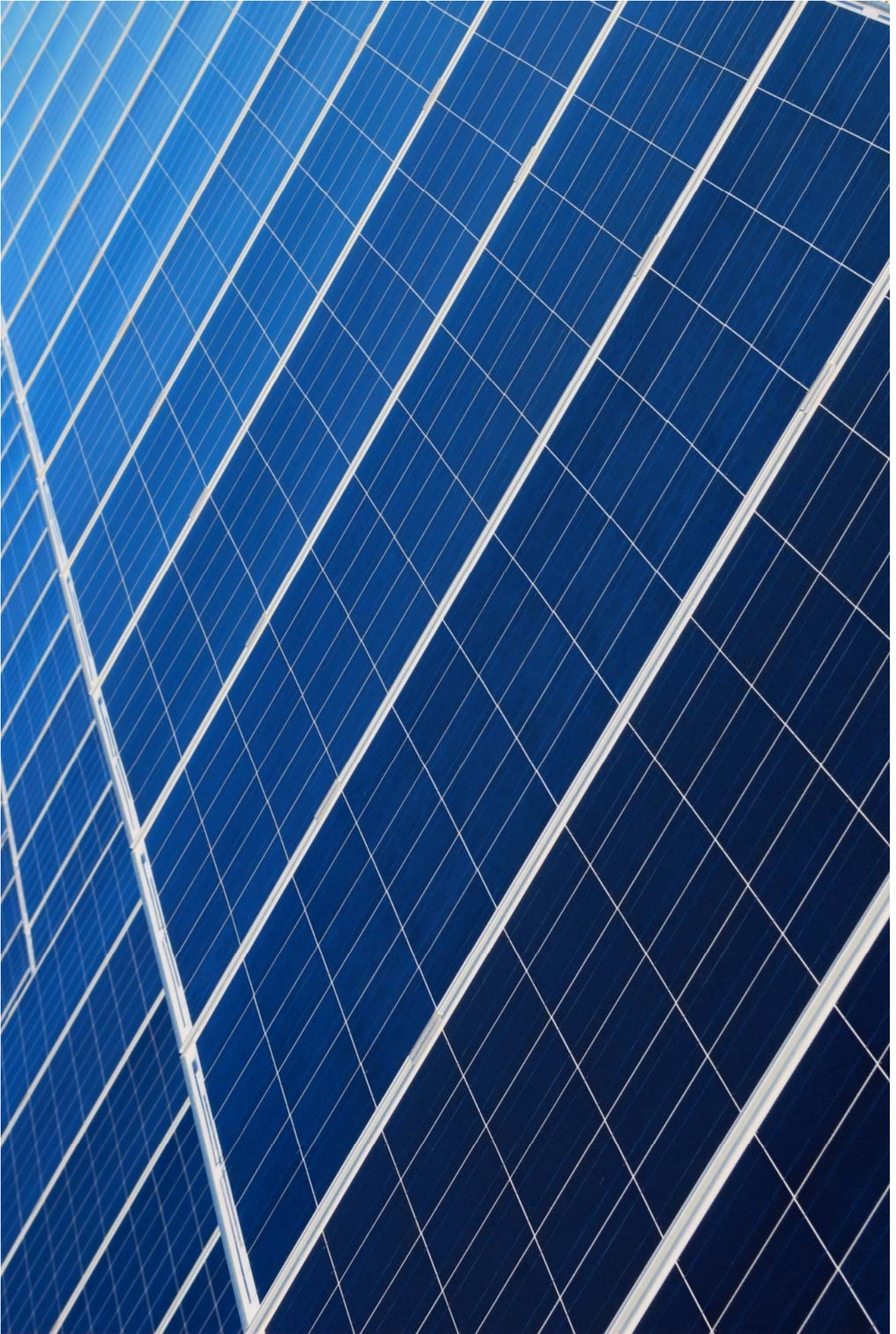
^{vii} Ernst & Young, Prospectus for London, the Low Carbon Capital (2009)

^{viii} London Development Agency, Low Carbon Capital – London as a leader of the low carbon economy (2010)

^{ix} DTZ / Innovas Ltd, Low Carbon Skills for London (2010)

^x Ernst & Young, Prospectus for London, the Low Carbon Capital (2009) (2009 prices)

^{xi} Ernst & Young, Prospectus for London, the Low Carbon Capital (2009)



4 Securing a low carbon energy supply for London

Summary

Aim

To meet the energy demands of London's homes, businesses and infrastructure through the provision of an efficient, affordable and secure supply of low and zero carbon energy, including 25 per cent from decentralised energy by 2025.

The Mayor will contribute towards this through the following policies:

- **Policy 3 - Enabling the identification and development of decentralised energy opportunities** - Tools and support to identify and develop decentralised energy schemes in London will be provided to London boroughs and the wider public and private sectors.
- **Policy 4 - Delivering decentralised energy through the planning system** - New development will, wherever possible, either support the expansion of existing decentralised energy systems or include new systems onsite. Strategic planning documents will identify priority areas for decentralised energy networks.
- **Policy 5 - Enabling the commercialisation of the decentralised energy market** - Investment in, and facilitation and delivery of exemplar decentralised and renewable energy projects will be underpinned by activity that develops a suitable market framework for decentralised energy.

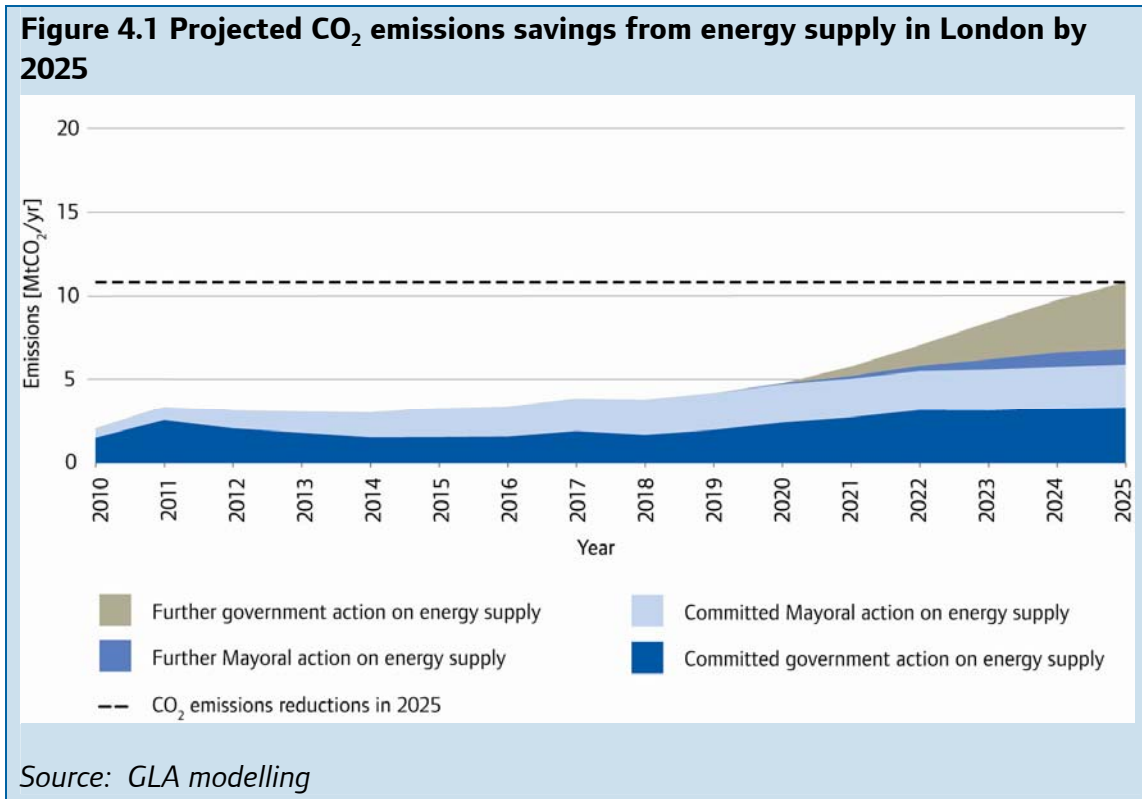
The Mayor's main programmes to deliver this are:

- **London Heat Map** - A web-based, interactive Geographic Information System tool that helps to identify decentralised energy opportunities for boroughs, generation companies and developers.
- **The Decentralised Energy Masterplanning Programme** - Offering a comprehensive package of support to boroughs, helping them identify and develop decentralised energy projects.
- **Co-development of exemplar decentralised energy projects** - One example is the London Thames Gateway Heat Network.

- **London Green Fund** - Investing in and attracting investment to strategic-scale decentralised energy and renewable energy projects.
- **Dedicated centre of expertise** - A committed team at the LDA providing strategic guidance, co-ordination of opportunities and support on decentralised energy to the public and private sectors.

CO₂ emissions from London's energy supply: 2008 - 2025

- **Current CO₂ emissions** - In 2008, CO₂ emissions from London's energy supply to homes and workplaces were 35.10 MtCO₂ per year.
- **Business as Usual CO₂ emissions by 2025** - Under a BaU scenario, London's energy supply emissions to homes and workplaces would be expected to reduce to 32.41 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from committed government action** - Decarbonisation of the national electricity grid will reduce London's CO₂ emissions from energy supply by 3.35 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from committed Mayoral action** - Committed Mayoral action is expected to reduce London's CO₂ emissions from energy supply by 2.57 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from further Mayoral action** - If support and funding is forthcoming so the Mayor can adopt a more ambitious target to supply 30,000 GWh per year from decentralised sources, CO₂ emissions from London's energy supply is expected to reduce by 0.93 MtCO₂ per year.
- **CO₂ 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, CO₂ emissions from London's energy supply is expected to reduce by a further 3.98 MtCO₂ per year.



4.1 Introduction

Building on the climate change evidence base set out in chapter 2 of this strategy, this chapter addresses the CO₂ emissions associated with energy supplied to buildings and stationary infrastructure in Londonⁱ and the security of that energy supply in the future. CO₂ emissions savings from the supply of low and zero carbon energy are taken into account within the homes, workplaces, transport and new development sectors of this strategy. Although CO₂ savings from the energy supply sector are discussed and quantified here, they are accounted for in other sectors to avoid double counting.

This chapter will:

- summarise London's current CO₂ emissions from energy supply
- summarise London's CO₂ emissions from energy supply under a BaU scenario

- summarise the CO₂ reductions expected as a result of committed government action on energy supply
- set out the challenges and opportunities for London to reduce its CO₂ emissions from energy supply and to guarantee its future energy supply, developing a more flexible and open energy supply market
- detail the specific policies and actions that the Mayor has committed to take to reduce London's CO₂ emissions from energy supply
- set out further Mayoral action that can be taken to reduce CO₂ emissions from energy supply, and that will be deliverable subject to further support, including funding from government and the private sector
- summarise further action that government will need to take to support the achievement of the Mayor's CO₂ emissions reductions targets.

4.2 Current CO₂ emissions from London's energy supply

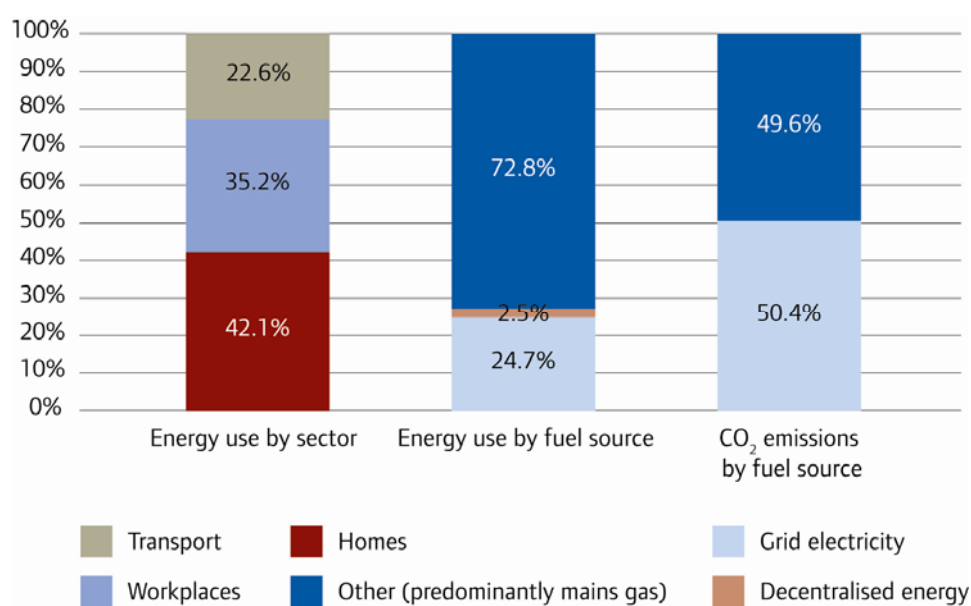
The total energy used in London in 2008 was 152 terrawatt hours (TWh), of which 26 per cent was electricity from the grid. Some 33 per cent of this was used in homes, 63 per cent in workplaces and four per cent in electric transport such as the London Underground. This equates to emissions of 22.5 MtCO₂ per year in 2008 or 50 per cent of London's total emissions.

Decentralised energy contributed 3.8 TWh, 2.5 per cent of overall supply, with the remaining contribution of 71.5 per cent coming from other sources of energy, predominantly mains gas for heating.

4.3 Projected CO₂ emissions under a Business as Usual scenario

By 2025, if CO₂ emissions from energy supply are allowed to continue under BaU scenario, emissions will have fallen by 11.5 per cent relative to 2008 levels, due to policies that were put in place to decarbonise the national grid, prior to the previous government's Low Carbon Transition Plan.

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



Source: LEGGI 2008

4.4 Projected CO₂ emissions after committed government action

National and EU policies geared towards moving to low and zero carbon sources for supplying electricity via the national grid will drive down CO₂ emissions from the supply of London's energy. This will involve the increased use of natural gas, an increase in 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 Kingsnorthⁱⁱ. Further information on national energy supply policies is set out in box 4.1. This activity is projected to reduce London's CO₂ emissions from energy supply by 3.35 MtCO₂ per year by 2025.

Although government programmes will reduce the carbon intensity of London's energy supply, to secure a fully low carbon energy supply will require further action. The next section sets out the Mayor's approach to delivering that further action.

Box 4.1 Government policies and programmes for energy supply

The new coalition government has announced its intention to introduce the Energy Security and Green Economy Bill, covering energy market reform, including a framework for a smart electricity grid, and creation of a Green Investment Bank. In addition, the coalition agreement proposes measures to promote energy-from-waste via anaerobic digestion. Further details of this are yet to be announced.

The previous government also introduced a number of energy supply policies and programmes, the future of which are currently being reviewed by the new coalition government. The rest of this box summarises those policies and programmes:

- **Renewable Energy Strategy (RES)** - The RES (2009) commits the UK to a 15 per cent target for production of renewable energy by 2020. The scale of the new renewable energy (power, heat and transport fuels) target is far more challenging than the previous renewable electricity-only target, requiring an almost seven-fold increase in the share of renewables in little more than a decade. The new coalition government now anticipates that at least 30 per cent of UK electricity will need to be sourced from renewables by 2020 and that the production of renewable heat will need to increase ten-foldⁱⁱⁱ.
- **Renewable Obligation (RO)** - The RO is the main government programme for delivering 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. As of April 2010 the RO only applies to installations of 5MW generating capacity or higher.
- **Feed in Tariff (FIT)** - The FIT is a financial support scheme to encourage the growth of renewable electricity capacity. The government requires that energy companies purchase electricity from renewable generators for a guaranteed price, which is significantly above the normal market rate. This gives micro-generation up to 50kW and renewable energy installations up to 5MW a guaranteed tariff for the electricity they generate and also for their electricity sales. The FIT came into force in April 2010.

- **Renewable Heat Incentive (RHI)** - Both the RO and FIT only cover renewable electricity generation. Pending review by the coalition government, a new RHI would support growth in renewable heat. It is expected that the incentive would apply to the generation of renewable heat at all scales, whether it is in households, communities or at an industrial scale.
- **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'^{iv} CHP engine, the fuel and energy generated and exported is exempt from paying the levy.

4.5 Opportunities and challenges for energy supply in London

a) The Mayor's objectives for energy supply in and to London

The Mayor has four overarching objectives for London's energy supply. Firstly, energy supply should be low carbon, in line with the supply contribution to London's 60 per cent CO₂ emissions reduction target.

Secondly, 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.

Thirdly, markets for heat and power should be open, fair, sustainable and 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 floor price that underpins low carbon and decentralised energy market development and market interventions that support medium and long-term carbon and cost efficient solutions and does not create perverse incentives for particular technologies.

Finally, heat and power infrastructure is needed that is 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, a low carbon heat network infrastructure for London and a mains gas grid that can accommodate renewable gas.

Energy markets may evolve to meet some of these objectives. However, government intervention will also be required to facilitate the market transformation required to ensure this ambition is deliverable by 2025.

b) Challenges and opportunities in meeting the Mayor's objectives

There are several key challenges to meeting the Mayor's objectives for London's energy supply. Firstly, deployment of new, lower carbon energy generation nationally faces a number of challenges with potential risks to the guarantees, affordability and carbon profile of supply to London. CCS technologies, whilst having significant carbon saving potential, are as yet unproven, on and offshore wind generation is very expensive and new nuclear generation faces public opposition. This will make decarbonisation of the national grid particularly challenging.

This challenge is revealed through analysis of government's projected grid mix over the period 2010-18^v which reflects the assumption that the majority of new power generating capacity over that period will be from gas turbines and intermittent wind generation, replacing decommissioned nuclear power stations. The risks of a national energy gap emerging are considered in chapter 1 of this strategy and the Mayor's view is that government needs to ensure that new national capacity comes on-stream more rapidly than is currently envisaged by setting an appropriate long-term regulatory framework that encourages investment in infrastructure. In tandem, greater support should be provided for demand reduction and decentralised (including renewable) supply. This will ensure a lower carbon energy supply for London and prevent the emergence of an energy gap between demand and available supply which could put London's economy and Londoners at risk.

Secondly, the use of low and zero carbon fuels within and around London and the generation and distribution technologies to make best use of them are limited by the availability of those fuels, immature markets for some technologies, and high upfront costs associated with the power and heat infrastructure needed to distribute them.

Thirdly, access to power and heat markets are currently restricted to the few major generators and suppliers that can accommodate the administrative and infrastructure costs of market access. Regulatory changes, appropriate financial support, and new infrastructure are all needed to facilitate the development of power and heat markets that are open to smaller and lower carbon energy suppliers. In the power market, this means a responsive and accessible distribution network that can manage supply from both

decentralised and intermittent sources. In the heat market, this means heat network infrastructure and a maturing heat market that can compete with mains gas and electric heating on price and carbon content.

In addition, within London, there are a number of key factors in attaining a secure, low carbon and affordable energy supply. This includes knowledge of new low carbon supply opportunities, effective strategic planning that maximises the carbon saving and supply potential, the capacity to deliver those opportunities, and an understanding of the public and private sector development risks.

c) The Mayor's 25 per cent decentralised energy target

The Mayor has set a target to generate 25 per cent of London's energy from decentralised sources by 2025. The Mayor believes this target provides the direction that is needed to transform the challenges set out above into opportunities.

Decentralised energy is defined here as low carbon power and/or heat generated and delivered within London. The primary opportunity in London is for low and zero carbon heat supplied by low carbon heat networks fed by combined heat and power (CHP) systems at a range of scales. A mix of energy sources can feed these systems, primarily including mains gas, waste-derived-fuels and biomass. Alongside this, a range of low and zero carbon micro-generation technologies would be deployed.

The deployment of heat network infrastructure to distribute low carbon heat, generated from CHP schemes and sources of waste heat, presents the most significant opportunity for a number of reasons:

- 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.
- CHP produces significantly less CO₂ emissions than conventional power and heat generation. CHP is a well-proven technology and countries such as Denmark and the Netherlands provide excellent examples of how a decentralised energy approach can lead to a more resource efficient, and lower carbon energy system.

- Heat networks provide the opportunity to distribute low carbon heat to homes, public buildings and businesses in London from a range of sources and allow CHP systems to be deployed at carbon and cost efficient scales. Box 4.2 explains this further.
- London is well suited to the deployment of CHP and heat networks. Its mixed building types and uses, and 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 more cost effective.
- Heat network deployment will also facilitate the transition from fossil-fuel-powered networks (particularly natural gas) to the efficient use of a range of lower and zero carbon fuel sources such as renewable gas, waste-derived-fuels and biomass as these become more commercially available. This is complementary to the planned decarbonisation of the electricity grid. In the medium term CO₂ emission reductions will be accelerated as heat networks accelerate the scaled use of zero carbon fuel sources. Longer-term, this will support national targets for renewables and will stimulate a competitive market for heat and power from a range of low carbon sources.
- Decentralised gas-fired CHP system costs per megawatt installed are broadly equivalent to those of the centralised combined cycle gas turbines (CCGT) and nuclear power stations envisaged by government to come online over the next 20 years. They also provide better guarantees of deployment and supply to London than are currently provided by the planned nuclear and CCS rollout. Moreover, inward investment into decentralised energy represents a significant long-term opportunity, with rates of return that improve significantly over the life of a scheme, with the potential to make energy more affordable to end-users and more resilient to energy price fluctuations.
- In combination with a responsive electricity distribution network, more decentralised generation (including micro-generation) will give London a more diverse range of electricity supply options and a more competitive market and allow the distribution network to be managed to use the most cost effective and lowest carbon generation available at a given time.
- Decentralised energy provides new building developments with opportunities to meet tighter CO₂ reduction requirements as set out in government's plans for zero carbon development and the draft replacement London Plan either directly or, where a heat

network can be connected to existing buildings, via carbon offsetting mechanisms. The development community is increasingly recognising this potential^{vi}.

Box 4.2 Definition of decentralised energy schemes by scale

There are broadly four scales of decentralised energy system:

- **Micro-generation** - 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 this is renewable energy systems of a capacity up to 50KWe.
- **Single development** - 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, such as BedZed in Sutton. It would also include larger onsite networks with CHP generation equipment in the order of 3 MWe 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 sector consumers. It is very likely that the plant will 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 will own and be responsible for different parts of the system. Such systems can take from five to ten years to deliver. The planned London Thames Gateway Heat Network is an example.

d) Challenges to the implementation of decentralised energy in London

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

- **Knowing where London's decentralised energy opportunities are** - Successful project development is reliant on a spatial evidence base that identifies suitable energy demands and supply opportunities – the 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 boroughs, their strategic partners and the development community. However, often they do not have the capacity or inclination to develop large-scale decentralised energy projects.
- **Risks inherent in the delivery of decentralised energy projects** - Large-scale decentralised energy schemes 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.
- **The regulatory framework is currently not favourable to decentralised energy in London** - 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.
- **A lack of financial support and incentives to install the heat network infrastructure required to make effective use of low carbon fuels in London** - Given that opportunities for the deployment of wind and solar technologies at scale are limited due to London's dense built environment, utilisation of local low carbon resources at scale will depend on the distribution of heat generated from low carbon gas, biomass, waste heat and waste-derived-fuels.

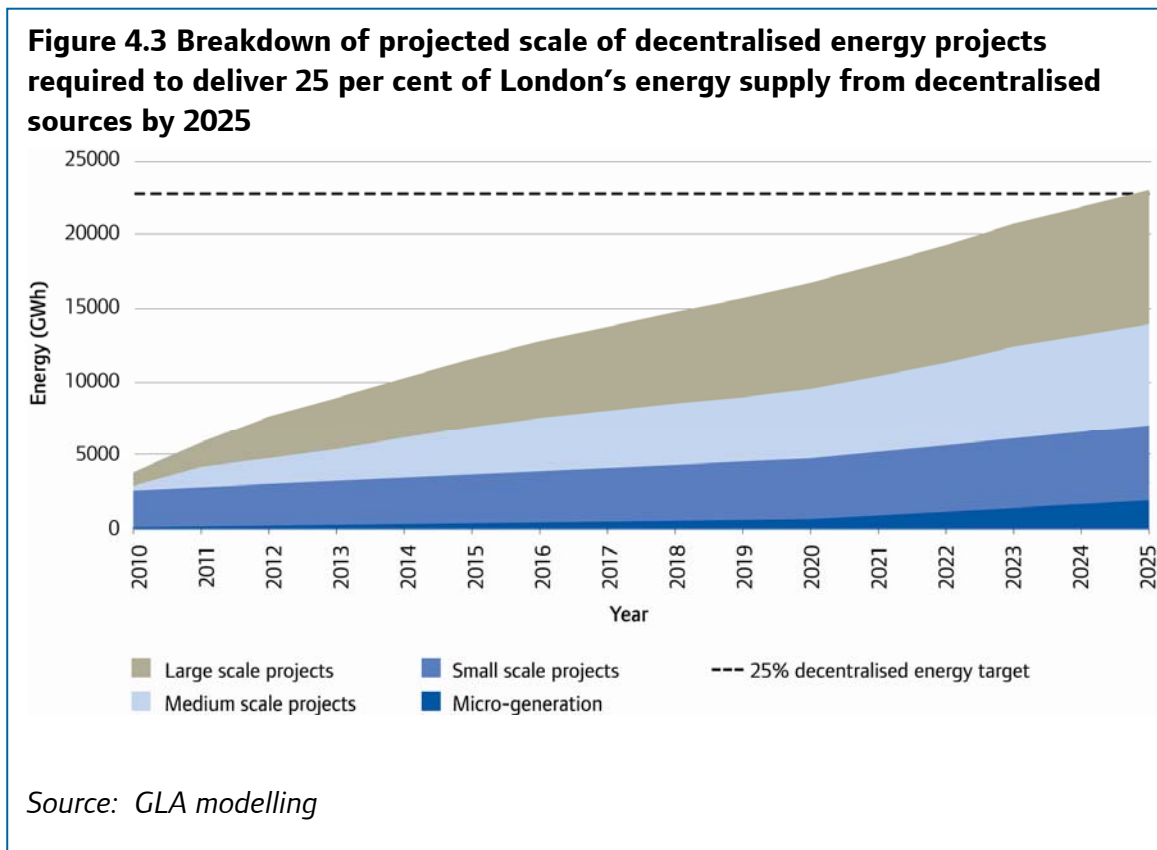
4.6 Reducing CO₂ emissions from London's energy supply through committed Mayoral action

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's

approach is to identify, develop, invest in and deliver decentralised energy projects at scale in partnership with a range of public and private stakeholders, with the aim of developing a fully functioning decentralised energy market in London.

It is estimated that 25 per cent of London's total energy demand in 2025 will amount to around 23 TWh. 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 CO₂ emissions by 2.57 MtCO₂ per year.

Figure 4.3 sets out how decentralised energy can supply 25 per cent of London's total energy. The projection includes all existing, planned or known potential capacity from micro-generation and small, medium and large-scale decentralised energy schemes.



Large-scale decentralised energy schemes are crucial to meeting the 25 per cent target as they offer the following benefits:

- **Lower cost per unit of energy generated** – Large-scale plants benefit from economies of scale, more efficient systems and potentially the capacity to process cheaper, lower quality fuel. These all drive down the cost of generating a unit of energy.
- **Unique renewable energy opportunities** – Certain forms of renewable energy require a minimum size of generating plant to achieve economic viability. Such plant therefore needs a minimum volume of energy customers and the infrastructure to support that.
- **Adaptability to future energy generating technologies** – For example, the potential to capture and distribute heat from large-scale heat pumps powered by a lower carbon electricity grid.
- **Introduction of competition to the heat market** – This could be achieved by potentially giving customers access to multiple heat suppliers.
- **Longevity** – Large systems are generally built to last longer than smaller systems, in order to get the most benefit from the high capital cost, and because large equipment is usually more durable.
- **Lower CO₂ and air quality pollutant emissions** – Larger plant can support more expensive exhaust-cleaning equipment and so tends to have lower pollutant emissions.

Policy 3 Enabling the identification and development of decentralised energy opportunities and building capacity to deliver decentralised energy projects

Vision

The wide range of opportunities for decentralised energy schemes in London have been identified and developed by the Mayor, through the LDA, London boroughs and the private sector.

Vision to policy

The Mayor will identify and develop opportunities to deliver decentralised energy and support London boroughs and other key stakeholders to do the same.

Policy to action

a) Knowing where London's decentralised energy opportunities are

- **Action 3.1** - The Mayor, through the LDA, will continually update the London Heat Map to include accurate local data on opportunities for decentralised energy.
- **Action 3.2** - The Mayor will undertake a detailed assessment of London's low and zero carbon energy resources, clearly identifying the capital's potential to utilise them. The assessment will also quantify the enabling effect of the installation of large-scale district heat networks on the transition to the deployment of large-scale renewables in London.
- **Action 3.3** - The Mayor will commission and publish work to assess the potential of using the tidal range of the River Thames to support a tidal energy generation system.
- **Action 3.4** - The Mayor will encourage government to make data on large boilers available to public sector organisations.

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

- **Action 3.5** - The Mayor, through the Decentralised Energy Masterplanning Programme, will support London boroughs to produce local heat maps and energy masterplans. Energy masterplans will also be developed for the London Plan's Opportunity Areas in order to identify both local and strategic, cross-borough decentralised energy potential.
- **Action 3.6** - Through the Decentralised Energy Masterplanning Programme, the Mayor will provide decentralised energy strategy and project experts to develop the capacity of the public sector to deliver decentralised energy schemes.

a) Knowing where London's decentralised energy opportunities are

The start of any significant 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 decentralised energy systems, 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 because it minimises the amount of piping required, which can be the main cost for a decentralised energy scheme, particularly for larger projects.

A local, area-wide evidence base is essential to drive decentralised energy networks at efficient scales. A major study for the Department of Energy and Climate Change (DECC) found that the overall cost of CO₂ abatement (£/tCO₂ saved) is significantly lower for area-wide decentralised energy schemes compared with smaller standalone CHP plants serving individual developments^{vii}. The Mayor is therefore pursuing the following activities to develop this evidence base:

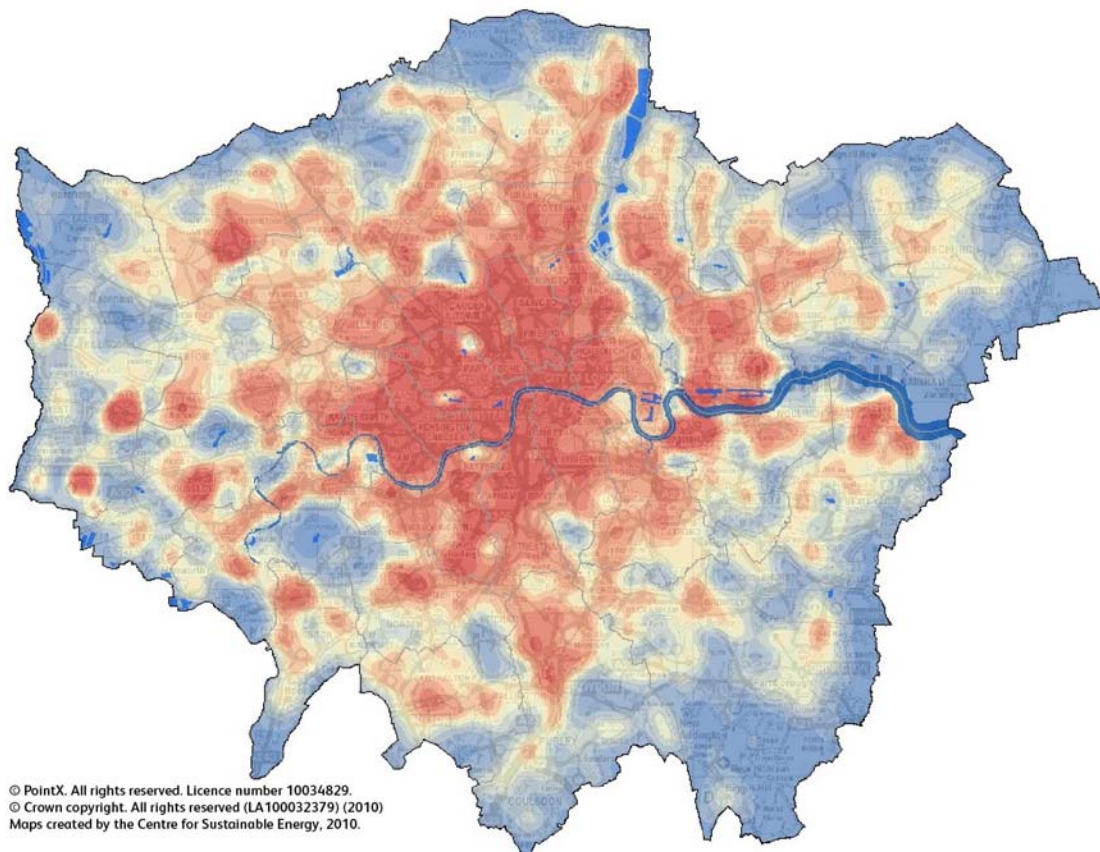
The London Heat Map

The London Heat Map 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 is available, including major energy consumers, fuel consumption, CO₂ emissions, energy supply plant, community heating networks and energy demand density. It is publicly 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, work is in progress to build a similar map of existing and potential waste management sites in London. The maps will be linked, providing opportunities to identify energy-from-waste opportunities.

The map will evolve over the next three years alongside the Decentralised Energy Masterplanning Programme (DEMaP), becoming more sophisticated and more accurate at higher resolutions and providing a hub for information of use to the decentralised energy market. Ten borough heat maps produced under the first phase of DEMaP have already been incorporated into the London Heat Map and have identified 30 new priority locations for decentralised energy projects in London.

Figure 4.4 The London Heat Map



Identifying London's renewables capacity

In addition to the London Heat Map, the Mayor will also work to understand the low carbon energy supply potential in London, through two studies. Firstly, the Mayor will utilise the methodology developed by the Office for Renewable Energy Deployment for assessing regional low carbon and renewable energy potential and refine the existing renewable energy projections for London. Part of this refinement will mean gaining a better understanding of the extent to which the planned establishment of heat networks within London will enable the transition to renewable heat generation to be accelerated. The outputs of this work will enhance the regional evidence base and the local evidence base being developed by boroughs to inform policies and project development.

Secondly, the Mayor is commissioning a study of 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.

Data availability

Critical to the establishment of wide-scale 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 500kWt 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 will therefore encourage 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.

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, through the LDA and in partnership with London Councils, is working to deliver a comprehensive decentralised energy support package to 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.

Engaging the wider public sector and the buildings they own and manage is of central importance as these buildings (often major energy users) can be the anchors^{viii} for decentralised energy networks. DEMaP supports boroughs in identifying opportunities for projects through energy demand mapping, and then provides feasibility studies and detailed legal and commercial advice to help boroughs bring forward projects that attract private sector involvement.

Successful decentralised energy projects can make significant contributions to 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, 24 boroughs were receiving DEMaP support with organisational capacity building and project identification through energy demand mapping, six were also being supported with detailed feasibility studies and eight were being supported in the project implementation stages.

Key outputs of DEMaP will include:

- local energy demand and supply maps, and high-level feasibility studies that provide the evidence base 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
- a series of small and medium-scale decentralised energy projects taken forward by the boroughs and their delivery partners
- a London district heating manual, providing technical guidance on heat network development.

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.

Policy 4 Delivering decentralised energy through the planning system**Vision**

All new development will, where appropriate, either support the expansion of existing decentralised systems or include new systems on-site. Strategic planning documents will also identify priority areas for decentralised energy networks.

Vision to policy

The Mayor will use his planning powers to identify and support opportunities for the development of decentralised energy in London.

Policy to action

- **Action 4.1** - Through the draft replacement London Plan, the Mayor will require new developments to support the implementation of decentralised energy systems and networks, making use of the Community Infrastructure Levy and offset mechanisms where appropriate.
- **Action 4.2** - Through the draft replacement London Plan, the Mayor will require that local authorities 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 the London boroughs to identify and develop strategic multi-site and area-wide decentralised energy networks.
- **Action 4.4** - The Mayor will work with boroughs to use Local Development Orders to enable deployment of district heat networks.
- **Action 4.5** - The Mayor will support the growth of micro-generation technologies. The draft replacement London Plan requires that new development incorporates onsite low carbon and renewable energy generation where appropriate, and not contradictory to wider strategic energy objectives.

a) Planning decisions

As set out in policy 5.2 of the draft replacement London Plan, new developments are 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, taking advantage of opportunities to extend the supply of low or zero carbon energy beyond site boundaries.

New developments are required to achieve CO₂ savings on-site (see chapter 7 for details). Where proposed on-site CO₂ savings are not sufficient to meet the requirements of the draft replacement London Plan, developers will be able to use an offset mechanism to meet the requirement offsite or through a financial contribution to the borough. The Mayor is working with government and boroughs to develop appropriate local mechanisms that can provide contributions, where appropriate, to area-wide decentralised energy schemes, particularly heat network development.

Supporting the development of heat network infrastructure has also been identified in government guidance on the Community Infrastructure Levy (CIL)^{ix} as an appropriate use of funds received from developers under this mechanism. Boroughs can use funds received under the CIL, in combination with those received via 'allowable solutions', to invest in heat network infrastructure. The Mayor is exploring with London boroughs what opportunities may develop to enhance this investment through investment by the London Green Fund.

b) Strategic planning

The extant London Plan encourages local authorities to safeguard and develop area-wide decentralised energy networks. Over the last two years, the Mayor has provided input to over 70 Local Development Framework (LDF) documents and worked with a number of local authorities to develop their LDF decentralised energy policies.

To date, although the London Plan has been very successful in securing site-wide CHP in individual developments, the requirement for boroughs to identify opportunities for decentralised energy in their LDFs has often proved difficult in practice. The draft replacement 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.

The Mayor also encourages 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.

In addition, the Mayor has indicated in policy 5.7 of the draft replacement 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.

c) Local Development Orders

The Mayor will work with 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'^x. Where enacted by a London borough, an LDO can be used to significantly accelerate the consent and installation of heat networks. The LDA has received funding from government to develop an LDO with boroughs for the London Thames Gateway Heat Network.

Policies 3 and 4 of this strategy will work towards building the knowledge base and capacity to deliver decentralised energy, as well as the required planning framework. However to achieve the Mayor's 25 per cent decentralised energy target will require the commercialisation of technologies. Policy 5 sets out how the Mayor will act to catalyse action that will achieve this commercialisation.

Policy 5 Enabling the commercialisation of the decentralised energy market to deliver decentralised energy on a wide scale in London

Vision

The decentralised energy market in London matures, providing investable opportunities to deliver the Mayor's 25 per cent decentralised energy target.

Vision to policy

Investment in, and facilitation and delivery of, exemplar decentralised projects will be underpinned by activity that develops a suitable market framework for decentralised energy.

Policy to action

a) Facilitation and delivery of exemplar projects with public sector partners

- **Action 5.1** - Through the Decentralised Energy Masterplanning Programme, the Mayor and boroughs will explore opportunities across publicly-owned land to install decentralised energy generation and commit public sector buildings and housing as energy loads.
- **Action 5.2** - Through the Decentralised Energy Masterplanning Programme, the Mayor will offer project-specific support to boroughs on procurement, including legal and financial considerations, and help to establish special purpose vehicles to take decentralised energy projects forward.
- **Action 5.3** - The Mayor will work through the LDA to develop exemplar decentralised energy projects, carrying out sufficient capacity building, technical feasibility and commercial viability work to deliver them through the initial high-risk stages.

b) Investment in and commercialisation of the decentralised energy market

- **Action 5.4** - The Mayor, through the LDA, will work with industry to build London's decentralised energy market by developing consistent technical standards across London, publishing a Technical Guide for district heating systems.
- **Action 5.5** - The Mayor will develop commercial guidance and a London Heat Charter to help give confidence to potential decentralised energy market participants.
- **Action 5.6** - The Mayor will use the London Green Fund to invest in and attract investment to decentralised energy infrastructure in London.

c) Stimulation of the market for renewable and indigenous fuels

- **Action 5.7** - The Mayor will work with boroughs and the London Waste and Recycling Board, to ensure London's indigenous energy resources, particularly waste, are available to support meeting the 25 per cent decentralised energy target.

- **Action 5.8** - 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 5.9** - Through his existing programmes, the Mayor will work to ensure London takes full advantage of the Feed-in-Tariff and proposed Renewable Heat Incentives to encourage delivery of renewable energy at scale.
- d) Working with government to support decentralised energy*
- **Action 5.10** - The Mayor will encourage government to establish a regulatory and commercial framework that supports decentralised energy and accessible heat and power markets.

a) Facilitation and delivery of exemplar projects with public sector partners

The public sector's role in reducing decentralised energy project risks

The public sector has a significant opportunity to participate in the commercialisation of strategic decentralised energy projects, developing delivery models, underwriting projects in their early stages, and convening key scheme delivery partners to promote the viability of strategic-scale heat networks.

The public sector can underwrite higher risk projects by offering buildings up to long-term, low-risk energy purchase contracts that stabilise revenues for private investors. The public sector can also invest capital, taking a long-term view to help lever private sector investment.

DEMaP will provide guidance to boroughs on business models and delivery entities for decentralised energy projects. 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 design, build, operation and finance 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. Schemes 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 schemes, with the greater number of bodies becoming involved as project size and complexity increases. DEMaP will work with 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.

Box 4.4 Types of energy services company

- **Energy service company (ESCO)** is 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. In both cases, schemes 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. The case study in box 4.3 provides an example of a London borough achieving this.

Box 4.3 Case study - Southwark's Elephant and Castle decentralised energy scheme

Southwark's Elephant and Castle decentralised energy scheme is a good example of the key role local authorities can play in developing CHP and district heating network projects. This scheme is positioned to deliver electricity, heat and hot water services for 9,700 residential units and 38,000m² of commercial space, including two major urban regeneration sites: the Elephant and Castle, and Aylesbury. The scheme was made possible as Southwark Council provided land for the energy centre, which will be repaid through a commercial arrangement with a consortium of private sector partners. The council has also played a crucial role in securing energy demands for the network by pledging social housing estates to the scheme and publishing supplementary planning guidance to its LDF, obliging all developers to connect new developments into the decentralised energy scheme.



Architects drawing of the underground strategic services corridor

Delivering exemplar decentralised energy projects to catalyse the market

As well as supporting boroughs to commercialise decentralised energy projects, the Mayor, through the LDA, has committed to deliver exemplar decentralised energy projects to demonstrate to the market that large-scale decentralised energy can be delivered in London and is commercially viable.

The LDA has identified strategic, pioneering opportunities for decentralised energy that require direct support and/or investment to ensure delivery. The LDA is leading the development of these key strategic projects that will help catalyse the decentralised energy market and prove its commercial viability. These projects include:

- the extension of the Olympic Park's Energy Centre heat network to the Stratford High Street area (potentially co-funded with London Thames Gateway Development Corporation)
- the development of a new scheme along the Euston Road involving Camden Council, residential developments and the UK Centre for Medical Research and Innovation.

The LDA's largest exemplar decentralised energy project is the London Thames Gateway Heat Network.

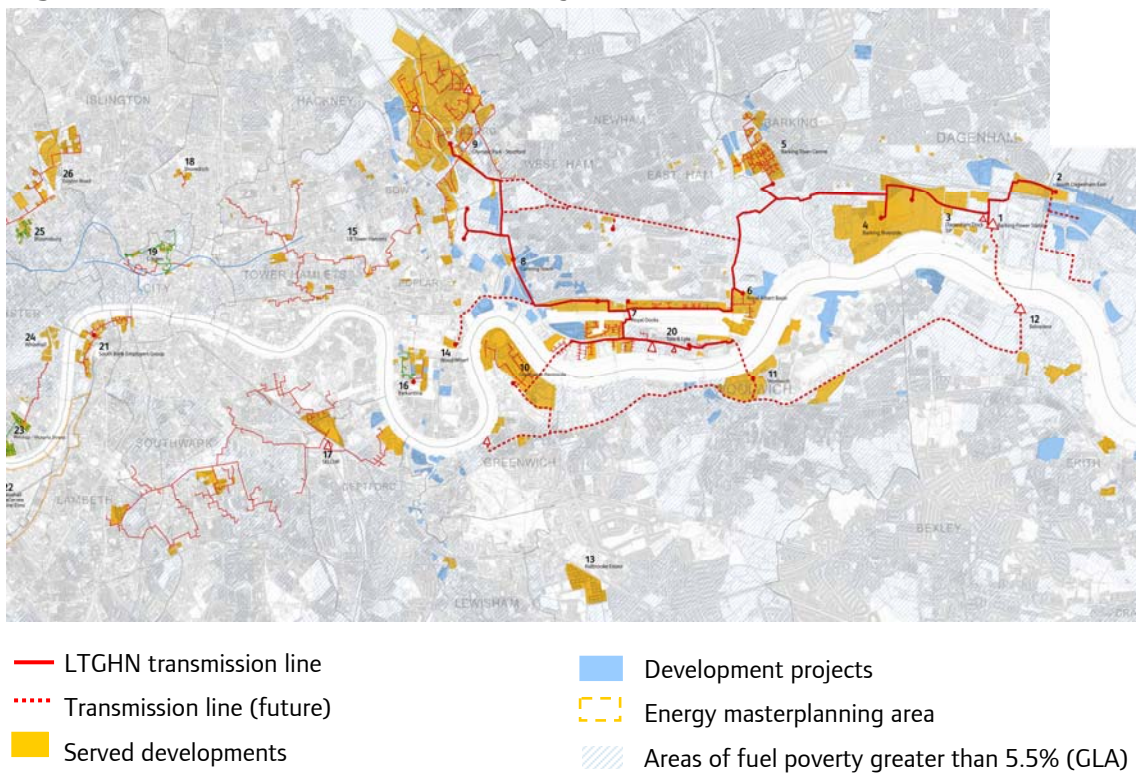
[The London Thames Gateway Heat Network](#)

The Thames Gateway is Europe's largest regeneration area and holds the key to the future expansion of London. The project involves the construction of a 23km transmission network capturing low carbon and renewable heat from a number of generating plants. This includes energy from Barking Power Station, industrial process plants and potentially new energy-from-waste plants. This will 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 will offer developers an opportunity to meet the Mayor's planning requirements and to 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 CO₂ each year and, in the construction phase, to create over 200 jobs.

The LDA is providing strong technical and engagement support to progress the project to its financial close. Initially public sector funded, there is a significant long-term opportunity for private sector investment.

More information on these projects, and on the LDA's role in moving decentralised energy forward in London, is available in the Mayor's 'Powering Ahead: Delivering Low Carbon Energy for London' report^{xi}.

Figure 4.5 The London Thames Gateway Heat Network

b) Investment in and commercialisation of the decentralised energy market

To build further confidence in London's decentralised energy future, the Mayor, through the LDA, is working with industry to develop consistent technical and commercial standards across London and publishing a technical guide for district heating systems.

The Mayor is also investigating developing commercial guidance and a London Heat Charter to help give confidence to potential heat market participants and in particular to heat consumers and others with a demand for heat. In addition the Mayor is investigating the need for a code or charter to provide a framework for facilitating arrangements for developers to connect new developments to existing networks. In combination, these standards will help overcome some of the existing barriers to a mature, fair and competitive market for heat.

Attracting investment to deliver decentralised energy at scale

The upfront capital costs of decentralised energy schemes can deter private investors. However, the Mayor believes that decentralised energy in London represents a significant

investment opportunity. Through the LDA, the Mayor is establishing the London Green Fund, using significant public sector investment to lever in private funds.

The total investment required to achieve the Mayor's 25 per cent decentralised energy target by 2025 is in the order of £5 to £7 billion^{xii} 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 nationally, estimated by energy regulator Ofgem, to be required over the same period^{xiii}. Inward invest to London can be attracted through the establishment of investment vehicles, investing public money initially to create opportunities for private sector investment and to develop markets in the decentralised energy sector. The Mayor is working through the LDA to create commercial templates that will allow private markets to step in and deliver the levels of investment required.

Public funds will target strategically important projects that, due to underlying levels of risk, cannot initially attract conventional commercial financing. As the project develops, the level of risk reduces and revenues become attractive to private sector investors, public sector funding will be recycled to help other projects. For more information on financing and the London Green Fund, please see chapter 3.

c) Stimulation of the market for renewable and indigenous fuels

Utilising London's zero carbon energy resources

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 zero carbon energy resources. The Mayor aims to move to progressively lower carbon fuel sources for energy supply. For example, 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 and biomass.

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

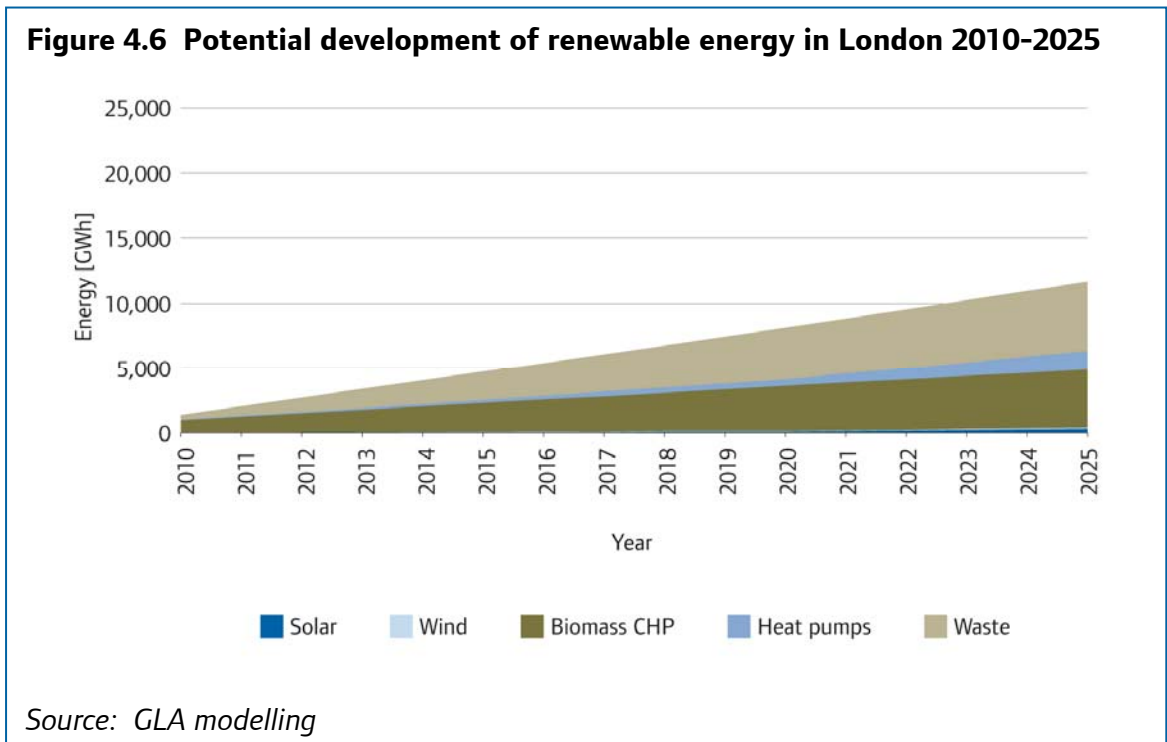


Figure 4.6 summarises current GLA modelling for projected rollout of renewable energy in London. Figures will be updated following the renewables capacity study described under action 3.2. In 2025, this could supply 11.70 GWh of energy, or 12.8 per cent of London's total energy supply - half of the 25 per cent decentralised energy target.

Analysis undertaken to date shows that the main opportunities to increase renewable energy generation in London are:

- waste-to-energy schemes using advanced conversion technologies such as anaerobic digestion and gasification/pyrolysis (alongside opportunities to make efficient use of waste heat from London's existing incineration plant operating in CHP-mode)
- large-scale (>5MWe) biomass heat and power schemes
- the wide-scale deployment of small and medium-scale renewable heat and power technologies, such as photovoltaics, solar thermal systems, heat pumps and biomass heat and power systems.

Waste to energy: The London Waste and Recycling Board

Advanced waste conversion technologies have significant CO₂ reduction potential, but the market for these technologies in London has not reached maturity. The Mayor, through London Waste and Recycling Board (LWaRB) funding, is providing financial support for the development of waste infrastructure in London, including energy-from-waste technologies that generate renewable heat and power. The LWaRB Board may also support existing waste infrastructure to convert from electricity-only to CHP generation.

Although there are currently no advanced conversion technology facilities (such as anaerobic digestion or gasification) in London, many operate in the UK and overseas. The Mayor is producing a catalogue of commercially-operating advanced waste facilities and is preparing a report outlining the opportunities for their development in London. For details, see the Mayor's draft Municipal Waste Management Strategy.

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 demonstration of links to hydrogen fuel cells. The Mayor's aim is for the Food to Fuel Alliance to develop at least one exemplar anaerobic digestion facility in London by 2012.

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. Heat networks will in most cases initially carry low carbon heat from gas-fired CHP plant, but will also be able to carry heat from renewable sources as and when the sources are commercially available at scale. With CHP and heat network infrastructure in place, the transition between low carbon and zero carbon supply should be accelerated.

The Mayor also strongly recognises the importance of London's air quality. In most cases, measures to tackle CO₂ 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 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 exacerbate poor air quality. Limits are likely to be at least as stringent as those currently proposed in the RHI consultation. As technology improves emission limits would be re-assessed. Further information on boilers and air quality is provided in the Mayor's draft Air Quality Strategy and draft replacement 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 and the Hydrogen Action Plan. The Hydrogen Action Plan includes a communications and business strategy focused on promoting the benefits of large and small-scale hydrogen fuel cell technologies via the Mayor's energy efficiency and waste programmes such as RE:FIT, the Better Building Partnership, RE:CONNECT, the Green500 and LWaRB.

The Hydrogen Action Plan also aims to set out the potential financial and CO₂ savings for public and commercial buildings from hydrogen fuel cells, and looks to market these findings through partnerships within the GLA group, with local authorities and with private organisations. It will also examine the availability of funding to support stationary deployment in London and the UK. The plan aims to negotiate the delivery of large-scale hydrogen fuel cells in London by 2012. For more information please see the Mayor's Hydrogen Action Plan.

Micro-generation

The Mayor has supported the installation of micro-generation technologies on GLA group buildings and through the London Plan requirements for new developments. The Mayor continues to support micro-generation through the draft replacement London Plan, by ensuring full benefit of the RHI and FIT incentives are taken across London, and that participants in the micro-generation market get full access to the electricity market.

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) Working with government to support decentralised energy

Alongside the direct interventions of the Mayor, government action is needed to support the commercialisation of decentralised energy (at all scales) and 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.

Development of 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 zero carbon heat proposed by the previous government under the RHI, but is encouraging government to supplement this with support for the heat network infrastructure that can deploy low and zero carbon heat at scales 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
- exemption from the supplier levy for the proposed RHI for suppliers of low carbon heat.

The introduction of the RHI scheme, as currently proposed, would 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 but does not believe that it should be restricted to hard-to-treat properties.

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.

Furthermore, the Mayor believes that banding of support should not be a feature of an RHI as it is likely to result in a distortion in the underlying cost effectiveness of the various technologies that are being supported, introducing the risk that the RHI could actually support the introduction of technologies in places and buildings where it is not the most cost effective solution for reducing CO₂ emissions. This would increase the total cost of the RHI to consumers, who would ultimately be paying for it, as well as distort the market in various heat technologies.

[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 will continue to do so.

Key elements of the final framework should include:

- The new licensing arrangements, operated by Ofgem, for distributed electricity suppliers that supply more than 1MWe to consumers, should operate so that decentralised energy operators (along with other smaller electricity suppliers) can apply for a licence on the basis that they need not join the complex and risk-related market structures in which the major suppliers operate, but rather can buy and sell locally-produced electricity on a distributed generation market.
- The electricity distribution pricing mechanisms should enable 'short haul' use of the local distribution system to take place at a reduced price - in effect the decentralised energy operator only paying for use of the part of the distribution system actually used. The decentralised energy operator should then be in a position to supply on a direct generator-to-consumer retail basis, provided that Ofgem's Electricity Distribution Price Review process monitors the actual costs on an ongoing basis.

- Supplier services agreements between large, fully licensed electricity suppliers and distributed generators using the short-haul network. This would then ensure a fair and effective interface between the two markets.

The Mayor anticipates that government's proposed Energy Markets Review will ensure that smaller operators can access energy markets in a competitive manner.

Smart grid development

The Mayor supports government plans to accelerate the development of responsive, robust and accessible electricity grids. London's existing electricity distribution network will not be fit for purpose by 2025. The network needs to develop in a number of ways, including to accommodate decentralised (distributed) electricity generation at all scales, to accommodate intermittent wind generation at the national scale, and to accommodate higher electricity demands associated with electric vehicles, heating and high electricity demand sites at vulnerable points on the network. The network also needs to manage and mitigate peaks in demand at certain times of the day or year that make the network vulnerable to outages and require the use of carbon-intensive peaking plant.

The Mayor is keen to work with key stakeholders to pilot smart grid technologies that improve access to decentralised generators and to accelerate the deployment of smart meters and demand management incentives and mechanisms to ensure that London's electricity supply is guaranteed in the longer-term and that demands on the network do not increase CO₂ emissions.

4.7 Reducing CO₂ emissions from London's energy supply through further Mayoral action

The policies and actions in this chapter have set out the Mayor's committed action to reduce CO₂ emissions from energy supply. To reach the Mayor's CO₂ emissions reduction target will require further activity however. This section therefore sets out further Mayoral action that can be taken, subject to support and funding, to reduce CO₂ emissions from energy supply. These are not committed actions, and will only be deliverable if there is further support, including funding from government and the private sector.

As set out previously, assuming that the demand reduction measures proposed by this strategy are delivered, meeting the Mayor's 25 per cent target for decentralised energy would be equivalent to producing around 23 TWh per year from 2025. A 2008 London First study^{xiv} on delivering decentralised energy in London concluded that the potential

capacity for decentralised energy in London could be greater under favourable market conditions. The report suggests that a target of 30 TWh per year could be achieved. If this level of decentralised energy were to be available in 2025, an additional 0.93 MtCO₂ per year would be saved. The total savings from a 30 TWh per year decentralised energy supply would therefore be 3.5 MtCO₂ per year and, after the proposed demand reduction measures are delivered, would be close to 33 per cent of London's total energy demand.

The upcoming study of London's low carbon and renewables capacity will provide further evidence of these opportunities. The study will consider options for an accelerated rate of transition to the use of zero carbon fuel sources at scale, deployed via CHP and heat network infrastructure. This additional capacity could be delivered in a number of ways including the import of biomass to London or the deployment of large-scale heat pumps. Alternatively, the addition of new fossil fuel power station capacity with CCS in the Thames Gateway, attached to heat networks could provide a significant contribution to this additional capacity.

4.8 Reducing CO₂ emissions from London's energy supply through further government action

The above committed Mayoral and government programmes, along with further Mayoral action, will reduce CO₂ emissions from London's energy supply by 6.85 MtCO₂. However, further government action will also be required to contribute to meeting the Mayor's target to reduce London's CO₂ emissions by 60 per cent of 1990 levels by 2025.

The Committee on Climate Change (CCC), in its first annual progress report published in October 2009, 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^{xv}.

The Mayor agrees with the CCC that government needs to show more ambition and commit to a much faster rate of decarbonising power generation. 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 CO₂ emissions reductions from energy supply of 3.98 MtCO₂.

4.9 Implementing Mayoral policies and actions

Annex A of this document set out the projected CO₂ emissions reductions, by source, as a result of activities in the energy supply sector, along with assumptions for expected CO₂ emissions reductions. Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter.

Endnotes

ⁱ Including street lights and water pumps.

ⁱⁱ DECC, Low Carbon Transition Plan (2009)

ⁱⁱⁱ 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.

^{iv} Good Quality refers to CHP generation that is highly efficient in operation, meeting the standards set down in the EU CHP Cogeneration Directive.

^v DECC, Low Carbon transition Plan (2009)

^{vi} Buro Happold for London First, Cutting the Capital's Carbon Footprint (2008)

^{vii} Poyry for DECC, The Potential and Costs of District Heating Networks (2009)

^{viii} '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.

^{ix} CLG, Community Infrastructure Levy: An Overview (2010)

^x CLG, Planning Policy Statement: Planning and Climate Change – Supplement to Planning Policy Statement 1 (2007)

^{xi} GLA, Powering Ahead: Delivering low carbon energy for London (2009)

^{xii} GLA, Powering Ahead: Delivering low carbon energy for London (2009)

^{xiii} Ofgem, Project Discovery – Energy Market Scenarios: Consultation (2009)

^{xiv} Buro Happold for London First, Cutting the Capital's Carbon Footprint (2008)

^{xv} UK Committee on Climate Change, Meeting Carbon Budgets - the need for a step change (2009)



5 London's homes: driving our energy future

Summary

Aim

By 2030 London's existing homes are retrofitted with energy efficiency measures and can generate low and zero carbon energy, Londoners use energy more efficiently and fuel poverty is eradicated.

The Mayor will contribute towards this through the following policies:

- **Policy 6 - Retrofitting existing homes with energy efficiency measures and renewables** - The Mayor will work to provide Londonwide retrofitting of whole-house energy saving measures in existing homes, and encourage London's households to change the way they think about and use energy at home. The Mayor will also create mechanisms to enable Londoners to install more expensive measures, such as solid wall insulation, new boilers or renewable energy technologies, to further reduce CO₂ emissions from their homes.
- **Policy 7 - Tackling fuel poverty in London** - The Mayor will work to minimise fuel poverty in London by linking fuel poverty programmes where appropriate with energy efficiency and wider carbon reduction programmes.

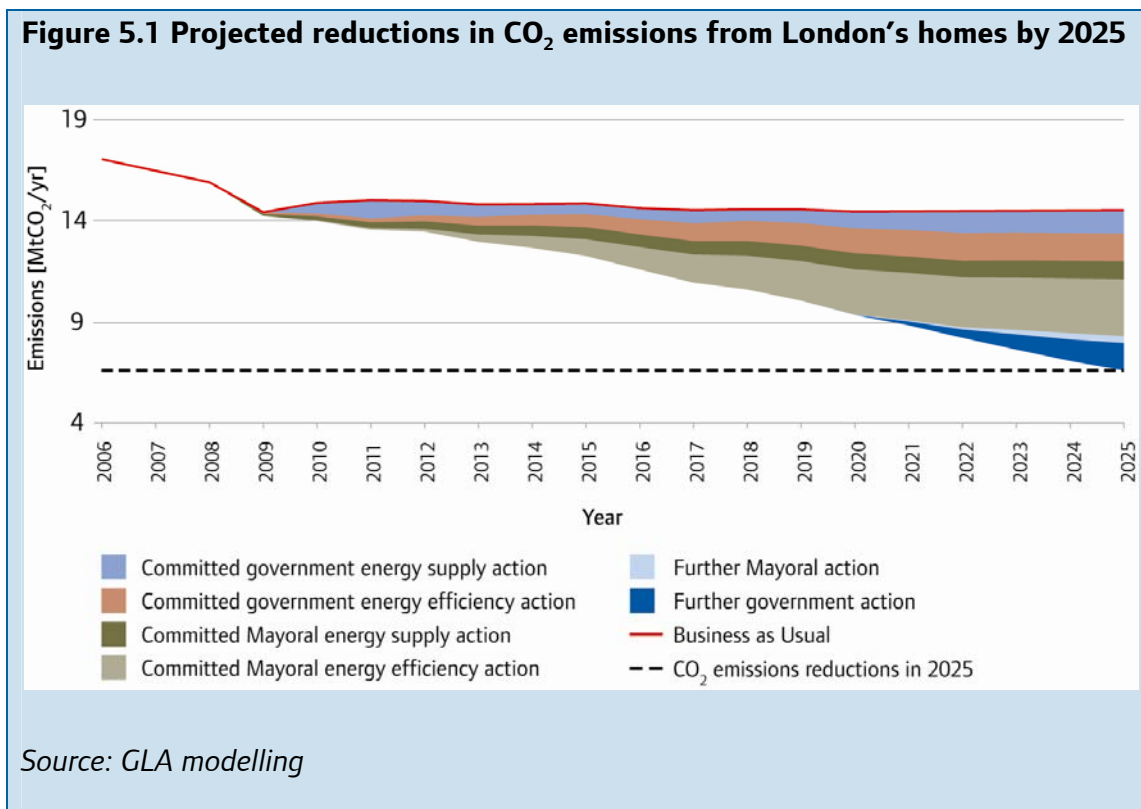
The Mayor's main programmes to deliver this are:

- **RE:NEW (formerly the Homes Energy Efficiency Programme)** - The Mayor, working through the LDA and 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 will catalyse delivery of advice, easy-to-install energy efficiency measures to 1.2 million homes and loft and cavity wall insulation where practical. By 2015 RE:NEW will have developed an approach that will utilise a pay-as-you-save funding model 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 and an enhanced Decent Homes standard** - The Mayor's London Housing Strategy sets high energy efficiency standards for retrofitting existing homes. The Mayor is also exploring options for the delivery of an enhanced Decent Homes standard which would deliver improvements in the quality and environmental performance of London's social rented homes.

- **RE:CONNECT (Low Carbon Zones)** - The Mayor is working with London boroughs and local communities to cut CO₂ 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 CO₂ emissions that can be rolled out within and beyond London.

CO₂ emissions from London's homes: 2008-2025

- **Current CO₂ emissions** - In 2008 emissions from London's homes were 15.93 MtCO₂ per year.
- **Business as Usual CO₂ emissions by 2025** - Under a BaU scenario, CO₂ emissions from London's homes are expected to reduce to 14.55 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from committed government action** - Government, EU and international action is expected to reduce CO₂ emissions from London's homes by 2.52 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from committed Mayoral action** - Committed Mayoral action will reduce CO₂ emissions from London's homes by 3.69 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from further Mayoral action** - If the Mayor adopts a more ambitious target to supply 30,000 GWh of energy per year from decentralised sources, CO₂ emissions from the homes sector's share of this will reduce by 0.34 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from further government action** - If government implements more ambitious CO₂ emission reductions programmes, according to the recommendations of the Committee on Climate Change, it is expected London's CO₂ emissions from homes will reduce by 1.36 MtCO₂ per year.



5.1 Introduction

This chapter sets out the contribution of London's existing homes to CO₂ emissions, and actions currently underway and proposed that will contribute towards minimising them. Chapter 4 has already set out how CO₂ emissions from the generation and supply of energy to London will be reduced by 2025. Chapter 7 will set out how CO₂ emissions from new development in London will be reduced. This chapter therefore focuses on how CO₂ emissions from the use of energy in London's existing homes will be minimised.

The CO₂ emissions savings associated with micro-generation technologies installed in homes have been accounted for as energy supply savings. The expected level of deployment of micro-generation and renewables, as well as policies to encourage rollout are included in chapter 4 of this strategy.

This chapter will:

- summarise London's current CO₂ emissions from existing homes
- summarise London's CO₂ emissions from homes under a BaU scenario
- summarise CO₂ reductions expected as a result of committed government action on homes
- set out the challenges and opportunities for London to further reduce its CO₂ emissions from homes
- detail the specific policies and actions that the Mayor has committed to take to reduce CO₂ emissions from London's homes
- set out further Mayoral action that can be taken to reduce CO₂ emissions from London's homes, and that will be deliverable subject to further support, including funding from government and the private sector
- summarise further action that government will need to take to reduce CO₂ emissions from London's homes, and support the achievement of the Mayor's CO₂ emissions reductions targets.

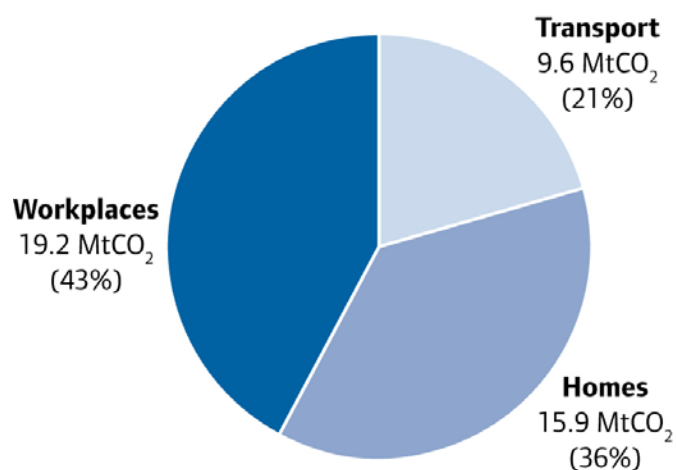
5.2 Current CO₂ emissions from London's homes

In 2008 London's homes were estimated to have emitted 15.93 MtCO₂ⁱ, around 36 per cent of London's total emissions for 2008 as shown in figure 5.2. 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 vast majority (just over 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 minimise the demand for these energy consuming activities. The remainder is split between lighting and appliances, which account for 16 per cent of CO₂ emissions, and cooking which accounts for three per cent. These emissions can be minimised by specifying the most energy efficient appliances, for example an A+ rated washing machine.

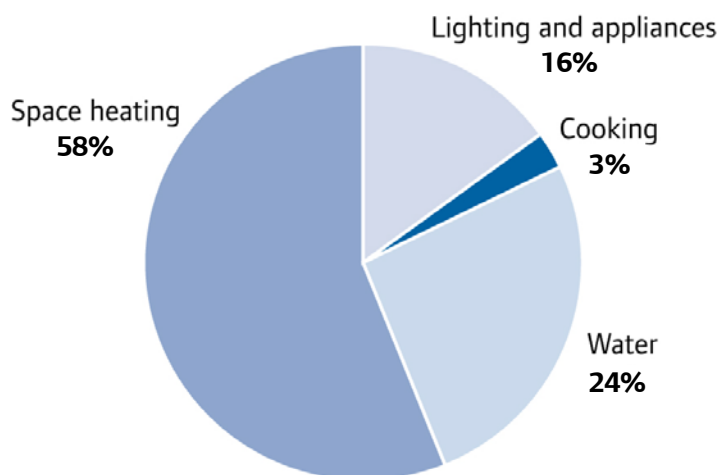
CO₂ emissions from London's homes stayed approximately level between 1990 and 2008. This is despite London's population rising by around three quarters of a million in that period and an overall increase in the number of energy consuming goods in homes, demonstrating there has been a reduction in CO₂ emissions per capita.

Figure 5.2 The contribution of London's homes to CO₂ emissions in 2008



Source: LEGGI 2008

Figure 5.3 Energy use in London's homes in 2008



Source: DECC, Energy consumption in the UK, 2009

5.3 Projected CO₂ 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 MtCO₂ per year by 2025. This fall in CO₂ emissions is principally driven by changes in energy supply, but includes a baseline level of ongoing reactive retrofitting improvements to the housing stock made on an individual basis, such as the replacement of single-glazed windows with double glazing or old boilers with A rated new boilers that is undertaken by homeowners or landlords on a voluntary basis.

5.4 Projected CO₂ emissions after committed government action

The previous government had a number of policies and programmes to reduce CO₂ emissions from homes, including the Carbon Emissions Reduction Target (CERT), Carbon Emissions Savings Programmes (CESP), Warm Front, Decent Homes and smart meters. The new coalition government is currently reviewing these programmes, and has also announced its intention to introduce a Green Deal for homes, although details are yet to be announced. For more information on government policies and programmes, please see box 5.1. These programmes are expected to reduce emissions from London's homes by 2.52 MtCO₂ by 2025.

Box 5.1 Government CO₂ reduction policies and programmes for homes

The new coalition government has announced its intention to introduce a Green Deal for homes. Details are yet to be announced, but it is likely this would give each household upfront funding to pay for energy efficiency measures, which would be paid back through savings on energy bills.

The previous government also introduced a number of energy efficiency policies and programmes for homes, the future of which are currently being reviewed by the new coalition government. The rest of this box summarises those policies and programmes:

- **Homes Energy Management Strategy (HEMS)** - This strategy was published in March 2010. It aimed to make homes more comfortable in cold weather, reduce energy use and save money, along with making greater use of small-scale renewable low carbon sources of energy.
- **Carbon Emissions Reduction Target (CERT)** - CERT is an obligation on domestic energy suppliers with over 50,000 customers to make savings in the amount of CO₂

emitted by households. The existing obligation runs between 2008 and 2011 and energy suppliers are required to deliver overall lifetime CO₂ savings of 185 MtCO₂. The coalition government has announced an extension to CERT to December 2012 with an increased focus on insulation and the most vulnerable.

- **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. CESP is promoting a whole-house approach to energy efficiency. The programme is delivered through community-based partnerships between local authorities, energy companies and community groups. Seven of London's Low Carbon Zones have applied for CESP.
- **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.
- **Decent Homes** - This is the previous government's programme to ensure all social housing meets a standard of decency. The standard means that it meets a minimum standard for housing, is in a reasonable state of repair, has reasonably modern facilities and provides a reasonable degree of thermal comfort.
- **Social Housing Energy Saving Programme (SHESP)** - SHESP is an £84 million fund aimed at reducing fuel bills for social housing tenants through cavity wall insulation.
- **Smart meters** - Government has mandated energy suppliers to roll out smart meters for electricity and gas to all homes in Great Britain by 2020. This will provide consumers with better information, enabling them to monitor and reduce their energy use and CO₂ emissions.

5.5 Opportunities and challenges to reducing CO₂ emissions from London's homes

Although government and EU action will make reductions in CO₂ emissions from London's homes, meeting the Mayor's CO₂ emissions target will require the pace and scale of activity to be faster in London, and will need to enable mass take-up of measures including loft and cavity wall insulation, as well as more expensive measures such as solid

wall insulation, boiler replacement and renewables. The Mayor's activity to achieve this will need to address a number of challenges and opportunities in London:

a) Fragmented delivery in London

There are over 30 home retrofit schemes in operation in London. Although some have been very successful in meeting their specific CO₂ 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 the energy efficiency programmes that are being offered. It also means that opportunities for realising economies of scale are being lost.

b) Delivering energy efficiency measures in London has traditionally been more difficult

In addition to fragmented delivery, there are also 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 propertiesⁱⁱ** - Seventy per cent of London's homes are considered hard to treatⁱⁱⁱ and it is estimated that 57 per cent of homes have solid walls. 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 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 a managing 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 renewable 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.
- **The number of properties in conservation areas** - Some 13 per cent of London's homes are in conservation areas and current planning policy in these areas can reduce options for externally-visible efficiency measures. This includes replacing sash windows with more energy efficient double glazing, installing external solid wall insulation and renewable technologies. This only compounds the retrofitting challenge in London,

where the majority (70 per cent) of the housing stock actually requires these types of installations to reduce its CO₂ emissions.

- **The number of properties with loft insulation** - Only 30 per cent of London's homes have lofts and approximately 95 per cent of lofts in the London area already have some loft insulation. Insulation schemes are therefore essentially top-up schemes. Although this can deliver significant CO₂ 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 than lofts that have no insulation.
- **The higher associated costs of installing measures** - The high density urban nature of London increases the associated logistical costs of running a programme and installing energy efficiency measures. Additional costs include transport costs and congestion charging, car parking and the time it takes for installers to travel from job to job in London's traffic.
- **Private rented properties** - The private rented sector in London represents 15 per cent of London's homes^{iv}. 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 Energy Savings Allowance have been offered.

c) Funding required 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 types of 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 obligation elsewhere in the UK. The London Assembly estimated that only 4.5 per cent of total UK insulation installations took place in London, even though the capital has 12 per cent of the population. This means that, under a conservative estimate, London lost out on

approximately £100 million in energy efficiency funding over the period from 2005 to 2008^v. This shortfall in funding means that London cannot deliver homes energy efficiency at the scale and pace required to meet the Mayor's CO₂ emissions targets.

In addition, funding streams for delivering more expensive home retrofitting measures such as solid wall, new boilers or renewables are far more limited and harder to access. Also, the pay-back periods for these types of measures are too long to make them attractive to households.

New financing models are needed to fund the upfront costs of these measures and allow homeowners to pay them back over time from the savings on their energy bills. The government is currently looking at a range of pay-as-you-save (PAYS) or Green Deal models and is trialling a small number of different models across the UK. To meet the Mayor's CO₂ emissions reduction target London requires that PAYS or Green Deal pilot models are available for trialling by 2012. This will ensure that they are fully operational and available for large-scale rollout by 2015.

d) Savings on fuel bills and opportunities for new income streams

Delivering energy efficiency measures in homes should reduce energy consumption and deliver financial savings on fuel bills, especially benefiting those in fuel-poverty.

In simple terms a fuel poor household is unable to keep the home warm at an acceptable cost. This can lead to serious health implications and is also linked to a number of winter deaths (please see box 5.2). Government's definition of a fuel poor household is one where more than ten per cent of net income is spent on fuel costs for satisfactory heating and other normal energy use. In London in 2008, this equated to 318,000 households. However, government's definition fails to take account of the much higher costs of housing within London. If fuel poverty were calculated as homes that spend more than ten per cent of their net income after housing costs have also been deducted from their gross income, this number would more than double to an estimated 760,000 households^{vi}.

In addition to saving money on fuel bills, reducing CO₂ emissions from homes through installing renewable energy technologies represents an opportunity to access additional income streams. The introduction of the FiT in April 2010, and the potential for a Renewable Heat Incentive in 2011, has created a potential income stream for households that can afford to install these technologies as part of a whole-house approach to cutting CO₂ emissions. The basic premise is that the household receives a pre-set tariff per unit of

renewable energy generated. The financial value of the tariff is different for each technology.

There is an emerging market developing on the back of the FiT for renting out large areas of roof space to renewable energy businesses. These companies rent the roof space and install renewable energy technologies (mainly solar photovoltaics). The income generated from the tariff creates a competitive return on their investment.

Box 5.2 Causes and effects of fuel poverty in London

Causes of fuel poverty include: low income; high energy costs related to inefficient and expensive heating systems; poor energy efficiency; energy price fluctuations; and payment differentials (including high tariffs, particularly from some suppliers, for those on pre-payment meters). The consequences of fuel poverty can be severe and wide-ranging, affecting families both directly in areas such as health and indirectly in areas such as education. Children, older people and those who are sick or disabled can suffer serious health implications including respiratory infections, bronchitis, asthma, heart attacks, strokes and hypothermia. Fuel poverty is also associated with a significant number of winter deaths.

e) 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. Unfortunately the energy efficiency market is relatively immature and the main drivers of demand are from government energy efficiency programmes, predominantly CERT and Warm Front. 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, there is currently very little demand. This means the supply chain is immature for these and is unlikely to strengthen until a consistent level of demand is available to give confidence to the market.

f) Lack of data on CO₂ emissions from homes in London

Boroughs currently lack access to accurate data on CO₂ 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. Energy suppliers currently hold data on which homes use most energy, but this is not shared with boroughs. In addition, the Department for Communities and Local Government holds data on the energy rating for homes through the Energy Performance Certificates, but this is not currently widely shared.

5.6 Reducing CO₂ emissions from London's homes through committed Mayoral action

The Mayor is committed to minimising CO₂ emissions from London's homes and has developed the RE:NEW homes energy efficiency programme to achieve this. RE:NEW will create a framework that can be used by London boroughs to co-ordinate 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^{vii}.

RE:NEW will 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 CO₂ emissions from London's existing homes will be 3.69 MtCO₂ by 2025. The Mayor will achieve this through the following policies:

Policy 6 Retrofitting existing homes with energy efficiency measures, along with low and zero carbon energy generating technologies, to reduce their CO₂ emissions

Vision

The rate of rollout of energy efficiency measures, low and zero carbon energy generating technologies, and water saving measures to London's homes is exponentially increased. By 2015 RE:NEW is catalysing delivery of advice and easy-to-install energy efficiency measures, loft and cavity wall insulation where practical, and some renewable technologies to 1.2 million London homes. By 2015 a model will be in place that pays for the upfront costs of more expensive energy efficiency measures that will enable every London home to be offered a whole-house retrofit.

Vision to policy

The Mayor will work through the LDA, and with London Councils, London boroughs, the Energy Saving Trust and other stakeholders to provide Londonwide retrofitting of whole-house energy saving measures in existing homes through RE:NEW, and help London's households to change the way energy is used and generated. The Mayor will also work to develop financing mechanisms that will allow Londoners to install more expensive measures, such as renewables.

Policy to action

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

- **Action 6.1** - Through the LDA, and working with London boroughs, the Mayor is committing £9.5 million to developing the RE:NEW delivery model and rolling it out until 2012. This first phase of RE:NEW will create the momentum to provide energy saving advice and deliver easy-to-install energy efficiency and water saving measures to a target number of 200,000 homes, along with enabling loft and cavity wall insulation where practical.
- **Action 6.2** - The Mayor will work with boroughs to support the delivery of RE:NEW, including systematic data collection to reduce the operational costs of delivery and increase the likelihood of locating lofts and cavity walls in the private-rented and owner-occupied sectors.
- **Action 6.3** - The Mayor will encourage government to ensure that London receives at least an equitable share of the funding that is available for improving energy efficiency in homes, and seek to integrate smart meter rollout with RE:NEW delivery wherever possible.
- **Action 6.4** - The Mayor will work with partners and energy suppliers 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.

b) Improved homes energy efficiency standards

- **Action 6.5** - In implementing his London Housing Strategy, the Mayor will seek to maximise funding for homes retrofit from central and regional housing funding pots and ensure it complements the overall approach adopted by RE:NEW.
- **Action 6.6** - 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 the home achieves a high energy efficiency rating.
- **Action 6.7** - The Mayor will work with partners to explore options for the delivery of an enhanced Decent Homes standard, and has commissioned research into the technical options for, and costs of, delivering improvements in the quality and environmental performance of London's social rented homes.

c) Maximising uptake of more expensive measures

- **Action 6.8** - Through RE:NEW, the Mayor will work with partners to establish financing mechanisms as part of the Green Deal for the rollout of more expensive measures on a large-scale by 2015, such as solid wall insulation, new boilers, new windows and renewable energy technologies, as part of the whole-house approach to retrofitting London's homes.

d) Develop effective community-based approaches to delivering home energy efficiency measures

- **Action 6.9** - The Mayor will support London boroughs to deliver ten Low Carbon Zones to demonstrate the potential for CO₂ savings from physical measures and community engagement, and encourage innovation. The Mayor aims to expand the programme if successful.

*a) Working with boroughs, energy suppliers, government and partners, install easy measures in 1.2 million homes and loft and cavity wall insulation where appropriate by 2015***RE:NEW - Homes energy efficiency for tomorrow**

To retrofit London's homes with energy efficiency, renewable and water saving measures and attract the required funding into London, the Mayor is working with partners to deliver RE:NEW, a pan-London model for retrofitting homes. This initiative aims to overcome the barriers to retrofitting homes in London on a large scale. RE:NEW will build

on existing energy efficiency schemes and help co-ordinate the plethora of schemes that are offered at a borough level into a more integrated and coherent energy efficiency programme for households. This will create a consistent and engaging experience with a common branding that is simple for households to understand. This will help to increase the likelihood of households taking up the measures on offer under RE:NEW and attract funding from commercial partners.

The RE:NEW model has been developed, and is being rolled out, through collaboration between the Mayor, through the LDA, and London Councils, the 33 London boroughs, and the Energy Saving Trust. 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 low energy light bulbs, stand-by switches, and real-time display units are installed, and energy saving advice is given. The energy assessor also refers households to further energy saving measures. In the case of loft and cavity wall insulation and heating measures, appointments for installations are booked in during the visit. For more expensive measures, such as renewables and solid wall insulation, households are referred on to appropriate organisations, such as the Energy Saving Trust, to provide them with further information and support to pursue these measures.
- **Area-based delivery by boroughs** - Homes are retrofitted on a street-by-street basis. This approach can help to cut down costs, particularly through time saved between installations, and also allows for community engagement and neighbour recommendations to take place which increases the overall uptake of measures.
- **Capability to tackle all types of housing** - The RE:NEW model promotes approaches for retrofitting all types of housing and all tenures. The energy assessment 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 communications will be through direct contact and also through landlord accreditation schemes and other networks.

- **Free upfront** - The RE:NEW model offers easy-to-install energy efficiency measures to homes for free. Going forward, it aims to integrate with PAYS or 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, the borough and the environment. For example, it will not only deliver energy efficiency advice and measures but also water efficiency measures that will reduce both the carbon emissions and water consumption in households along with other services such as installing smoke alarms and conducting benefit checks.

Figure 5.4 The RE:NEW customer journey



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.



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SAVING ENERGY, MONEY AND TOMORROW

1,102 households in Catford South were visited by the RE:NEW programme and over 10,000 energy and water savings measures were installed, with 538 properties referred for additional measures including loft and cavity wall insulation and heating improvements. From these referrals there have already been 125 loft insulations completed.

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 the CO₂ emissions from these homes by more than 450 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 visual display unit

The LDA has committed £9.5 million between 2009 and 2012 to RE:NEW. The RE:NEW partnership carried out three technical trials during summer 2009 to determine the package of easy-to-install measures on offer, the logistical and cost implications of the programme, and how households will be referred for follow-up insulation visits. RE:NEW also carried out a series of demonstration projects from November 2009 to April 2010 in nine boroughs to test delivery on a large-scale and inform the final RE:NEW delivery model. The trials and demonstration projects have retrofitted approximately 9,000 homes, and initial results show uptake rates of up to 35 per cent. 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 or increase. Box 5.3 gives a case study on the RE:NEW demonstration project in Lewisham.

From 2010 to 2012, the RE:NEW model will be rolled out to all boroughs, aiming to install energy and water efficiency measures in 200,000 homes by 2012. By 2015, it aims to deliver a package of easy-to-install measures and energy efficiency advice to 1.2 million homes, insulate the remaining loft and cavity walls where practical and top-up those lofts that only have a small amount of insulation. RE:NEW will then aim to provide a whole-house retrofit to all London homes that are interested by 2030.

Achieving these targets will require integration between RE:NEW and existing energy efficiency schemes in boroughs, as well as wider local priorities. The programme will also need to attract the necessary levels of funding from energy suppliers, government and other private funding streams if these targets are to be met.

The Mayor will look to government and London boroughs to co-ordinate funding between 2012 and 2015 and to continue the expansion of the RE:NEW approach across London. A wide-scale rollout of RE:NEW will depend on the development of a cost effective delivery model, government's willingness to provide London with an equitable share of funding, and energy suppliers' commitment to fund in London. To achieve this, the Mayor will pursue a three-pronged approach:

Working with boroughs

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

- Targeting RE:NEW delivery to 2015 on areas with a large proportion of homes yet to have their lofts and cavity walls insulated. This will ensure that the programme creates a large market for these insulation activities and therefore make them more cost effective to fund.
- Offer reduced parking rates or ease parking permit administrative burdens, provide free or cheaper storage areas for the easy-to-install measures, and 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 Systems, along with increasing awareness and support through relevant private rental networks.
- Drive uptake by raising awareness of energy efficiency and RE:NEW through local marketing, PR and community awareness events, as well as adoption of a pan-London brand. The RE:NEW trials have shown that up to one third of homes taking up the programme did so because they received a recommendation from within their community.

To deliver the ambitious RE:NEW CO₂ emissions reductions will require high levels of uptake of energy efficiency measures in London's homes. To achieve this, the Mayor will work with boroughs to develop a common recognisable pan-London 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.

Working with government

The Mayor is encouraging government to take a number of actions to ensure the effective delivery of RE:NEW in London, including:

- Ensuring that national programmes, such as successor programmes to CERT, 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.
- Protecting key housing funding streams in London, including the Targeted Funding Stream.

- Supporting the rollout of smart meters and calling on government to combine this with the RE:NEW rollout. Smart meters offer a real opportunity to help consumers 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 when it comes to proving the business case for PAYS financing models. The Mayor is committed to working with energy suppliers, London boroughs and social services in London to achieve this.
- Supporting the government's proposals to share Energy Performance Certificate (EPC) data for homes so that energy efficiency programmes can be better targeted within geographical areas.

Working with energy suppliers

In addition, the Mayor is working with energy suppliers to understand how the RE:NEW model can link closely with their energy supplier obligations. This will include:

- encouraging energy suppliers to share data on energy use in homes so that the RE:NEW model can be targeted at the highest CO₂ emitting properties and therefore be more cost effective
- encouraging energy suppliers to ensure a more constant flow of insulation activity in London to enable the development and growth of supply chains
- encouraging energy suppliers to commit CERT funding to deliver energy efficiency activity in London through RE:NEW
- working closely with energy suppliers to identify how and where CESP can be best used to increase the measures that can be offered through RE:NEW.

These actions will enable the successful delivery of RE:NEW and increase London's share of energy efficiency measures, from its current estimated level of 4.5 per cent of the national total, to at least its equitable share of 12 per cent by 2015.

b) Improved homes energy efficiency standards

To support the Mayor's targets on homes energy efficiency, as well as supporting the Mayor's housing priorities to improve social housing, the Mayor will ensure that the

energy elements of his London Housing Strategy that are related to energy efficiency retrofitting work are effectively implemented and linked in to RE:NEW.

Firstly, the Mayor is working with partners to explore options for the delivery of an enhanced Decent Homes standard. The Mayor has commissioned research into the technical options for, and costs of, delivering improvements in the quality and environmental performance of London's social rented homes. A key aim of the research will be to provide a total estimated cost for delivering an enhanced environmental standard for social rented homes in London. The findings of the research will be finalised in 2010.

In addition, the Mayor's London Housing Strategy has set high energy efficiency standards for retrofitting existing homes. These standards should be reached so long as the fabric of the building allows.

c) Maximising uptake of more expensive measures

So far this policy has focussed on easy-to-install energy efficiency measures and loft and cavity wall insulation. However, given the nature of London's housing stock as set out earlier in this chapter, reaching the Mayor's CO₂ emissions targets will require more than these measures. Solid wall insulation and renewables will also need to be installed rapidly, far exceeding current levels of installation. As set out in chapter 4, the Mayor is undertaking a renewables capacity study to assess the potential for greater uptake of micro-generation technologies in the homes sector, and the findings of this will inform the RE:NEW model going forward.

The installation of these measures involves high upfront costs, so to make them attractive to households they need to be offered in ways that make them more affordable. Financing mechanisms, such as PAYS models, could open up the market for this. PAYS models usually involve an upfront investment from a funding partner, rather than the household, allowing the household to make repayments over a period of time through the savings on their energy bills. The repayments need to be lower than the household's predicted energy bill savings, meaning financial and carbon savings are made from day one, but high enough to allow a long-term return on investment for the funding partner.

The successful rollout of harder energy efficiency measures to London homes will therefore be dependent on government developing a successful PAYS model. The coalition government has announced its intention to roll out a Green Deal to homes.

Although the details of this are yet to be announced by government, it is likely the deal would see each household receiving upfront funding to retrofit their homes, which would be paid back through a PAYS model.

The Mayor is actively working with government to develop this model so 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. This includes developing a compelling and workable proposition for all key players, including lenders, households and delivery agents. It also involves identifying the right delivery model and government initiating the legislative changes needed.

For the Green Deal to work in the long run, it is likely there will be a need for primary and secondary legislation change, which could take in the region of two years to implement. However, there is ample opportunity to design a first-wave trial without legislation. This first-wave of activity needs to be scalable, prove the business case, instil confidence in investors and gather learning points for future refinement of the model.

The Mayor is encouraging government to develop a model that is in its early delivery phase by the end of 2012. Through the RE:NEW programme, London is ideally placed to deliver these early phases and ensure early CO₂ emissions savings. The Mayor believes that the early phase of this scheme should explore marketing of the scheme, the operational delivery model and options for accessing low-cost finance. The model will also need to incorporate delivery of both easy-to-install measures and more expensive measures, including micro-generation technologies to ensure that Londoners can capitalise on the FiT incentives.

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 via RE:NEW and RE:CONNECT, including through the London Green Fund. For more information, please see chapter 3. Detailed discussions are underway with a range of potential commercial partners, including utilities, retail and telecommunication companies due to their existing relationship with homeowners.

In addition, the FiT and anticipated RHI offer significant potential to retrofit micro-generation technologies on London's homes, creating attractive pay-back periods for households and investors. The Mayor will work with boroughs and investment partners to

make sure these and any similar financial incentives are integrated into whole-house offers through RE:NEW and RE:CONNECT.

d) Develop effective community-based approaches to delivering home energy efficiency measures

To complement the RE:NEW programme, the Mayor, working with boroughs, is delivering RE:CONNECT; ten low carbon zones in London neighbourhoods. The zones aim to show 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.

The zones have a target to deliver a reduction of 20.12 per cent CO₂ emissions by 2012 and aim to bring together London boroughs, community organisations, residents, businesses and utilities to work in partnership. It is proposed that the low carbon zones become focal points of borough-led and Mayoral schemes, allowing them to leverage greater funding from government and energy suppliers.

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 LDA has committed between £200,000 and £400,000 per zone. The boroughs are co-ordinating 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.

The successes of the zones will be 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 will be 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.

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 25 SMEs. Baseline emissions are estimated at 7,500 tonnes of CO₂ per year, and the borough is aiming for a 24 per cent reduction over the life of the programme.

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LOW CARBON ZONES

Mayoral commitment to the zone has helped secure an additional £340,000 of investment from DECC towards solar measures on community buildings, hard-wired smart meters for 200 homes, an educational installation in a local school, and cycle parking.

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 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 the Mayoral and DECC funds and the borough will also be drawing on CERT funding for energy efficiency measures.

In March 2010, 150 residents attended a public consultation event at which London Sustainability Exchange held two sessions on behaviour change and low carbon lifestyles and identified volunteer co-ordinators to act as peer-to-peer energy champions. A personal carbon trading pilot is planned, pending EU funding.

A business audit, web-interface metering and small measures scheme is also planned for 2010-11.

Muswell Hill Primary School Living Ark

Policy 7 Tackling fuel poverty in London
<p>Vision</p> <p>By 2025, energy consumption and bills throughout London have been reduced through installing energy efficiency measures and enabling more energy-aware behaviour. The most vulnerable will have lower energy bills and better access to the support and benefits that they are entitled to, resulting in their being better able to pay their energy bills.</p>
<p>Vision to policy</p> <p>The Mayor will work to help eradicate fuel poverty in London by increasing the energy efficiency of homes through specific programmes and linking where appropriate with energy efficiency programmes such as RE:NEW, increasing the provision of energy efficient affordable housing and increasing the uptake of benefits and energy efficiency measures.</p>
<p>Policy to action</p> <p><i>a) Increase uptake of energy efficiency measures in fuel poor households</i></p> <ul style="list-style-type: none"> • Action 7.1 - The Mayor will use RE:NEW to increase uptake of CERT funding and Warm Front offers in London by implementing an effective referral system. The Mayor will also work to maximise the income of fuel poor households by including the opportunity to conduct benefits checks as part of RE:NEW. • Action 7.2 - The Mayor will make the case for more accurate, up-to-date and regional data on fuel poverty, and will encourage London boroughs to use energy efficiency programmes, where possible as one way to start collecting a standard set of data for their housing stocks. • Action 7.3 - The Mayor will use his Older People Strategy to promote energy efficiency measures to older people. <p><i>b) Support changes to billing arrangements</i></p> <ul style="list-style-type: none"> • Action 7.4 - The Mayor will investigate working with energy suppliers, through RE:NEW and RE:CONNECT, to ensure that smart meters are rolled out in London ahead of government's 2020 timetable for national implementation, with particular focus on London's fuel poor areas.

- **Action 7.5** - The Mayor will work with partners such as the Energy Saving Trust and National Energy Action to make the case to government for all suppliers to offer social tariffs as an integral part of an energy assistance package that includes energy efficiency measures.
- c) Promote the London Living Wage and increase affordable housing provision*
- **Action 7.6** - 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 7.7** - The Mayor will call on government to recognise the true scale of fuel poverty in London once housing costs are considered and to re-define the definition of fuel poverty to take account of housing costs.

Although the previous government announced a range of initiatives that included energy efficiency activity as one of the ways of addressing fuel poverty, the Mayor agrees with the Fuel Poverty Advisory Group's view that these announcements were inadequate and that further measures are needed as part of a robustly co-ordinated, detailed and funded plan to eradicate fuel poverty by 2016. This section sets out how the Mayor will work to achieve this.

a) Increase 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 key to reducing fuel bills and helping households out of fuel poverty. For this reason, the rollout of RE:NEW across London can be effective in reducing the incidence of fuel poverty.

The Mayor will therefore work through RE:NEW to increase the level of CERT funding London receives, which also includes funding for priority groups^{viii}. He will also work with partners to transform the market for the provision of more expensive measures. The Mayor aims to increase uptake of Warm Front offers in London by implementing an effective referral system for loft and cavity wall insulation through RE:NEW.

RE:NEW will also include a benefit eligibility check as part of the offer to the household. As receipt of certain income or disability benefits is an eligibility criterion for obtaining

free measures from national schemes such as Warm Front, increasing benefits uptake should have a positive impact on the number of installations delivered.

In London boroughs where there is a benefit checking service, this will be included as part of RE:NEW so it can be carried out face-to-face rather than over the telephone. In London boroughs where there is no existing benefit checking service the RE:NEW programme will refer potential households onto the appropriate council service and the Mayor will work with relevant organisations to help ensure that individuals receive the appropriate support through the application process.

The success of fuel poverty programmes will also 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, numbers of pre-payment meters and fuel debt is not available on a regional basis. The Mayor will make the case for more accurate, up-to-date and regional data on fuel poverty, and will encourage London boroughs, where possible, to use energy efficiency programmes as one way to start collecting a standard set of data for their housing stocks.

In targeting fuel poverty support, the GLA's 'Fuel Poverty in London' report found that the incidence of fuel poverty in black and minority ethnic households is approximately twice as high as in white households^{ix}, whilst older people are amongst those most likely to be in fuel poverty and can be particularly vulnerable to its impacts. The Mayor is therefore using his Older People Strategy to promote energy efficiency measures. He has run a 'Know Your Rights Campaign' to raise awareness amongst older people of the benefits and energy efficiency measures that they are entitled to^x.

b) Support changes to billing arrangements

In addition to energy efficiency levels, variations in energy prices can have serious implications for fuel poverty. Fuel prices have fluctuated significantly between 1996 and the present, and continue to change. The average domestic fuel bill (gas and electricity) increased from £572 to £1,287 (an increase of 125 per cent) between January 2003 and September 2008^{xi}. The long-term trend for energy prices is likely to be upwards, despite recent fluctuations.

Furthermore, 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.

To mitigate against these factors, the Mayor will investigate working with energy suppliers including through RE:NEW and RE:CONNECT to push for smart meters to be rolled out in London ahead of government's 2020 timetable for national implementation. Smart meters will provide households with accurate bills, helping them to better plan their budgets and avoid fuel debt.

The Mayor will also work with partners such as the Energy Saving Trust and National Energy Action to make the case to government for all suppliers to offer social tariffs as an integral part of an energy assistance package. Social tariffs can help those having difficulty paying their bills, ensuring they are given a lower tariff and the best payment methods.

c) Promote the London Living Wage and increase affordable housing provision

The 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 117 times more likely to fall into fuel poverty^{xii}.

The Mayor has set up the Living Wage Unit to ensure that data is available about what a living wage is in London, and will continue 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. In 2004-2006 the average (median) weekly rent in London was 66 per cent higher than that for England as a whole. A significant aspect of the Mayor's London Housing Strategy is provision of more affordable housing.

The Mayor will call on government to recognise the true scale of fuel poverty in London as a consequence of the higher cost of living in London. If Londoners' housing costs are considered when calculating their overall net income, it consequently increases the likelihood of being fuel poor.

5.7 Reducing CO₂ emissions from London's homes through further Mayoral action

The policies and actions in this chapter have set out the Mayor's committed programmes to reduce CO₂ emissions from London's homes. To reach the Mayor's CO₂ emissions reduction target will require further activity however.

As set out in chapter 4, the Mayor, subject to funding, can take further action on energy supply. This would involve increasing the target for the amount of London's energy supply from decentralised sources by 2025, from 25 per cent to 30,000 GWh per year. If the homes sector were to receive its relative share of the CO₂ emissions reductions associated with this, it would reduce CO₂ emissions from London's homes by a further 0.34 MtCO₂.

As noted in chapter 4, this is not a committed action, and will only be deliverable if there is further support, including funding from government and the private sector.

5.8 Reducing CO₂ emissions from London's homes 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 homes by 7.83 MtCO₂. However, further government action will also be required to contribute to meeting the Mayor's target to reduce London's CO₂ emissions by 60 per cent of 1990 levels by 2025.

Reaching the Mayor's CO₂ emissions reduction target will require government to adopt more ambitious CO₂ 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 CO₂/kwh. If these recommendations were to be adopted, this would further reduce CO₂ emissions from London's homes by 1.36 MtCO₂ per year.

5.9 Implementing Mayoral policies and actions

Annex A of this document sets out the projected CO₂ emissions reductions, by source, as a result of activities in the homes sector, along with assumptions for expected CO₂ emissions reductions. Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter.

Endnotes

- ⁱ The most recent CO₂ measurements for London are from the LEGGI 2008.
- ⁱⁱ 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 micro-generation from renewables.
- ⁱⁱⁱ GLA Modelling (2009)
- ^{iv} GLA Modelling (2009)
- ^v London Assembly, *Lagging Behind: Insulating homes in London* (2009)
- ^{vi} GLA, *Fuel Poverty in London* (2008)
- ^{vii} Government schemes and funding sources levered through the RE:NEW programme have been counted towards Mayoral emissions reductions in the modelling. This is based on the assumption that RE:NEW will be the mechanism that allows those schemes to be delivered effectively in London.
- ^{viii} 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.
- ^{ix} GLA, *Fuel Poverty in London* (2009)
- ^x In 2007, Age Concern estimated that in the UK, £4.2 billion in benefits for older people go unclaimed each year.
- ^{xi} Fuel Poverty Advisory Group (for England), *7th Annual Report* (2008)
- ^{xii} GLA, *Fuel Poverty in London* (2009)



6 Cutting costs and CO₂ in London's workplaces

Summary

Aim

By 2025, London's workplaces will be some of the most energy efficient of any major city in the world.

The Mayor will contribute towards this through the following policy:

- **Policy 8 - Minimising CO₂ emissions from London's existing workplaces** - The Mayor, working through the LDA and with other partners, will support organisations to reduce CO₂ emissions from their existing buildings by retrofitting them with energy efficiency measures, building the knowledge and capacity of workplaces to use energy more efficiently, and sharing best practice.

The Mayor's main programmes to deliver this are:

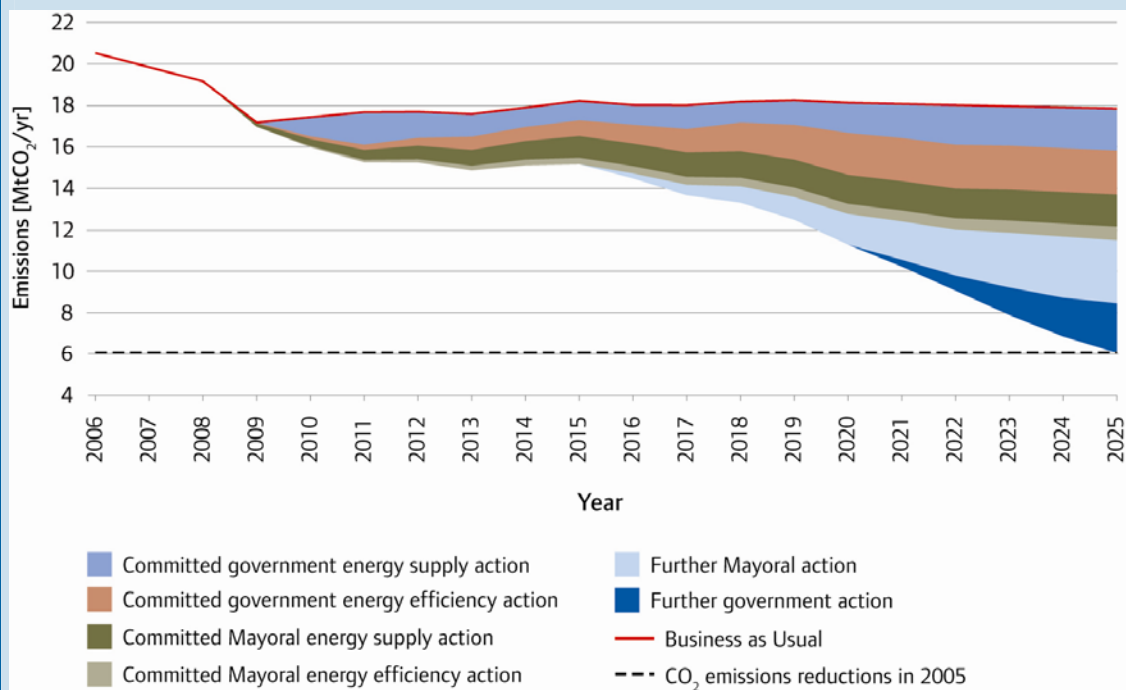
- **RE:FIT (formerly the Buildings Energy Efficiency Programme)** - This programme uses an innovative commercial model to support the public sector to retrofit buildings with energy efficiency measures. By 2025 it is expected to reduce London's CO₂ emissions by 400,000 tonnes per year.
- **The Better 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 not just for their own portfolios, but also with the intention of rolling them out to the entire market. By 2025, the aim is for the BBP to have catalysed activity that will be reducing CO₂ emissions by 5,000 tonnes per year.
- **Green500** - Energy efficiency advice provided through the Green500 has already catalysed activity that will reduce CO₂ emissions by 100,000 tonnes per year by 2025. This support will be extended to ensure further reductions in CO₂ emissions.

CO₂ emissions from London's workplaces: 2008-2025

- **Current CO₂ emissions** - In 2008 emissions from London's workplaces were 19.17 MtCO₂.
- **Business as Usual CO₂ emissions by 2025** - Under a BaU scenario, emissions from London's workplaces would be expected to reduce to 17.85 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from committed government action** - Government, EU and international action, are expected to reduce London's CO₂ emissions from workplaces by 4.13 MtCO₂ per year.

- CO₂ emissions reductions by 2025 from committed Mayoral action -**
 Committed Mayoral action will reduce CO₂ emissions from London's workplaces by 2.21 MtCO₂ per year.
- CO₂ emissions reductions by 2025 from further Mayoral action -** If the Mayor adopts a more ambitious target to supply 30,000GWh per year from decentralised sources, the RE:FIT programme is rolled-out to the commercial sector, and a RE:NEW-type programme is rolled out to SMEs, CO₂ emissions from the workplaces sector will reduce by 3.03 MtCO₂ per year.
- CO₂ emissions reductions by 2025 from further government action -** If government adopts a more ambitious CO₂ emissions reduction scenario, as recommended by the Committee on Climate Change, emissions are expected to reduce by a further 2.40 MtCO₂ per year.

Figure 6.1 Projected reductions in CO₂ emissions from London's workplaces by 2025



Source: GLA modelling

6.1 Introduction

This chapter sets out the relative contribution of workplaces to London's CO₂ 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 CO₂ emissions from the generation and supply of energy to London will be reduced by 2025 and chapter 7 will set out how CO₂ emissions from new buildings in London will be reduced. This chapter therefore focuses on how CO₂ emissions from the use of energy in London's existing workplaces will be minimised.

This chapter will:

- summarise London's current CO₂ emissions from existing workplaces
- summarise London's CO₂ emissions from workplaces under a BaU scenario
- summarise CO₂ reductions expected as a result of committed government action on workplaces
- set out the challenges and opportunities for London to further reduce its CO₂ emissions from workplaces
- detail the specific policies and actions that the Mayor has committed to take to reduce CO₂ emissions from London's workplaces
- set out further Mayoral action that can be taken to reduce CO₂ emissions from London's workplaces, and that will be deliverable subject to further support, including funding from government and the private sector
- summarise further action that government will need to take to reduce CO₂ emissions from London's workplaces, and support the achievement of the Mayor's CO₂ emissions reductions targets.

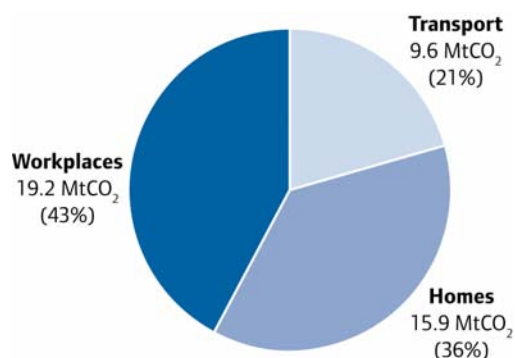
6.2 Current CO₂ emissions from London's workplaces

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 19.17 MtCO₂ in 2008ⁱ, equivalent to 43 per cent of London's total CO₂ emissionsⁱⁱ. This includes CO₂ emissions

from both commercial and industrial activity. The majority of CO₂ 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 sources of CO₂ emissions in London's workplaces are through the use of energy to heat and light buildings. This highlights the importance of retrofitting London's workplaces to reduce this sector's CO₂ emissions.

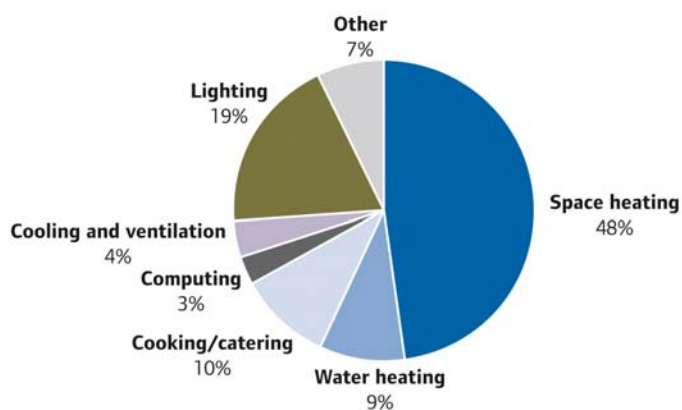
From 1990 to 2005, London's CO₂ emissions from workplaces increased, after which they started falling. Overall, CO₂ emissions have decreased by three per cent between 1990 and 2008ⁱⁱⁱ. This reflects the growth in economic activity in London as well a shift to a more service-based economy.

Figure 6.2 The contribution of London's workplaces to CO₂ emissions in 2008



Source: LEGGI 2008

Figure 6.3 Energy use in London's workplaces in 2008



Source: *Energy Consumption in the UK, 2009 update*, DECC

6.3 Projected CO₂ 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 CO₂ emissions from London's workplaces. The BaU scenario^{iv} estimates that CO₂ emissions from London's workplaces are projected to fall by ten per cent by 2025 to 17.85 MtCO₂. This is due to the increasing growth of the service sector and the shrinking industrial sector.

6.4 Projected CO₂ 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 CO₂ emissions from London's workplaces. These include the CRC Energy Efficiency Scheme (formerly the Carbon Reduction Commitment) 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). These combined programmes will reduce emissions in London by 4.13 MtCO₂ by 2025. However further action will be required to meet the Mayor's 2025 CO₂ emissions reduction target. The new coalition government is currently reviewing these programmes, although details are yet to emerge.

Box 6.1 Government and EU CO₂ reduction policies and programmes for workplaces

European Union (EU) policy

- **EU Emissions Trading System** - This is the largest multi-national emissions trading scheme in the world and it 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 CO₂ emissions^v.
- **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^{vi}.

UK government policy

The new coalition government has announced its intention to introduce a Green Deal which could offer energy efficiency measures to workplaces. However, further details of this are yet to be announced.

In addition, the previous government introduced a number of energy efficiency policies and programmes for workplaces, the future of which are currently being reviewed by the new coalition government. The rest of this box summarises those policies and programmes:

- **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 CO₂ emissions from large energy users that fall outside the remit of the EU Emissions Trading System. Around 5,000 organisations in the UK are expected to come under the scheme, including businesses and the public sector.
- **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 CO₂ targets set under Climate Change Agreements. The Chancellor announced in June 2010 that the Climate Change Levy would be reshaped to help deliver the government's commitment to a carbon price floor.
- **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. The previous government announced its intention for smart meters to be rolled out to all small and medium non-domestic gas and electricity sites by 2020.
- **National Indicator 185** - The performance framework for local government requires all local authorities to calculate and report CO₂ emissions from their estate through an analysis of energy and fuel use in their relevant buildings and transport, including where these services have been outsourced.

6.5 Opportunities and challenges to reducing CO₂ emissions from London's workplaces

Although government policy assists in reducing CO₂ emissions from London's workplaces, further cuts will need to be made in order to retrofit buildings at the scale and pace required to deliver the Mayor's CO₂ emissions reduction target. In doing so, the Mayor will address a number of challenges and opportunities in London's workplaces, including:

a) The pace of retrofitting of 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^{vii}. However, the Committee on Climate Change predicts that while public sector CO₂ emissions will fall in the period to 2020, this will be driven entirely by the lower carbon intensity of electricity supply, with energy consumption predicted to rise due to a growing demand for public services^{viii}. Barriers to reducing CO₂ 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 to medium enterprises (SMEs) are reluctant to take action on installing energy efficiency measures and micro-generation without seeing that government is taking action on it first^{ix}. Reducing public sector emissions is therefore an important step in developing the leadership needed to inspire residents and businesses to take action themselves.

b) 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 CO₂ emissions from their buildings. Landlords get occasional 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 CO₂ emissions reductions in this sector.

c) 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) 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 nearly 800,000 SMEs in the capital, 78 per cent of which are sole proprietorships and partnerships comprising only the self-employed owner-manager(s), and companies with only an employee director^x. It is estimated that collectively SMEs emit 20 per cent of the UK's total CO₂ 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, for example free personalised support from the Carbon Trust and the CRC Energy Efficiency Scheme.

The following policies and actions aim to overcome these barriers. It is expected they will reduce CO₂ emissions from London's workplaces by 2.21 MtCO₂ per year by 2025.

6.6 Reducing CO₂ emissions from London's workplaces through committed Mayoral action

The Mayor is committed to minimising CO₂ emissions from London's workplaces and has developed a number of programmes to achieve this. 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.

Policy 8 Minimising CO₂ emissions from London's existing workplaces

Vision

London's existing workplaces are fitted with energy efficiency measures and equipment, and people are aware of how to further reduce emissions through energy management and their behaviour.

Vision to policy

The Mayor, working through the LDA and with other partners, will support organisations to reduce CO₂ emissions from their existing buildings by retrofitting them with energy

efficiency measures, building the knowledge and capacity of workplaces to use energy more efficiently, and sharing best practice.

Policy to action

a) Retrofit London's existing workplace building stock with energy efficiency measures through RE:FIT and the Better Buildings Partnership

- **Action 8.1** - The Mayor will make the RE:FIT programme available to all public sector organisations in London and deliver guaranteed energy efficiency measures to all those organisations that sign-up to the programme.
- **Action 8.2** - Working through the Better Buildings Partnership, the Mayor will roll out green lease agreements with its 14 members which collectively own a significant proportion of London's commercially-rented floorspace, and promote 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 their benchmarking toolkit published in 2010; promoting the best ways for landlords to make a business case for retrofit through their toolkit on enabling low carbon retrofit published in 2010; and rolling out a toolkit on the role of managing agents in sustainable building management.

b) Provide energy efficiency support and advice through the Green500 and other schemes

- **Action 8.4** - The Mayor, working through the LDA, will support and expand the Green500 to help businesses make the most of the economic opportunities of reducing CO₂ emissions. This scheme will be extended to include SMEs with a utility spend of £20,000 or more per year.
- **Action 8.5** - The Mayor will review the provision of environmental management support to SMEs in London, and identify areas where the Mayor can contribute to the quality, availability and accessibility of support.
- **Action 8.6** - The Mayor will investigate provision of sector-specific support to businesses in London, building on existing programmes, and identify priority sectors for action.

c) Encourage those organisations already taking a lead on CO₂ 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 CO₂ emissions in their supply chains, procure lower carbon products and services, and support suppliers to reduce their CO₂ emissions through awareness raising and practical guidance.

a) Retrofit 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. The Mayor, working through the LDA, has developed RE:FIT (previously the Buildings Energy Efficiency Programme) to address this. RE:FIT was developed with the support of the Clinton Climate Initiative (CCI) and uses an innovative commercial model to retrofit public sector buildings. By 2025, RE:FIT aims to catalyse activity that will be reducing CO₂ emissions by approximately 400,000 tonnes per year.

London is the first city in the world to appoint an approved panel of Energy Service Companies (ESCOs) that undertake audits of buildings to identify potential energy saving measures and then install them. A project management office at the LDA also provides hands-on support and guidance to participating organisations to help them through the entire retrofitting process, 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 programme is based on an Energy Performance Contracting approach where the building owner identifies a portfolio of buildings they would like to retrofit, sets a target percentage energy savings and a payback period. An ESCo is appointed from the framework panel and implements the energy efficiency measures and guarantees the resulting energy savings. This guarantees the payback of the initial investment with the delivery risk transferred to the ESCo.

This programme 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.

The framework panel of ESCos is procured under the OJEU process^{xi}. This programme simplifies the procurement process by allowing participating organisations to run mini-competitions to procure an ESCo to undertake the retrofitting activity. The LDA has witnessed a growing interest from ESCos to deliver energy performance contracts in London since the first procurement process was undertaken in 2007. As RE:FIT expands it is expected to stimulate further the ESCo market.

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 and ten police stations and almost complete in 22 TfL buildings. The measures will deliver average CO₂ emissions reductions 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.

A further 58 GLA group buildings will be retrofitted under the scheme and the Mayor has recently announced the extension of the programme to the rest of the public sector. Twenty early adopter organisations have already signed-up to the programme to retrofit their buildings including the London Boroughs of Barking & Dagenham, Croydon and Sutton; Guy's and St Thomas' NHS Foundation Trust; the University of London; and Kew Gardens.

The total floorspace of London's workplaces is estimated at 110 million m², and 27.5 million m² of this is occupied by public sector organisations^{xii}. RE:FIT will seek to retrofit approximately three per cent of this on an annual basis, totalling 40 per cent by 2025. RE:FIT has been designed for organisations that have funds or can borrow funds to install energy efficiency measures easily. The London Green Fund, which the Mayor, through the LDA, has developed, will seek to provide funding to those organisations that do not currently have access to such funds. In addition, the Mayor will seek to work with government to: make available more upfront financial assistance for participating organisations; extend the Salix funding scheme to include measures with longer term payback periods; establish a national RE:FIT programme management office to support public sector organisations; and encourage government departments to lead by example by

joining the programme. For more information on the London Green Fund, see chapter 3 of this strategy.

Box 6.2 RE:FIT case study - Ilford Fire Station

Ilford Fire station was fitted with energy efficient systems, automatic controls and a photovoltaic (PV) panel as part of the RE:FIT programme. The overall CO₂ 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.

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RE:FIT 
BUILDING ENERGY EFFICIENCY FOR TOMORROW

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 the 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 CO₂ 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 CO₂ per year. There are plans to extend RE:FIT to a further 20 fire stations.



Mayor of London Boris Johnson with photovoltaic panels at Ilford Fire Station

The Better Buildings Partnership (BBP)

In addition to overcoming the barriers to reducing CO₂ emissions from public buildings, the Mayor is also addressing the barriers between landlords and tenants through the BBP. This programme aims to catalyse activity that will reduce CO₂ emissions by 5,000 tonnes per year, and through to 2025 by a cumulative total of 75,000 tonnes of CO₂.

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 also 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, will roll out the Green Lease Toolkit with the 14 members of the partnership, and promote 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 three other key areas; sustainability benchmarking; the role of property agents in enabling sustainability; and carrying out low carbon retrofits. The toolkits are all publicly available at www.betterbuildingspartnership.co.uk and will be 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 2010, BBP members had carried out two annual rounds of data gathering to build a good understanding of sustainability benchmarking. All the lessons from these activities are being published to spread best practice to the wider sector.

b) Provide energy efficiency support and advice through the Green500 and other schemes

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 and successor scheme

The Mayor is supporting businesses to reduce their energy use through the Green500, which offers energy audits, identifying where energy efficiencies can 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. To date, over 200 businesses, including HSBC, M&S, John Lewis, Chelsea and Arsenal football clubs and Radisson Edwardian Hotels (see box 6.3), have joined the programme. The organisations in the programme have already implemented energy efficiency measures that will reduce CO₂ emissions in London by nearly 385,000 tonnes over the lifetime of the measures.

In autumn 2010, the Green500 scheme will be incorporated into a new partnership. The successor scheme will serve the needs of existing of Green500 members and provide expert guidance to even more organisations across the capital. Organisations that join the new scheme will benefit from assistance in reducing their carbon emissions and capturing cost savings. Over the next three years, the new scheme will aim to help at least 1,500 London businesses (with a utility expenditure of more than £20,000) to save up to two million tonnes of CO₂, over a quarter of which will be attributable to Mayor activities, plus £100 million in energy costs over the lifetime of the projects.

The new partnership will provide audits, mentoring and one-to-one support much as the Green500 did, but will also provide more implementation support, master-classes and workshops and adopt a sector-based approach.

It is estimated that by 2025 the Green500 and the successor scheme will have catalysed activity that will be reducing CO₂ emissions by 250,000 tonnes per year, and through to 2025 by a cumulative total of 3.5 MtCO₂.

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 as it joined the Green500 in March 2008.

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 then 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 include fitting low energy light bulbs throughout all guest rooms and back of house areas, and a new combined heat and power (CHP) system providing cleaner energy to the Heathrow hotel. Additionally, water consumption has been 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 CO₂. 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

Although the Green500 successor scheme will extend support to a greater number of organisations, including SMEs, the Mayor believes there is further scope to help even more SMEs.

Energy efficiency support for SMEs in London is currently provided through a number of routes including Business Link, the London boroughs, RE:CONNECT and other support organisations (please see box 6.4). The Mayor is keen to help London's SMEs reduce their CO₂ emissions and energy costs and will review the provision of environmental management support to SMEs in London and identify areas where the Mayor can complement existing support and contribute to improving the quality, availability and accessibility of such support.

The LDA will continue to work through the Business Link in London website and telephone portals, and in collaboration with organisations already offering support, including the Carbon Trust, London boroughs, Chambers of Commerce, CBI, and Federation of Small Businesses to signpost London organisations to the most appropriate source of support.

Box 6.4 Energy efficiency support for SMEs in London

The LDA already funds or co-funds, through the European Regional Development Fund (ERDF), a number of services to support SMEs to improve their energy efficiency. They are accessed through Business Link in London and delivered through London boroughs and partners, including:

- **Ecovate** - Delivered through the Centre for Environment and Safety Management for Business, 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 Creative Environmental Networks, this is supporting 81 SMEs by delivering personalised climate change action plans on reducing CO₂ emissions from transport, energy use, and by using renewable energy.
- **Energy Savings Through ICT** - Delivered through Global Action Plan, this 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, will be 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** - Supports SMEs in Business Improvement Districts to reduce their energy use and improve environmental management through advice sessions and audits.

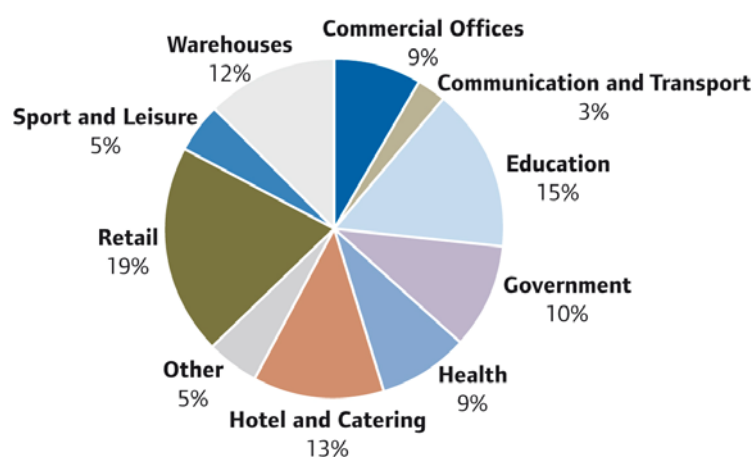
For more information and to access support, visit www.businesslink.gov.uk/london

In addition, the Mayor's ten RE:CONNECT low carbon zones provide carbon management support, including metering, audit, and advice to approximately 1,500 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

The Mayor will also investigate developing sector-specific support for those sectors that have significant potential to reduce London's CO₂ emissions, including support provided through the Green500 successor scheme. This will build on existing work, such as the Green Guides developed for London's creative communities, to 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 34 per cent. The Mayor's RE:FIT programme is in place to reduce emissions from this sector. The next biggest energy users are the retail sector at 19 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.

Most businesses will focus on a similar range of energy efficiency measures to reduce their energy use. However, businesses within the same sector will often face similar challenges implementing these measures. For this reason the Mayor is supporting a sectoral approach to energy reduction from London's workplaces.

Figure 6.4 UK energy consumption by sub-sector in the service sector

Source: *Energy Consumption in the UK, 2010 update, DECC*

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) Encourage large organisations already taking a lead on CO₂ reduction activities to share best practice, and cascade through their supply chains

The programmes mentioned so far are all supporting organisations to reduce their CO₂ 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 CO₂ emissions to spread best practice through their supply chains, encouraging them to:

- measure and disclose CO₂ 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 GHG emissions
- procure lower carbon products and services
- support suppliers to reduce their CO₂ emissions, through awareness-raising and practical guidance on how to measure, manage and reduce their energy use and wider CO₂ emissions.

This will be particularly important in the public sector, which the Sustainable Development Commission and the Carbon Trust have stated has an important role to play in stimulating the low carbon supply chain. The Mayor will therefore work with boroughs, partners and through existing initiatives to share best practice on measuring, reporting and reducing CO₂ emissions between London boroughs.

6.7 Reducing CO₂ 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 CO₂ emissions from workplaces. To reach the Mayor's CO₂ emissions reduction target will require further activity however. This section therefore sets out further Mayoral action to reduce CO₂ 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.

As set out in chapter 4, the Mayor can take further action on energy supply. This would involve increasing the target for the amount of London's energy supply from decentralised sources by 2025, from 25 per cent to 30,000 GWh (33 per cent).

The Mayor can also take further action. This includes promoting 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 MtCO₂ per year by 2025. In order to facilitate this, the proposed national RE:FIT programme management office 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 CO₂ savings and will create jobs and investment in London.

In addition, further opportunities exist to reduce CO₂ emissions from SMEs in London through a RE:NEW-type model. Providing such additional support for 50,000 of London's SMEs is expected to deliver a further 0.5 MtCO₂ per year by 2025.

If the combination of actions set out above were to be delivered, emissions from London's workplaces would reduce by a further 3.03 MtCO₂.

6.8 Reducing CO₂ 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 11.26 MtCO₂. However, further government action will also be required to contribute to meeting the Mayor's target to reduce London's CO₂ emissions by 60 per cent of 1990 levels by 2025. It will require government to adopt more ambitious CO₂ 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 CO₂/kwh. If these recommendations were to be adopted, this would further reduce CO₂ emissions from London's workplaces by 2.40 MtCO₂ per year.

6.9 Implementing Mayoral policies and actions

Annex A of this document sets out the projected CO₂ emissions reductions, by source, as a result of activities in the workplaces sector, along with assumptions for expected CO₂ emissions reductions. Annex B of this strategy sets out a detailed implementation plan for the policies and actions in this chapter.

Endnotes

ⁱ The most recent CO₂ measurements for London are from the LEGGI 2008.

ⁱⁱ GLA, LEGGI (2008)

ⁱⁱⁱ GLA, LEGGI (2008)

^{iv} For more information on London's Business as Usual CO₂ emissions, please see chapter 2.

^v DECC, EU ETS Phase II National Allocation Plan: 2008-2012 (2009)

^{vi} 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.

^{vii} BIS, Energy consumption in the United Kingdom (2009)

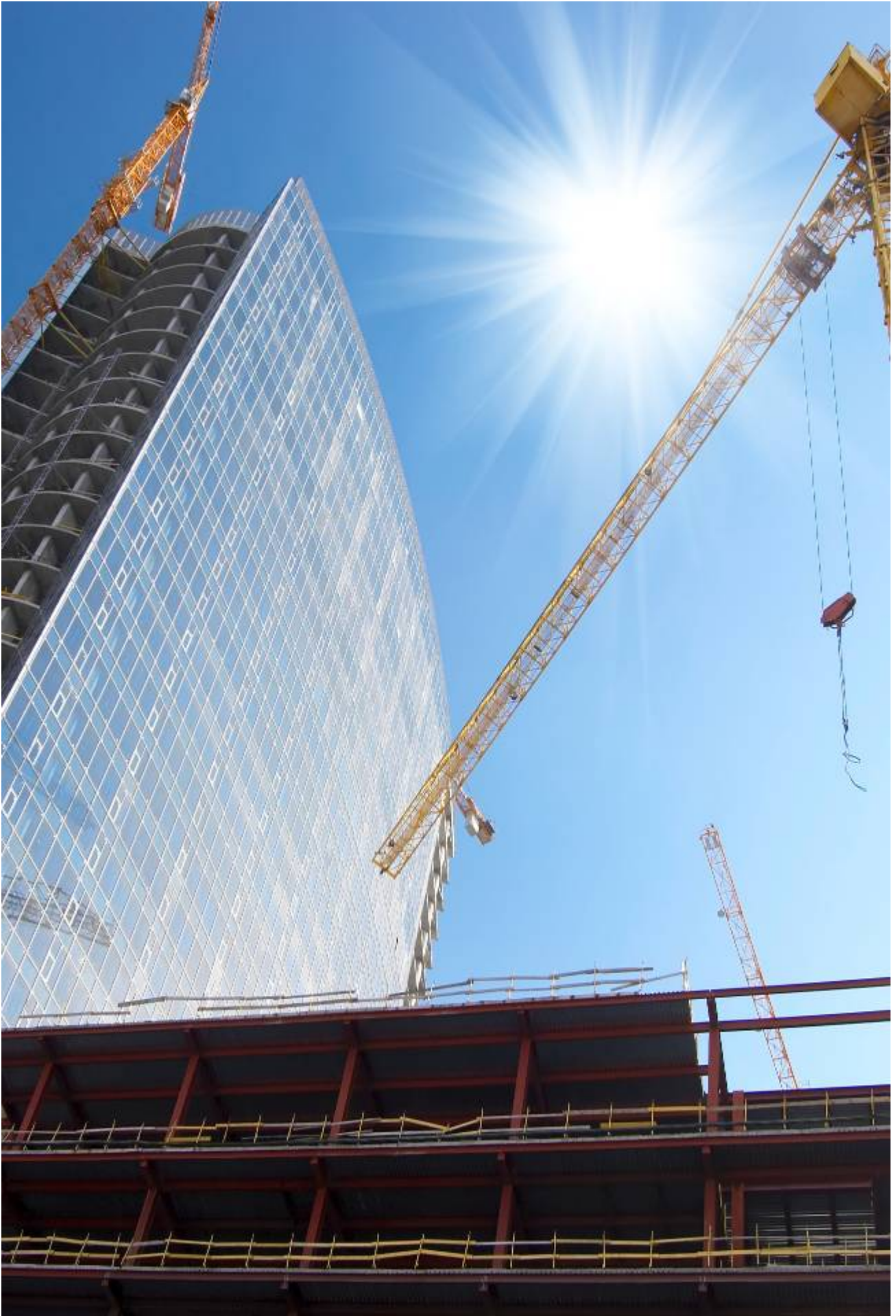
^{viii} UK Committee on Climate Change, Building a low-carbon economy (2008)

^{ix} Sustainable Development Commission, Public Sector Uptake of Low Carbon and Renewable Energy Technologies (2009)

^x BIS, SME statistics for the UK and the regions (2008)

^{xi} 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.

^{xii} LDA modelling based on ODPM, Commercial and Industrial Floorspace and Rateable Value Statistics (2005)



7 Building towards a zero carbon London

Summary

Aim

By 2025 all new buildings are 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 CO₂ emissions and energy use from London's new buildings** - This will include implementing climate change policies set out in the draft replacement London Plan, developing additional guidance and best practice support, and working to deliver exemplar new build projects.

The Mayor's main strategies to deliver this are:

- **The draft replacement London Plan** - This sets out ambitious new incremental CO₂ 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. It also states that from April 2011, all new publicly-funded homes will be required to meet the Code for Sustainable Homes level 4. The Mayor is also investing through the Targeted Funding Stream in housing developments that demonstrate an exemplary approach to energy efficiency and tackling climate change.

CO₂ emissions from new development in London

- Between the years of 2010 and 2025, policies on new development will save a cumulative total of 2.44 MtCO₂.

7.1 Introduction

The last two chapters of this strategy have focused on reducing CO₂ emissions from London's existing buildings; both homes and workplaces. This chapter sets out actions, both underway and proposed, to minimise CO₂ emissions through the design of new buildings. The Mayor's draft replacement London Plan (the Spatial Development Strategy

for London) and the Mayor's London Housing Strategy set out a number of policies to minimise CO₂ emissions from new buildings in London. This chapter will summarise the most relevant parts of these strategies.

For the purposes of this strategy, CO₂ emissions from new development are defined as those associated with the supply and use of energy in buildings once they have been constructed. The embodied energy associated with new buildings, the CO₂ emissions 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.

Building Regulations Part L provides a baseline standard that new development needs to meet with regard to minimising CO₂ emissions and this chapter focuses on how the Mayor, through the draft replacement London Plan, aims to minimise London's emissions associated with new development.

7.2 Government action to reduce CO₂ emissions from new development

Government has committed to a number of policies aimed at delivering zero carbon residential and non-domestic developments by 2016 and 2019 respectively. These include the Code for Sustainable Homes, Building Regulations and Planning Policy Statements. (See box 7.1 for more information.) These provide the context for the Mayor's proposed actions to reduce CO₂ emissions from new build in London.

Box 7.1 Government CO₂ reduction policies and programmes for new development

The previous government introduced a number of policies and programmes for reducing CO₂ emissions from new development, the future of which are currently being reviewed by the new coalition government. This box summarises those policies and programmes:

- **Zero carbon developments** - The previous government consulted on the definition of zero carbon. The results of this indicated that its components are likely to be a carbon compliance standard, a 70 per cent reduction in regulated energy use to be achieved onsite, and then a range of good quality allowable solutions (yet to be determined) which could be achieved offsite, in recognition of the difficulty in achieving zero carbon through physical onsite measures alone. This will apply to residential developments from 2016 and non-domestic from 2019. The coalition government is considering the definition.

- **Code for Sustainable Homes** - Government's Code for Sustainable Homes (CSH) provides targets for CO₂ emission reductions based on improvements beyond Building Regulations. Each level of the CSH requires an incremental improvement for new residential buildings towards the achievement of (net) zero carbon emissions (code level 6) for homes built from 2016.
- **Buildings Regulations (Part L)** - The baseline for the CSH was the energy performance standard set in Part L of Building Regulations 2006. A revised Part L came into force on 1 October 2010 and requires a minimum carbon emissions reduction of 25 per cent over 2006 Part L Building Regulations 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.

7.3 Opportunities and challenges to reducing CO₂ 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 development can strongly influence the way in which London responds to climate change. It is generally easier to deliver energy efficient new development than to retrofit existing buildings to the same standard, therefore new build 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 plan, and its policies will help guide decisions on planning applications by boroughs and the Mayor.
- **Supplementary Planning Guidance** - 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 draft replacement 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. The 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 borough 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.

The Mayor has commissioned two reports to assess the impact of the energy and climate change mitigation policies outlined in the draft replacement London Plan. The most recent in 2009, commissioned London South Bank University (LSBU) to analyse and report on the impact of these policiesⁱ. This included a quantification of the CO₂ savings, based on modelling for planning applications that will be achieved through the planning process. The report assessed 147 strategic planning applications out of 340 that were reviewed by the Mayor between November 2006 and June 2009 and found:

- over half were expected to achieve improvements in CO₂ savings on Building Regulations (2006) Part L of at least 30 per cent, and about a quarter were expected to make savings over 40 per cent
- average improvements over Building Regulations for CO₂ savings have increased from 29 per cent in 2006 to 33 per cent in 2009
- that between 2006 and 2009 as CO₂ savings have increased from development, the contribution from decentralised energy has increased, but the contribution from renewables has decreased.

The report also found that the London Plan policy was helping to deliver new decentralised energy infrastructure in London. Examples included 94 gas-fired CHP installations committing to 20MWe of CHP capacity and 74 biomass boilers committing to 50MWt of heat capacity. Table 7.1 provides more detail on further energy infrastructure that was secured.

Table 7.1 Contribution by main renewable energy and combined heat and power technologies as a result of London Plan policies (2006-2009)

	Biomass boilers	Ground source heating/cooling	Photo-voltaics	Solar thermal	Wind	Gas-fired CHP	Fuel cell CHP	Biomass CHP
Number of installations	74	31	55	26	10	94	6	6

Source: London South Bank University, *Monitoring the London Plan Energy Policies Phase 3 Part 1, 2009*

This shows that developers have responded pro-actively to the policies relating to CO₂ emissions reduction in the London Plan. However it also highlights the potential for further savings. The findings of the report support the inclusion of CO₂ reduction targets in the draft replacement London Plan and that these should be at least a 40 per cent improvement on Building Regulations (2006) Part L, bearing in mind these should be revised over time.

A second stage of the study will focus on the actual CO₂ savings gained from the implementation of these policies, based on as-built data from developers and designers and site visits. This will focus on the challenges with enforcement of Building Regulations as well as the issue of real versus modelled energy performance in buildings. Further details will be available in the final version of this strategy.

7.4 Reducing CO₂ emissions from new development in London through committed Mayoral action

The work from LSBU has shown the real opportunity in London to reduce CO₂ emissions from new development. The Mayor has significant powers to influence the CO₂ emission levels of new development through planning policy in the draft replacement London Plan and funding priorities in the Mayor's London Housing Strategy.

The Mayor will therefore seek to use his proposed targets for CO₂ emissions reductions for new development and build on the success of existing policies in this area. The Mayor will also provide advice and support to meet these targets, as well as working to deliver exemplar low carbon new developments.

The following policies and actions set out in this chapter aim to build on successes to date. Based on the Mayor's policies on new development, it is estimated that 2.44 MtCO₂ 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.

Policy 9 Minimising CO₂ emissions and energy use from London's new buildings

Vision

All new development in London is designed to reduce CO₂ emissions by minimising energy use, ensuring energy is supplied efficiently and using renewable energy.

Vision to policy

Energy consumption and CO₂ emissions from new buildings will be minimised through implementing the climate change and energy policies set out in the draft replacement London Plan. Additional guidance and best practice support will be available and London will work to deliver exemplar new development.

Policy to action

a) Implement climate change mitigation and energy policies set out in the draft replacement London Plan

- **Action 9.1** - The Mayor will set ambitious new CO₂ reduction targets for 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.
- **Action 9.2** - The Mayor will require major new development proposals to meet the minimum standards outlined in the Mayor's supplementary planning guidance on Sustainable Design and Construction. Proposals should also be able to demonstrate that sustainable design and construction standards have played an integral part in the design of the development.

b) Provide further guidance and best practice support to maximise energy efficiency, ensure efficient energy supply and minimise energy consumption

- **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 (SPG) document to cover aspects of sustainable design and construction for new housing and neighbourhoods. The final London Housing Design Guide, to be published by the LDA, will support this.
- **Action 9.5** - The Mayor will revise the existing SPG on Sustainable Design and Construction to be consistent with the draft replacement London Plan.
- **Action 9.6** - The Mayor will produce detailed guidance on how to design buildings and specify their cooling technologies to minimise the CO₂ emissions associated with their cooling.

c) Work to deliver exemplar new development

- **Action 9.7** - The Mayor will require from April 2011 that all new publicly-funded housing achieves a minimum of Code for Sustainable Homes Level 4. The Mayor will use his Targeted Funded Streams (subject to confirmation of budgets) to direct investment to new homes that achieve the higher levels of the Code for Sustainable Homes.
- **Action 9.8** - 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 draft replacement London Plan CO₂ emissions targets.
- **Action 9.9** - The Mayor will continue to work through the LDA to ensure that new build development projects constructed on their sites are exemplars of low carbon development.

a) Implement climate change mitigation and energy policies set out in the draft replacement London Plan

Through proposed policy 5.2 of the draft replacement London Plan, the Mayor has introduced CO₂ emissions targets based on improvements on Part L of Building Regulations (2006) (as set out in tables 7.2 and 7.3). The Mayor will expect all 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 CO₂ 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.

Proposed policies 5.2, 'Minimising carbon dioxide emissions'; 5.3 'Sustainable design and construction'; 5.5 'Decentralised energy networks'; 5.6 'Decentralised energy in development proposals'; and 5.7 'Renewable energy' in the draft replacement London Plan set out how the Mayor expects spatial planning activity and new development to contribute to London meeting its CO₂ reduction targets. This includes a requirement that proposals for major development provide a detailed energy assessment. It also includes a renewed emphasis on incorporating relevant design and technology measures early in the design process to ensure developments are more energy efficient. The draft replacement London Plan provides flexibility on how the energy hierarchy is applied to each scheme to encourage innovative and cost effective approaches to meeting the new targets for CO₂ emission reductions.

Where it is demonstrated that targets cannot be fully achieved onsite in an economically viable way, the shortfall in CO₂ savings can be offset. This can be done either through offsite contributions, or by contributing funds to a relevant borough. These funds will be ring-fenced to secure delivery of CO₂ savings elsewhere in the borough through existing or planned carbon reduction programmes. These programmes can include retrofitting existing building stock, developing larger scale renewable energy capacity or a district heating network. More information will be included on this in the final version of this strategy.

Table 7.2 CO₂ emissions targets for new residential buildings in London

Year	Improvement on 2006 Building Regulations
2010 - 2013	44 per cent
2013 - 2016	55 per cent
2016 - 2031	Zero carbon

Table 7.3 CO₂ emissions targets for new non-domestic buildings in London

Year	Improvement on 2006 Building Regulations
2010 - 2013	44 per cent
2013 - 2016	55 per cent
2016 - 2019	As per building regulations requirements
2019 - 2031	Zero carbon

For an example of a development that is delivering CO₂ savings well in excess of Part L Building Regulations (2006) standards, please see the case study in box 7.3.

For further information on the implementation of policies in the draft replacement London Plan related to decentralised energy, please see chapter 4, and for those related to spatial development and transport, please see chapter 8.

Box 7.3 Case study - St Andrews

St Andrews is a residential-led regeneration project in Bromley-by-Bow, Tower Hamlets. The 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. This included 50 per cent affordable housing, to Code for Sustainable Homes Level 3, community facilities, retail space and a new Primary Care Trust unit. The scheme will also provide two new parks and easy walking routes to the Bromley-by-Bow tube station.

The developments were to be designed to deliver CO₂ savings to achieve at least a 40 per cent improvement on Building Regulations (2006) Part L.

The five buildings were designed by three separate architectural firms to create a diverse set of structures within one framework. There will be green roofs on all five structures, and a hectare of landscaped public realm, including gardens, courtyards and play areas. Regular workshops with the LDA and Design for London have been held throughout the design of the scheme and will continue.

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. It is delivering CO₂ savings that meet the targets proposed in the draft replacement London Plan of an improvement of 55 per cent over Part L of Building Regulations (2006).

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

b) Provide further guidance and best practice support

As well as setting the planning framework, the Mayor will support the implementation of the climate change and energy policies set out in the draft replacement London Plan.

The Mayor has already delivered a training programme for planning officers in London boroughs to improve their knowledge and understanding of energy issues within developments. It also showed officers how to ensure that developments commit 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 draft replacement London Plan and Housing Strategy is being provided through revised Supplementary Planning Guidance (SPG) and Best Practice Guidance (BPG). A revised Housing SPG was published in draft in August 2010 and covers aspects of sustainable design that concerns new housing and neighbourhoods. This is supported by the Mayor's interim London Housing Design Guide which was also published in August 2010. The guide consolidates and simplifies a number of common or emerging design requirements to help bring greater certainty to the development process. In this respect, clarity regarding the design standards expected and greater consistency in implementing them should increase certainty 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 addition, the Mayor intends to revise the existing SPG on Sustainable Design and Construction to support the draft replacement London Plan once it is adopted. The Mayor will also produce a Low Carbon Cooling Guide for new development in London that developers, architects and designers can use to help inform the design and technology specification for their developments to minimise the energy and CO₂ emissions associated with their cooling requirements. It is also intended as an informal guidance document for the consideration of strategic planning applications for the design community.

c) Working to deliver exemplar projects

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 London Housing Strategy contains policies to improve the environmental standards and increase the energy efficiency of new and existing homes. All new publicly-funded homes in London are expected to adhere to a minimum requirement of the Code for Sustainable Homes Level 4 between 2008 and 2011. However, there are opportunities to go much further. The Innovation and Opportunities Fund within the Targeted Funding Stream has already allocated funds to support exemplary schemes that will reach levels 5 or 6. This additional funding, which recognises the existing financial barriers housing developers face in meeting the higher levels of the code, is intended 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 Innovation and Opportunities Fund will make £19 million available in 2010/11. This will help to develop innovative approaches to tackling climate change in new housing developments, and improve local authority homes beyond the current Decent Homes standard.

The Mayor will also work with the Olympic Delivery Authority, through the Olympics Legacy Masterplanning Framework, to ensure that the Olympic Village meets the draft replacement London Plan targets for CO₂ emissions. 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.

The Mayor will use OAPFs to identify and facilitate strategic opportunities for development. This allows for a greater degree of planning and coordination that would not otherwise be realised if an area were developed out on a site-by-site basis. This paves the way for ensuring large residential developments include sustainable design standards and take advantage of the opportunity to undertake area-wide transport planning and integrated area-wide environmental infrastructure, such as decentralised energy schemes. The Mayor will also use OAPFs to ensure that London's largest housing regeneration areas are exemplars of low and zero carbon development by identifying opportunities for, and facilitating the delivery of, large-scale community energy projects.

The Mayor will continue to work with the GLA group to ensure that development projects constructed on their sites are exemplars of new build development. The LDA already utilises sustainable design and construction standards that ensure the environmental specifications for their developments are well in excess of Building Regulations. This

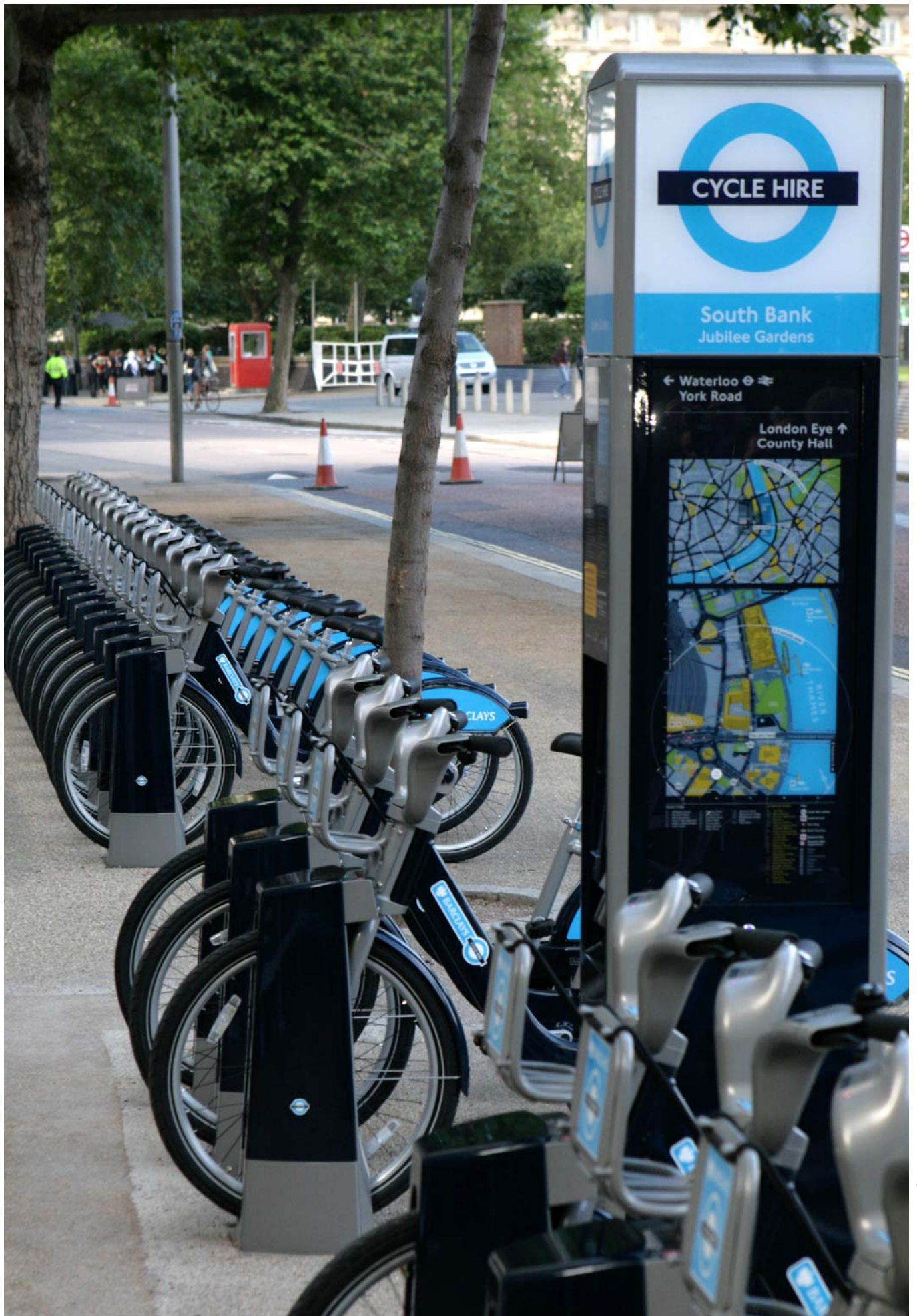
includes a standard that all its new build developments will be low carbon, an improvement of at least 40 per cent over Building Regulations (2006) Part L.

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 London South Bank University, Monitoring the London Plan Energy Policies Phase 3, Part 1 Report (2009)



8 Moving towards zero emission transport in London

Summary

Aim

By 2025 London's transport system will excel amongst global cities, with low carbon infrastructure and access to ever more low carbon transport options.

The Mayor will contribute towards this through the following policies:

- **Policy 10 - Minimising CO₂ emissions through a shift to more carbon efficient modes of transport** - This includes: reducing the need to travel where possible; encouraging people to switch to public transport, walking and cycling; and encouraging freight to switch from road to rail and water.
- **Policy 11 - Minimising CO₂ emissions through more efficient operation of transport** - This includes the rollout of eco-driving techniques on public transport, raising awareness of fuel efficient driving styles, and smoothing traffic flows.
- **Policy 12 - Minimising CO₂ emissions from transport through the use of low carbon vehicles, technologies and fuels** - This includes supporting and encouraging the uptake of low emission vehicles, reducing the use of energy by transport infrastructure, and promoting the use of sustainable biofuels.

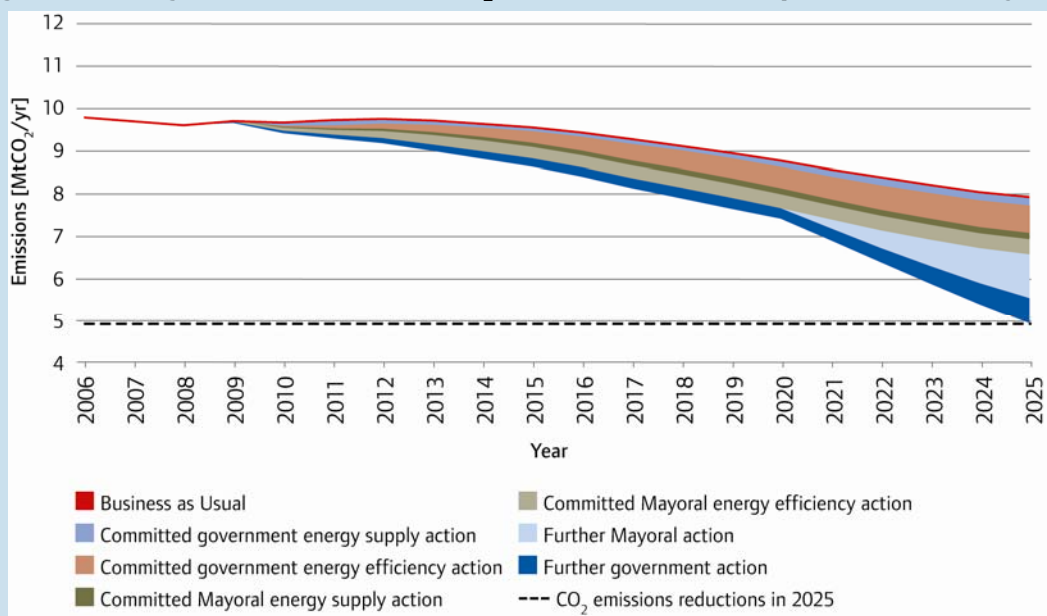
The Mayor's main programmes to deliver this are:

- **Create a cycling revolution in London** - This includes delivering a central London Cycle Hire scheme, Cycle Superhighways and an additional 66,000 secure bike parking spaces.
- **Make 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, London Underground upgrades and Thameslink.
- **Enable and encourage the uptake of less polluting vehicles** - This includes the aim to reach the milestone of 100,000 electric vehicles on London's roads by 2020 or earlier if possible, ensuring that all new buses introduced to the London bus fleet are low carbon vehicles from 2012, and encouraging the implementation of pricing differentials based on vehicle emissions for resident parking permits and parking charges.

CO₂ emissions from London's transport: 2008 - 2025

- **Current CO₂ emissions** - In 2008 emissions from London's transport sector were 9.61 MtCO₂.
- **Business as Usual CO₂ emissions by 2025** - Under a BaU situation, London's transport emissions would be expected to reduce to 7.93 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from government and EU action** - Government, EU and international action will reduce London's CO₂ emissions from transport by 0.84 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from committed Mayoral action** - Committed Mayoral action will reduce London's CO₂ emissions from transport by 0.51MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from further Mayoral action** - Further Mayoral, government and borough action could reduce London's CO₂ emissions from transport by 1.03 MtCO₂ per year.
- **CO₂ emissions reductions by 2025 from further government action** - If government adopts more ambitious CO₂ emissions reduction scenarios, according to the recommendations of the Committee on Climate Change, it is expected to reduce London's CO₂ emissions from transport by 0.60 MtCO₂.

Figure 8.1: Projected reductions in CO₂ emissions from transport in London by 2025



Source: TfL planning and GLA modelling

8.1 Introduction

The previous chapters of this strategy have set out Mayoral policies and action to reduce CO₂ emissions from the homes and workplaces sectors. This chapter addresses the final sector of transport. It sets out the relative contribution of London's transport to CO₂ 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 CO₂ emissions in line with the Mayor's CO₂ emissions reduction target. Therefore, the reduction of CO₂ emissions forms a core theme that influences the Mayor's Transport Strategy. This chapter summarises the most relevant parts of that strategy.

As set out in chapter 2 of this strategy, London's CO₂ 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, CO₂ emissions from transport are defined as:

- those associated with the combustion of fuel for transport purposes, for example, CO₂ 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 vehiclesⁱ
- those associated with the taxiing, take-off and landing (up to 1,000 metres) of aeroplanes at airports within London's boundaries.

This chapter will:

- summarise London's current CO₂ emissions from transport
- summarise London's CO₂ emissions from transport under a BaU scenario
- summarise CO₂ 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 CO₂ emissions from transport
- detail the specific policies and actions that the Mayor has committed to take to reduce CO₂ emissions from London's transport
- set out further Mayoral action that can be taken to reduce CO₂ 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 government will need to take to reduce CO₂ emissions from London's transport, and support the achievement of the Mayor's CO₂ emissions reductions targets.

It is important to note that in London's transport sector, the most effective way of reducing CO₂ emissions is through EU and government action. Eighty per cent of transport emissions are derived from vehicle fleets such as aviation, road freight and cars, making national and international action particularly effective. It is therefore vital that government implements its commitments on reducing CO₂ emissions from transport. The Mayor, through TfL, continues to work closely with the EU and government to ensure action is taken.

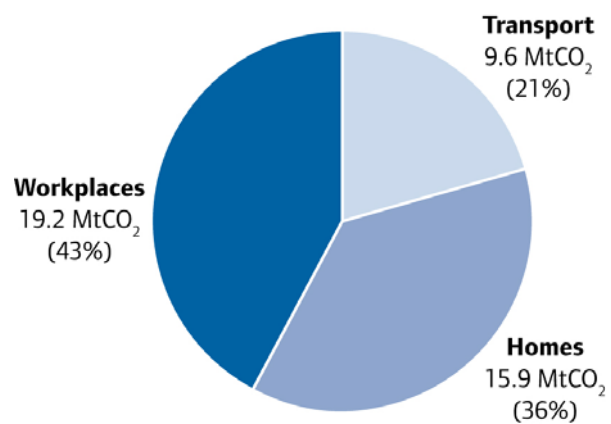
However, the Mayor is committed to reducing CO₂ emissions from London's transport and the policies and actions set out in this chapter will address how he will achieve this.

8.2 Current CO₂ emissions from London's transport

In 2008ⁱⁱ, transport accounted for 21 per cent of London's total CO₂ emissions, equivalent to 9.61 MtCO₂ per year (see figure 8.2). These emissions represent an increase on 1990 levels of one per cent.

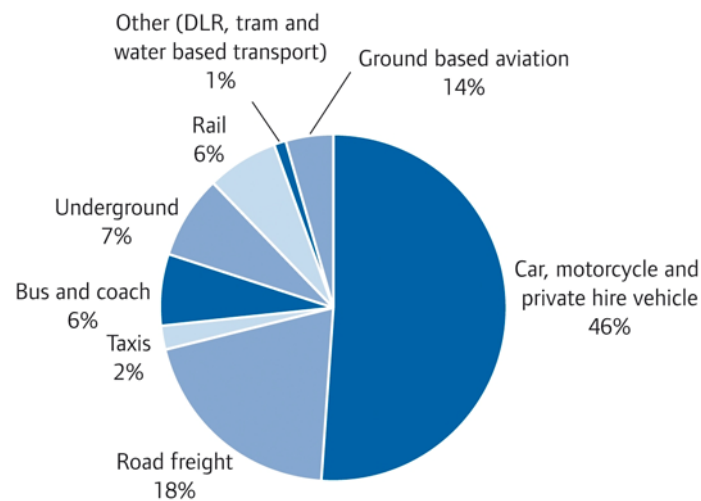
As figure 8.3 illustrates, the majority of these were emitted from cars and motorcycles (46 per cent), with a further 18 per cent from road freight. In total nearly three quarters of London's CO₂ emissions from transport are from road-based modes.

Figure 8.2 The contribution of London's transport to CO₂ emissions in 2008



Source: LEGGI 2008

Figure 8.3 Breakdown of CO₂ emissions from London's transport by source in 2008



Source: LEGGI 2008 and TfL Planning

8.3 Projected CO₂ emissions under a Business as Usual scenario

Based on current legislation and existing Mayoral commitments it is projected that transport-related CO₂ emissions in London will fall by 16 per cent by 2025 to 7.93 MtCO₂, despite projected population and employment growth in excess of ten per cent. 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 under pre-Low Carbon Transition Plan government policy.

8.4 Projected CO₂ 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 CO₂ emissions from transport. These include enforcing EU average emissions targets for new cars, and a programme of rail electrification. (See box 8.1 for further details on EU and government policies and programmes.) However, these programmes will only reduce emissions in London by 0.84 MtCO₂ by 2025, so further action will be required to meet the Mayor's 2025 CO₂ emissions reduction target.

Box 8.1 Government and EU CO₂ 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 CO₂/km by 2015 (compared to around 149.5g CO₂/km in the UK in 2008ⁱⁱⁱ). Manufacturers will be penalised if average emissions from their new car sales do not meet the target. A target of 95g CO₂/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 CO₂ emissions reductions and restrictions on types of land use change. In the UK, the previous government intended to update the Renewable Transport Fuels Obligation (RTFO) to reflect this legislation.

UK government policy

The new coalition government has indicated a number of low carbon transport programmes that it intends to develop, including mandating a national recharging network for electric and plug-in hybrid vehicles, establishing a high-speed rail network, supporting Crossrail and further electrification of the rail network, and sustainable travel initiatives, including the promotion of cycling and walking. Further details of these policies and programmes are yet to be announced.

The previous government also introduced a number of policies and programmes to reduce CO₂ emissions from transport, the future of which are currently being reviewed by the new coalition government. The rest of this box summarises those policies and programmes.

In July 2009, the previous government published Low Carbon Transport: A Greener Future, a key part of the UK Low Carbon Transition Plan. The report set out what actions are needed by 2022 for the UK to reduce CO₂ emissions from transport. These included:

- **Supporting a shift to new technologies and fuels** – The previous government committed to promoting the use of low carbon vehicles by providing funding to incentivise early adoption of electric and plug-in hybrid cars. This was to take the form of a consumer grant to reduce the upfront cost of eligible vehicles by 25 per cent up to a maximum of £5,000. The new coalition government recently announced its intention to continue with this grant.
- **Promoting lower carbon transport choices** - The previous government committed to promoting a range of low carbon transport modes by preparing for a programme of rail electrification, developing the case for the preferred route for a north-south high-speed rail line, and promoting Cycling Demonstration Towns and Cities.
- **Using market mechanisms to encourage a shift to lower carbon transport** - The previous government pressed for the inclusion of international aviation and shipping in the global deal agreed at the Copenhagen Climate Change Conference in December 2009.

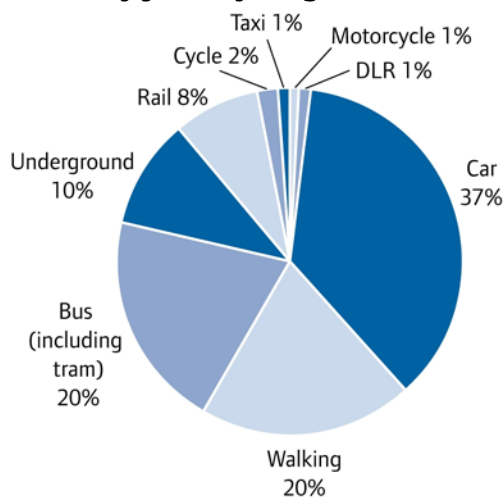
8.5 Opportunities and challenges to reducing CO₂ emissions from London's transport

In implementing policies to further reduce CO₂ emissions from London's transport the Mayor, through TfL and working with partners, will address a number of opportunities and challenges for London, including:

a) The number of trips being made by individuals on high CO₂ emitting forms of transport

As figure 8.4 shows, at present a large percentage of journey stages in London are made on high-emitting forms of transport. Thirty-eight per cent of individual journey stages are made by car or motorcycle, equivalent to 46 per cent of CO₂ emissions from ground-based transport in London. This is by far the highest source of transport emissions in the capital. 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^{iv}) it continues to represent a relatively low proportion of travel. As the majority of car journeys by London residents are under five kilometres (with over ten per cent being under one kilometre and around a third under two kilometres crow-fly distance), there is an opportunity to switch these to more carbon efficient forms of travel such as public transport, walking and cycling.

Figure 8.4 Modal shares of daily journey stages in London in 2008



Source: TfL Planning

b) 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^v.

The average emissions from vans below 3.5 tonnes are 340g of CO₂e per tonne of freight moved per kilometre (tkm)^{vi}. The average emissions from large heavy goods vehicles (HGVs) are 83g of CO₂e per tkm. Rail is much lower at 32g of CO₂e per tkm. Although 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, given London's relatively dense networks of railways and waterways, where there is scope for the efficient use of rail or water there is an opportunity to reduce CO₂ emissions from transporting freight in London.

c) 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 CO₂ emissions from new cars sold in the UK have fallen from around 190g CO₂/km in 1995 to around 150g today, there is significant potential for further reductions.

'Best in class' family cars available today have emissions of around 100g CO₂/km, although the average emissions from family cars were far higher in 2009 at around 150g.

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. The CO₂ emissions associated with the generation of the electricity to power electric vehicles are currently comparable with 'best in class' family cars at around 100g CO₂/km. However, when considered over the full lifecycle, electric vehicles result in up to 40 per cent fewer CO₂ emissions than petrol or diesel vehicles based on the current mix used to generate electricity for the UK grid.

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 CO₂ emissions per km for electric cars is expected to be in the region of 40g CO₂/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** - There is currently 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 CO₂ emissions from London's transport through committed Mayoral action

The following policies and actions set out in this chapter aim to overcome these barriers and make the most of the opportunities in London. The Mayor has developed policies to reduce CO₂ emissions from transport sources he can directly influence, including public transport and cycling, and by 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 CO₂ emissions.

The Mayor's contribution to reducing CO₂ emissions from London's transport will be 0.51 MtCO₂ by 2025.

Although this may appear to be a relatively small contribution to CO₂ reductions, as noted in the introduction to this chapter, this should be seen in the context of a projected growing population in London, 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 CO₂ emissions.

Policy 10 Minimising CO₂ emissions through a shift to more carbon efficient modes of transport

Vision

CO₂ emissions are minimised by reducing the need to travel through land-use planning, and a combination of individuals making smarter choices about which transport mode they use to travel, and freight being moved to more carbon efficient modes of transport.

Vision to policy

The Mayor, through TfL and working with boroughs and partners, will support and incentivise carbon efficient travel behaviour, minimising the need to travel and encouraging 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) Empower individuals to make a move away from private car use to 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 and deliver committed improvements to the rail network, including Crossrail and 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 commit £1 million over two years to March 2011 towards the expansion of car clubs to provide an additional 726 car club parking spaces spread across 19 London boroughs.
 - **Action 10.4** - The Mayor will use powers under the London Plan to implement 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) Create a cycling revolution and make walking count in London*
- **Action 10.5** - The Mayor will empower individuals to cycle through: the central London Cycle Hire scheme, delivering 6,000 bicycles and 400 docking stations; delivering Cycle Superhighways from outer London to central London, adding to the two delivered in summer 2010; improving cycle infrastructure, initially by increasing cycle parking spaces in London by 66,000 by 2012; and, through the draft replacement London Plan, introducing minimum standards for the provision of cycle parking facilities at new developments in London.
 - **Action 10.6** - The Mayor will empower individuals to walk by improving the quality of the walking environment, and the provision of information on walking, through the further rollout of the Legible London way-finding system.
- c) Enable and encourage 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 by spring 2011, support new rail freight terminals in or near London, and safeguard wharf sites for water freight.
- d) Support provision of alternatives to aviation*
- **Action 10.8** - The Mayor will support the expansion of competitive rail-based alternatives to aviation, including the development of a national high-speed rail network.

a) Empower individuals to make a move away from private car use to use of public transport in London

The first area in which the Mayor will work to achieve this policy is to encourage a shift to public transport. Since 2000, the mode share of private motorised transport in London has fallen by around six per cent. 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 committed 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 growth 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, developing further integration with digital communications.

Smart travel plans and car clubs

TfL has pioneered the use of smarter travel to achieve improved CO₂ travel efficiency, including the widespread uptake of workplace travel plans (covering around ten per cent of London's workforce and achieving a cut of 13 per cent in car use at those sites) and school travel plans (covering 90 per cent of London's schools and leading 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 smart travel plans.

London is a national leader in the development of car clubs, with a rapidly growing membership of around 100,000. The Mayor will continue to support the expansion of car clubs aiming for a total of 2,000 car club bays installed next year, doubling the number of

bays currently in the capital and ensure that around one third of London residents are within a five minute walk of a car club vehicle.

Integrating transport and land-use planning through the draft replacement 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 growth is accommodated and resulting travel demand patterns are catered for in a sustainable manner. Through the draft replacement 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 draft replacement London Plan that was published in October 2009.

b) Create a cycling revolution and make walking count in London

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. To achieve this, the Mayor launched the London 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, all year round. There are 400 docking stations located roughly 300 metres apart, with 10,000 docking spaces. TfL is also developing and rolling out a network of 12 Cycle Superhighways. The first two pilot routes were launched in July 2010.

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 those boroughs that wish to become Biking Boroughs. These are 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, the Mayor will improve cycle infrastructure, initially by increasing cycle parking spaces in London by 66,000 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 wider cycling programme can be found in the Mayor's Cycling Revolution London report, the Cycle Safety Action Plan, and the Draft Security Plan.

The Mayor is keen to increase levels of walking above the current 24 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. By taking focused action to ensure safe, comfortable and attractive walking conditions, a whole range of benefits can be realised, including a reduction in CO₂ emissions and an improvement in air quality through modal shift from short car journeys.

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) Enable and encourage greater efficiency of freight movement, 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 draft replacement London Plan, the Mayor will adopt planning requirements for DSPs and CLPs for major developments by spring 2011.

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 cargos 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 Tideway Sewers. 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) Support provision of alternatives to aviation

The Mayor's powers to influence CO₂ 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 to an altitude of 1,000m and taxiing in London) were 1.39 MtCO₂. Continuing patronage growth is anticipated at London's airports which will exacerbate the challenge of reducing emissions from the aviation sector.

The Mayor firstly 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. He is therefore interested in looking at whether optimum use is being made of London's existing airport capacity (though mixed-mode operation is not favoured at Heathrow).

With this in mind, providing viable alternatives to air travel will also be crucial in reducing CO₂ 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. Beyond 2010, EU policies will 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 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 evaluation will be made of this and other potential termini, in particular, in relation to links to Heathrow.

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 CO₂ emissions reductions can be made through more efficient operation of transport.

Policy 11 Minimising CO₂ emissions through more efficient operation of transport

Vision

CO₂ emissions are minimised through vehicles being driven in more fuel efficient ways, improved vehicle maintenance, and smoothing traffic flows.

Vision to policy

The Mayor, working through TfL and with boroughs and partners, will minimise CO₂ 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) Roll 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 provide training on energy efficient driving styles to drivers of non-automatic railways, private hire vehicles and taxis, and work with bus operators to provide training to London's bus drivers.
- **Action 11.3** - Working with boroughs, bus operators and other organisations, the Mayor, through TfL, will establish a no-idling zone throughout London, focusing on buses, coaches and taxis as well as particular problem areas such as around schools.

b) Enable Londoners to reduce fuel consumption by raising awareness of the impact of driving style and vehicle maintenance.

- **Action 11.4** - The Mayor will promote behavioural change and smarter travel measures aimed at encouraging eco-driving practices and better vehicle maintenance to all drivers to reduce CO₂ emissions, and support government initiatives, including the Act On CO₂ campaign.

c) Share 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 (FORS) and aim for 50 per cent of heavy goods vehicles and vans serving London to be members of FORS 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) Smooth 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) Improve 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 CO₂ 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 can help drivers to optimise energy efficiency through driving style) across the London Underground network. Drivers of non-automatic railways, such as London Overground, and drivers of private hire vehicles and taxis will also be given training on eco-driving to both reduce emissions and develop safer driving behaviour.

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. Boroughs have a patchwork of powers they can use to enforce against idling vehicles but these need to be streamlined and made more flexible to make them more effective.

A priority for the no-idling zone will be to raise awareness. Taxi idling, especially at taxi stations, is a particular issue. The current design of taxi ranks makes it difficult to prevent idling as taxis are required to move forward every few minutes and the stop-starting of engines would be worse for emissions. The Mayor will work with transport operators and boroughs to address this where practical, potentially by encouraging taxi passengers to walk along the rank to the taxi rather than the taxi moving up the rank.

b) Enable 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. To build on this, the Mayor is promoting behavioural change and smarter travel measures aimed at encouraging eco-driving practices and better vehicle maintenance to all drivers to reduce CO₂ emissions. This includes supporting government initiatives such as the Act On CO₂ campaign.

c) Share 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^{vii}. 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 CO₂ 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. Modelling has also shown that a programme to develop a significant increase in DSPs would provide a relatively cheap but effective method of reducing pollution through better route planning and eco-driving.

The Mayor will also encourage 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) Smooth 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 CO₂ emissions. Better management of London's road network and driver information will enable a

smoother flow of traffic and ultimately cut CO₂ 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 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 co-ordination, control and management of roadworks using LondonWorks which shows the location of all works on its roads and the surrounding network. The Mayor's new roadworks permit system 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, 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 utilities 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 looks at how CO₂ emissions can be reduced through the use of low carbon technologies and fuels.

Policy 12 Minimising CO₂ emissions from transport through the use of low carbon vehicles, technologies and fuels

Vision

London is a recognised leader in the mass-market uptake of low carbon transport vehicles and fuels. CO₂ 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 encourage the development and use of low carbon vehicles, energy and design principles.

Policy to action

a) Working with partners, support and encourage the uptake of low carbon vehicles in London

- **Action 12.1** - The Mayor will work with partners, aiming to reach the milestone of replacing 100,000 conventional road vehicles with electric vehicles in London by 2020. The Mayor aims to replace 1,000 conventional GLA group fleet road vehicles with electric vehicles by 2015, and will encourage London boroughs and private fleet operators to follow suit.
- **Action 12.2** - The Mayor will work with partners, aiming to deliver 25,000 electric vehicle charge points by 2015, with the aim of every Londoner being no more than a mile on average from a publicly accessible electric vehicle charge point.
- **Action 12.3** - The Mayor will catalyse the uptake of electric vehicles by working through TfL's Electric Vehicle team, leading through the London Electric Vehicle Partnership and Electric 10, and integrating with the nationwide Low Carbon Vehicle Partnership and the global C40 Electric Vehicle Network.
- **Action 12.4** - Through the draft replacement London Plan, the Mayor will propose targets for the provision 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 2012, including a three-year demonstration of at least five hydrogen-powered buses from 2010 and the deployment of a network of hydrogen refuelling infrastructure by 2012.
 - **Action 12.6** - Working through TfL, the Mayor will work with manufacturers and operators to maximise the number of low carbon buses entering service in London, with all new buses entering the fleet from 2012 being low carbon.
 - **Action 12.7** - The Mayor will work with the taxi manufacturing industry to develop an affordable zero emission taxi, such that all new taxis entering the fleet are zero emission by 2020 and 60 per cent more fuel efficient than today by 2015.
 - **Action 12.8** - The Mayor will encourage the implementation of pricing differentials based on vehicle emissions for resident parking permits and parking charges.
 - **Action 12.9** - The Mayor will support 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) Use low carbon technologies to reduce CO₂ 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 investigate the possibility of using geothermal heat pumps as part of the Crossrail project.
 - **Action 12.13** - The Mayor will aim to replace London's traffic signals with Light Emitting Diode (LED) technology at 300 sites across London. Going forward, LEDs will be preferred to conventional technology when replacing signals used for street and station lighting and dimming wherever suitable.

c) Promote the use of sustainable biofuels

- **Action 12.14** - The Mayor will promote the use of sustainable biofuels that can demonstrate substantial CO₂ emissions improvements over fossil fuels. Recognising the uncertainties relating to the air quality impacts of biofuels, their use will have to comply with prevailing European engine standards for the emission of air pollutants, to ensure that the use of biofuels in no way exacerbates air pollution problems in London.

a) Working with partners, support and encourage the uptake of 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 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 1,700 electric vehicles registered for the Congestion Charge 100 per cent discount in London, and around 250 charge points. 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 kick-start the capital's electric vehicle market, with an aim of, working with partners, achieving 100,000 electric vehicles on the streets by 2020.

The Mayor's Electric Vehicle Delivery Plan aims to have 1,000 electric vehicles in the GLA group fleet by 2015. The Mayor is creating the UK's largest electric vehicle and charge point procurement framework worth over £70 million. This will enable TfL and other interested organisations to purchase electric vehicles and charge points in a more efficient way. The procurement framework will be finalised by early 2011 and run until 2015.

The Mayor is aware that mass-market introduction of electric vehicles is dependent on joint working. He will therefore continue to catalyse the uptake of electric vehicles by working through TfL's Electric Vehicle Delivery Project, the London Electric Vehicle Partnership and the Electric 10^{viii}, and integrating with the nationwide Low Carbon Vehicle Partnership and the C40 Electric Vehicle Network.

To support the uptake of electric vehicles, the Mayor, through TfL, is aiming to work with partners to deliver at least 25,000 electric vehicle charge points by 2015. This includes a network of around 2,500 publicly accessible charge points located on streets, 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 on average from a publicly accessible charge point. TfL is also working with businesses and other organisations to install workplace charge points.

The Mayor is also working with stakeholders, including London boroughs, to launch a one-stop website and pan-London scheme for charging electric vehicles. As electric vehicle drivers currently have to register in every borough they charge in, the pan-London scheme will bring together the publicly accessible charge points in London into one network and will be developed in early 2011. Registered customers of the pan-London scheme will be able to use any of the publicly accessible charge points on the scheme, recognisable by a single pan-London scheme brand.

In February the Office for Low Emission Vehicles (OLEV) awarded the TfL-led public and private London consortium £9.3 million from the Plugged in Places (PiP) grant fund to develop the UK's largest electric charge point network. The consortium partners will contribute up to £7.6 million, providing a total of up to £17 million in new monies to support the Mayor's Electric Vehicle Delivery Plan.

In addition, through the draft replacement 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 for at least 40 per cent of parking in new residential developments. More information is available in policy 6.13 and table 6.1 in the draft replacement 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, it is anticipated that the majority of the additional demand 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 8.2.

Hydrogen-fuelled vehicles

In addition to electric vehicles, the Mayor is also considering the role of other 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. The Mayor's plans for this are set out in the Hydrogen Action Plan. It aims to deliver both hydrogen vehicles and the infrastructure to support them in London.

These plans include the aim to deploy up to 150 hydrogen-powered vehicles in the capital by 2012 including a three-year demonstration of at least five hydrogen-powered buses from 2010. The Mayor is also exploring opportunities within the rest of the GLA group fleet to catalyse the market. The Mayor also aims to deploy a minimum of six pieces of hydrogen refuelling infrastructure by 2012. The London Hydrogen Action Plan has commissioned research to identify the types of vehicles and opportunities that could be deployed in London. The research will be published in summer 2010.

Box 8.2 Case study - Electric road vehicles

Electric power has been identified as a particularly promising way to reduce emissions of CO₂, 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. CO₂ emissions associated with electric vehicles are ultimately determined by electricity generation. Currently electric vehicles account for around 40 per cent less CO₂ per kilometre than the average London car. 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 environmental reasons, but also for the associated economic and job creation opportunities.

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 CO₂ reductions of about 30 per cent. TfL currently operates around 60 hybrid buses in the capital. TfL will work with manufacturers and operators to maximise the number of low carbon buses entering service in London. All buses from 2012 entering service will be hybrid or better. The new bus for London was announced in May 2010 and will feature hybrid technology when on-street trials begin in 2011. It will be 15 per cent more fuel-efficient than existing hybrid buses, and 40 per cent more efficient than conventional diesel double-decker buses.

Cleaner taxis

The Mayor strongly believes that London's famous taxi trade can and should lead the world in moving towards a zero emission future. He is working with the trade and manufacturers to create a viable roadmap to this end and active discussions are underway. The taxi must be affordable for drivers and enhance the passenger experience. The aim is to produce a taxi that has 60 per cent lower fuel consumption by 2015 (based on current levels) and zero tail pipe emissions by 2020, which will deliver significant air quality benefits.

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 100,000 people, the Mayor will support 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) Use low carbon technologies to reduce CO₂ emissions from transport infrastructure

In addition to the use of low carbon vehicles, CO₂ 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 CO₂ 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 CO₂ emissions. The Mayor, through TfL, will also investigate the possibility of using geothermal heat pumps as part of the Crossrail project.

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 CO₂ savings, is a feature on a number of recently introduced rail fleets, and is now standard on all new electric-powered rail rolling stock.

To further reduce use of energy, the Mayor aims to replace conventional traffic signals with light emitting diode (LED) traffic signals at 300 sites across London. LED technology can reduce electricity consumption and CO₂ emissions by up to 60 per cent. Going forward, LEDs will be preferred to conventional technology when replacing signals. TfL will also implement LED street and station lighting and dimming wherever suitable, as the technology comes forward and will encourage boroughs to do likewise.

c) Promote the use of sustainable biofuels

Biofuel use has been widely promoted as a measure that will reduce CO₂ emissions, and national and European legislation has been enacted to encourage its use (see box 8.1). However, there are still concerns over the sustainability of sources of the raw materials used to produce biofuels and the lifecycle emissions associated with their production and use.

The Mayor will promote the use of sustainable biofuels that can demonstrate substantial CO₂ emissions improvements over fossil fuels and do not bring about harmful land-use change, in line with the minimum requirements set out by European legislation. As such, the Mayor supports the UK government's Renewable Transport Fuels Obligation (RTFO). In addition, where biofuels represent the best and most cost effective means of reducing transport CO₂ emissions, the Mayor will encourage their use in London's vehicle fleets. Where this is the case, the Mayor will seek to use biofuels which exceed the minimum CO₂ and sustainability standards set by European legislation.

Although biofuels can play an important role in reducing London's CO₂ emissions, they do not constitute part of the Mayor's plans to improve air quality. However, the use of

biofuels will have to comply with prevailing European engine standards for the emission of air pollutants, to ensure that the use of biofuels in no way exacerbates air pollution problems in London.

8.7 Reducing CO₂ 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 CO₂ emissions from London's transport. However, reaching the Mayor's CO₂ emissions reduction target will require further activity.

This section therefore sets out further Mayoral, government, and/or borough action to reduce CO₂ 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 CO₂/km for new cars by government, and encouraging the EU to implement similarly stretching levels for vans and other vehicle types.
- Keeping under review 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.
- Calling on 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 announced by government is a further 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.

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 MtCO₂. Assuming that a mid-point in this range is delivered, London's CO₂ emissions from transport will be reduced by 1.03 MtCO₂.

8.8 Reducing CO₂ 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 3.92 MtCO₂. However, further government action will also be required to contribute to meeting the Mayor's target to reduce London's CO₂ emissions by 60 per cent of 1990 levels by 2025.

To reach the Mayor's CO₂ emissions reduction target will require government to firstly adopt more ambitious CO₂ emission reductions, as recommended by the Committee on Climate Change. These include reducing the carbon intensity of electricity from the grid that supplies London's transport to 200g CO₂/kwh, and increasing the uptake of electric vehicles. If these measures were to be adopted, they would further reduce CO₂ emissions from London's transport by 0.60 MtCO₂ per year.

8.9 Implementing Mayoral policies and actions

Annex A of this document sets out the projected CO₂ emissions reductions, by source, as a result of activities in the transport sector, along with assumptions for expected CO₂ 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 CO₂ 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 The most recent CO₂ measurements for London are from the LEGGI 2008.

ⁱⁱⁱ Society of Motor Manufacturers and Traders, New Car CO₂ Report 2010 (2010)

^{iv} TfL, Travel in London, Key trends and developments, Report number 2 (2010)

^v UK Committee on Climate Change, Meeting carbon budgets - the need for a step change (2009)

^{vi} Defra (2009)

^{vii} 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.

^{viii} The Electric 10 consists of ten major companies in London already using electric fleet vehicles on a daily basis in the capital, who have agreed to work with the Mayor to promote the uptake of commercial electric vehicles.



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9 Setting an example through the GLA group

Summary

Aim

The GLA group will take a lead on reducing CO₂ emissions. It will set an example for the rest of London's public sector, with energy efficient buildings, using low carbon transport options, and stimulating demand for low carbon products and services through its purchasing decisions.

The Mayor will contribute towards the achievement of this through the following policies:

- **Policy 13 - Setting challenging targets and measuring and publicly reporting CO₂ emissions** - This will include setting interim targets to reduce CO₂ emissions, reporting progress against targets, and identifying further opportunities for CO₂ reduction.
- **Policy 14 - Reducing energy use and CO₂ emissions from GLA group buildings** - This will include retrofitting existing buildings with energy efficiency measures, minimising energy use in new buildings, and utilising decentralised energy.
- **Policy 15 - Driving down CO₂ emissions from transport in the GLA group** - This will include reducing the need to travel, switching to more carbon efficient modes of transport, driving fleet vehicles in fuel efficient ways, and procuring low carbon vehicles into the GLA group fleet.
- **Policy 16 - Demonstrating what can be achieved through demanding low carbon goods and services** - This will include procuring low carbon products and services, working through the GLA group's responsible procurement policy, and using the GLA group's procurement as a model to the wider public sector.

CO₂ emissions from the GLA group

- Current emissions from the GLA group are around 230,000 tonnes of CO₂ per year

9.1 Introduction

The previous chapters in this strategy have addressed how CO₂ emissions across London's sectors will be minimised. This chapter focuses on how the GLA group will take a lead across these sectors by minimising CO₂ emissions from its own operations. This will include

CO₂ emissions from the use of energy in its buildings, its use of transport, and its purchasing decisions. Whilst the CO₂ impact of the GLA group is small in the context of London overall, it will provide an opportunity to set an example and encourage the public, private and third sectors to follow its lead.

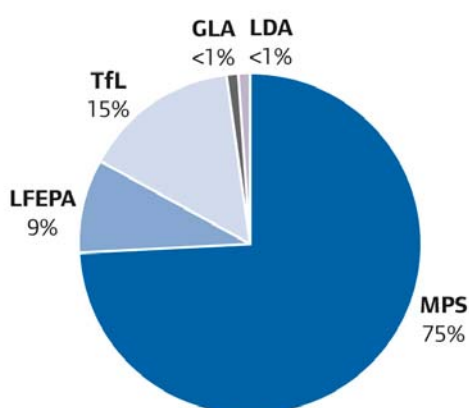
9.2 Current CO₂ emissions from the GLA group

The GLA group comprises the Greater London Authority and its four functional bodies: Transport for London (TfL), The London Development Agency (LDA), the London Fire and Emergency Planning Authority (LFEPA) and the Metropolitan Police Authority (MPA) (to which the Metropolitan Police Service is accountable). The bodies of the group are diverse in their operations, size and in what they deliver.

In total, the GLA group employs around 80,000 staff, occupies over 700 buildings with a combined floorspace of around 1,300,000 m², and has over 7,000 vehicles in its fleet. The GLA group emitted around 230,000 tonnes of CO₂ per year in 2008/9.

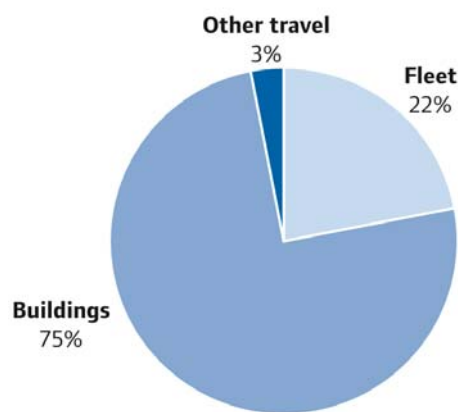
The contribution to the GLA group's overall CO₂ emissions by each of the functional bodies, as shown in figure 9.1, broadly reflects differences in the number of employees, size of the estate and vehicle fleet size, although differences in the operational activities of the organisations also play a role. The CO₂ emissions associated with the operation of public transport, taxis and private hire vehicles are not included within TfL's CO₂ emissions as they are accounted for in chapter 8 of this strategy.

Figure 9.1 Breakdown of CO₂ emissions by GLA group body¹



Source: GLA group

Figure 9.2 Breakdown of total CO₂ emissions from the GLA group by source



Source: GLA group

9.3 Reducing CO₂ 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 CO₂ 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 micro-generation measures without seeing that government is taking action on it firstⁱⁱ. Reducing public sector emissions will therefore help government and local authorities to be credible in leading programmes to reduce CO₂ emissions in other sectors.

The following policies and actions demonstrate how the Mayor will work with the GLA group to minimise CO₂ emissions from their operations.

Policy 13 Setting challenging CO₂ emissions reduction targets and measuring and publicly reporting CO₂ emissions

Vision

The GLA group leads the public sector on the reporting of CO₂ emissions, setting targets to reduce them and making its annual CO₂ emissions levels publicly available.

Vision to policy

The GLA group will measure and set targets to reduce its CO₂ 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 CO₂ 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 CO₂ emissions across the GLA group.
- **Action 13.3** - Measure and publicly report CO₂ emissions from energy use through the CRC Energy Efficiency Scheme.
- **Action 13.4** - Investigate how carbon is considered in internal decision-making.
- **Action 13.5** - Lead pan-European workstreams on encouraging innovation in sustainable construction through whole-life costing and procurement processes as part of the European Commission's Lead Markets Initiative.

The first step for large organisations such as the GLA group to effectively manage and reduce their CO₂ emissions is to measure them and understand their sources. The following list illustrates the significant progress that each functional body has made in this regard:

GLA

- measures its CO₂ emissions
- reports its CO₂ emissions through the GLA website
- signed-up to the 10:10 campaign (a commitment to reduce CO₂ emissions by ten per cent in 2010)

- achieved the Carbon Trust Standard for measuring, managing and reducing CO₂ emissions and committing to reducing them year-on-year.

TfL

- measures its CO₂ emissions
- reports its CO₂ emissions through public environment reports
- head offices and ten London Underground stations signed-up to the 10:10 campaign
- head offices and London Underground have achieved the Carbon Trust Standard (London Underground was the first public transport operator to do so).

LDA

- measures its CO₂ emissions
- signed-up to the 10:10 campaign.

LFEPa

- measures its CO₂ emissions
- reports its CO₂ emissions through public environment reports
- achieved the Carbon Trust Standard (and was one of the first 12 organisations to pilot the Standard)
- ten stations are joining the 10:10 campaign.

MPS

- measures its CO₂ emissions
- reports its CO₂ emissions through public environment reports.

In order to make its fullest contribution to the Mayor's CO₂ emissions reduction target, the Mayor is working with the GLA group to set interim CO₂ emissions targets up to 2025 and publicly report their progress against them. The GLA group bodies have already set a number of targets in their climate change actions plans as set out in table 9.1.

Table 9.1 GLA group targets

Organisation	Baseline year	Target year	CO ₂ emissions reduction target	Notes
LFEPA	1990	2012	20 per cent	Absolute target
MPS	2005/06	2010	10 per cent	Absolute target
	1990	2025	30 per cent	
TfL	2005	2017	20 per cent	Normalised across whole transport operations
GLA	2009	2010	10 per cent	Absolute target

The Mayor will set targets across the group. The targets will be set on the following principles:

- The target will apply to each functional body separately.
- The target will be applied to scope 1 and scope 2 CO₂ emissionsⁱⁱⁱ, as well as those from air travel. This is to reflect the GLA group's ability to directly reduce CO₂ emissions. This does not include TfL's public transport fleet, taxis or private hire vehicles (these are already accounted for in the transport section of this strategy). Therefore only TfL's support fleets and buildings, including head office operations, stations, and garages, will be included. The scope of emissions the target applies to will be reviewed and updated in line with national and international guidelines as appropriate.
- Targets will be absolute. However, to reflect potential growth of services, the GLA group will also report on a matrix of normalised CO₂ emissions to give context to the overall achievement of its targets.
- The targets will mirror the CO₂ 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 and business planning cycles, and will reflect changes in government and Mayoral policy.

- The GLA group will report progress against targets annually in environment reports and/or on their websites.
- To reflect that carbon reduction is a fast-changing area, with technological developments and cost implications regularly changing, 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 9.2 sets out the proposed targets for the GLA group.

Table 9.2 Proposed CO₂ emissions reductions targets for the GLA group to 2025

	2015 (interim target)	2020 (interim target)	2025
	20 per cent	38 per cent	60 per cent
Percentage CO₂ emissions reductions^{iv}	13 per cent delivered through GLA group action	24 per cent delivered through GLA group action	27 per cent delivered through GLA group action
	7 per cent through decarbonisation of the National Grid	14 per cent through decarbonisation of the National Grid	33 per cent through decarbonisation of the National Grid

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 CO₂ emissions, the targets are therefore separated into CO₂ emissions reductions that are within the control of the GLA group, and those that are dependent on government action (for example, decarbonisation of the National Grid). 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 call on the GLA group, as part of its business planning cycles going forward, to adopt these targets.

The Mayor recognises that delivery of these targets will depend upon a number of factors including the amount of CO₂ 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 cost. He will therefore work with the GLA group to understand how CO₂ emissions can be reduced across the group, and how these can be financed ongoing, including by attracting private sector funding.

To support these targets the GLA group is also working to ensure comparability in the measurement and reporting of their CO₂ emissions. The group will adopt government guidance for the measuring and reporting of CO₂ emissions. As well as measuring scope 1 and scope 2 emissions, the group will also commit to measuring scope 3 emissions from air travel.

In addition, the GLA responsible procurement team will lead a review of scope 3 emissions from some of the GLA's key suppliers, working with the Carbon Disclosure Project.

The Mayor is continuing to work with the GLA group to investigate how carbon is taken into account in internal decision-making. Through the central responsible procurement team, the GLA group will lead pan-European workstreams on encouraging innovation in sustainable construction through whole-life costing and procurement processes as part of the European Commission's Lead Markets Initiative. This will include how the public sector assesses CO₂ and wider environmental impacts as part of investment decisions on major capital projects.

To support the achievements of the GLA group targets, the Mayor has set three policies:

- reducing energy use and CO₂ emissions from GLA group buildings
- driving down CO₂ emissions from transport in the GLA group
- demonstrating what can be achieved through demanding low carbon goods and services.

Policy 14 Reducing energy use and CO₂ emissions from GLA group buildings

Vision

The GLA group takes a lead in the public sector by minimising CO₂ emissions from the use and supply of energy in existing and new buildings, demonstrating 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, reduce CO₂ emissions from new buildings, utilise decentralised energy supply, and share best practice with its supply chains.

Policy to action

a) The Mayor will work with the GLA group to continue to lead by example in reducing energy use from GLA group buildings, including:

- **Action 14.1** - Retrofitting GLA group buildings with energy efficiency measures, including through involvement in the RE:FIT programme, and by implementing recommendations from carbon audits provided through the Green500 and any successor schemes that the GLA group bodies sign up to.
- **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 greatest savings can be delivered.

b) The Mayor will work with the GLA group to reduce the energy used in new GLA group buildings and when buildings undergo major refurbishment, as well as their on-going energy requirements, including:

- **Action 14.4** - Calling on the GLA group to adopt the LDA's Sustainable Design and Construction Standards for new buildings.
- **Action 14.5** - Calling on the GLA Group to achieve at least BREEAM Excellent for new buildings and at least Very Good for major refurbishments.

c) The Mayor will work with the GLA group to minimise CO₂ emissions from energy supplied to the GLA group, including:

- **Action 14.6** - Examining the potential for low carbon and renewable micro-generation technologies within existing buildings, primarily through the RE:FIT programme.
- **Action 14.7** - Investigating the potential to catalyse local multi-site and area-wide decentralised energy schemes by committing to become a heat customer for locally developed projects, offering land for energy equipment, and providing assistance, where possible, in project development.

d) Through the central responsible procurement team, the GLA group will continue to work with organisations in its supply chain to signpost to best practice, including on energy efficiency, by:

- **Action 14.8** - Continuing to signpost GLA group suppliers to Mayoral climate change programmes and the Mayor of London's Green Procurement Code.
- **Action 14.9** - In addition to the inclusion of environmental standards in contractual obligations, extending the existing supplier relationship management programme which works with key suppliers above and beyond their contractual obligations to deliver tangible responsible procurement benefits, including reductions in CO₂ emissions.

a) The Mayor will work with the GLA group to continue to lead by example in reducing energy use from GLA group buildings

The GLA group bodies have already undertaken a number of activities to reduce the energy used in their buildings. Forty-two GLA group buildings have taken part in the RE:FIT pilot 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.

TfL

- Undertaken 70 energy efficiency projects in 22 office buildings as part of the RE:FIT programme, saving £555,000 per year and reduced CO₂ 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 an energy pledge for employees to sign up to and runs a successful environmental champions programme.

LFEPA

- retrofitted ten buildings under the RE:FIT pilot, reducing CO₂ emissions by an average of 27 per cent in those buildings
- installed a variety of energy efficiency measures in addition to RE:FIT, including:
 - lighting controls at 62 sites
 - high efficiency light fittings at 58 stations
 - thermostatic radiator valves at 45 sites
 - controllers for drying room dehumidifiers at 109 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 environmental 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 2,000 tonnes of CO₂, 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
- held environment open days and developed an organisation-wide environmental awareness campaign.

The GLA group will continue to reduce the energy use of its existing buildings by committing 58 more buildings to the RE:FIT programme and by implementing recommendations from carbon audits provided through the Green500 and any successor scheme (please see chapter 6 for further details on these programmes).

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 greatest savings for investment can be delivered.

Finally, to further reduce unnecessary energy use, the Mayor encourages the GLA group to continue to run environmental awareness programmes for employees, to help them use buildings and equipment in more energy efficient ways.

b) The Mayor will work with the GLA group to reduce the energy used in new GLA group buildings, and those that undergo major refurbishments, as well as their on-going energy requirements

The GLA group has already begun to implement high environmental design standards for new buildings and for major refurbishments:

TfL

- Palestra building has achieved a BREEAM excellent rating
- placed runner-up in the Chartered Institute of Building Services Engineers (CIBSE) Low Carbon Performance Awards for Refurbishment of the Year.

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 is applying for this rating
- won a CIBSE award for its refurbishment of Croydon Fire Station.

To ensure that GLA group buildings are built to the highest energy efficiency standards, the Mayor will call on all bodies to adopt the LDA's Sustainable Design and Construction Standards for new buildings. The Mayor will also call on the wider GLA group to achieve at least BREEAM excellent for new buildings and at least very good for major refurbishments.

c) The Mayor will work with the GLA group to minimise CO₂ emissions from energy supplied to the GLA group

The GLA group has already begun to utilise decentralised energy on its sites:

GLA

- installed PVs on the roof of City Hall.

TfL

- installed PVs, wind turbines and an innovative fuel cell at Palestra, the first tri-generation fuel cell and CHP system of its kind in the UK, which is expected to reduce CO₂ 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 (35 metres), and when operational, is expected to reduce CO₂ emissions by 41 tonnes per year.

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 20 micro-CHPs, providing the capacity to generate over five per cent of its electricity from CHP and renewables.

MPS

- the MPS programme to deliver borough-based custody centres includes the implementation of renewable technologies such as ground source heat pumps, hot water solar panels and PV panels.

The Mayor will work with the GLA group to continue to maximise the use of decentralised energy by examining the potential for low carbon and renewable micro-generation technologies within existing buildings, and investigating its potential to catalyse local multi-site 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 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 currently investigating how its procurement of energy can stimulate further low carbon energy supply.

d) Through the central responsible procurement team, the GLA group will continue to work with organisations in its supply chain to spread best practice on energy efficiency

The GLA group has over 7,000 significant suppliers, from catering and energy suppliers through to transport and construction suppliers. By encouraging these suppliers to adopt energy efficiency measures, the GLA group will not only help to further reduce CO₂ emissions, it will also create further demand for low carbon products and services.

To help organisations in its supply chains reduce their energy use, the GLA group's central responsible procurement team will, in addition to the inclusion of environmental standards in contractual obligations, extend the existing supplier relationship management programme which works with key suppliers above and beyond their contractual obligations to deliver tangible responsible procurement benefits, including reductions in CO₂ emissions. Work is already being undertaken with a number of the GLA group's key suppliers with a view to extending this into a broad range of categories.

The GLA group's central responsible procurement team will also continue to signpost key GLA group suppliers to Mayoral climate change mitigation programmes and sources of support to assist them in reducing their CO₂ emissions, including RE:FIT, the Green500, and the Mayor of London's Green Procurement Code.

Policy 15 Driving down CO₂ emissions from transport in the GLA group

Vision

The GLA group sets an example to the rest of the public sector, minimising CO₂ emissions from its use of transport.

Vision to policy

The Mayor will work with the GLA group to 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 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 CO₂ 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. Taxi and Private Hire Vehicle (PHV) drivers will also be eligible for this training.
- **Action 15.7** - Promoting national and regional vehicle maintenance campaigns, such as the Act On CO₂ campaign, to GLA group employees.

a) Work with the GLA group to encourage travel to be reduced where possible, and to switch to more efficient modes of transport

The Mayor is committed to reducing CO₂ 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. The MPS provides a good example of how the GLA group has already begun to encourage employees to travel less and to use more carbon efficient modes of transport:

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
- developed a travel plan for the organisation, as well as individual plans for 36 key sites with over 200 employees.

The Mayor will call on the GLA group to commit to reducing business car and air mileage year-on-year. Where air travel is unavoidable, the Mayor will call for the CO₂ emissions associated with those flights to 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) Use low emission vehicles in its fleets

As well as trialling ultra low carbon vehicles through the GLA group, such as electric vehicles, the GLA group is already taking the following measures to procure lower carbon vehicles into their fleets:

TfL

- currently runs around 50 hybrid-diesel electric support vehicles
- partner in the Department for Transport's Low Carbon Vehicle Procurement Programme
- aims to procure six electric vans, three hybrid vans, four electric cars and five plug-in hybrid cars in 2010.

LFEPA

- specifying that all cars must be within EU emission band B when renewing fleet contracts.

MPS

- committed to investing in a clean efficient fleet, including:
 - replacing vehicles with the latest Euro standards
 - setting emissions limits on general purpose and response/specialist vehicles (120g and 225g CO₂/km, respectively)
 - procuring lower carbon vehicles, such as its fleet of 123 hybrid vehicles.
- led on a feasibility study on behalf of the GLA group to implement the Mayor's vision for London, which aims for 1,000 GLA group vehicles to be electric by 2015

- engaged in developing the framework for procuring and funding electric and alternatively-fuelled vehicles in London.

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 CO₂ standards for vehicles procured by the Mayor and GLA group to reduce emissions from existing and new vehicles.

c) Encourage GLA group employees to drive vehicles in a fuel efficient manner

The GLA group is helping employees to drive vehicles as fuel efficiently as possible. For example, the MPS is trialling a bespoke vehicle telemetric system that monitors individual driving styles, behaviours, vehicle performances 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. Taxi and Private Hire Vehicle drivers will also be eligible for this training. The Mayor will also work through the GLA group to promote national and regional vehicle maintenance campaigns, such as the Act On CO₂ campaign, to employees.

Policy 16 Demonstrating what can be achieved through demanding low carbon goods and services

Vision

The GLA group uses its procurement muscle to reduce its indirect CO₂ emissions and stimulate markets for low carbon products and services.

Vision to policy

The Mayor will work with the GLA group, through the responsible procurement policy and the Mayor's climate change mitigation programmes, to procure low carbon products and services.

Policy to action

The Mayor will work through the GLA group to:

- **Action 16.1** - Implement the climate change elements of the GLA group's responsible procurement policy.

- **Action 16.2** - Make 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 16.3** - Work 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.
- **Action 16.4** - Stimulate demand for recycled and low carbon products through the Mayor of London's Green Procurement Code.
- **Action 16.5** - Use the central responsible procurement team and LDA business development programmes to explore the availability of low carbon technologies and products being developed by London-based businesses.

The GLA group has begun to undertake a number of activities to stimulate the low carbon economy in London. To create the necessary financing models to fund energy efficiency and low carbon transport measures, TfL, 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.

To stimulate demand for low carbon products and services, the GLA group will follow the group's responsible procurement policy, which includes a commitment to promoting greater environmental sustainability such as:

- a commitment to the Mayor of London's Green Procurement Code - members of the GLA group have achieved the highest rated (Gold) standard in the code
- sourcing green energy wherever feasible and adopting appropriate energy management measures across all GLA group sites
- ensuring that vehicles purchased have low emissions of local air pollutants and GHGs

- where appropriate, examining the environmental management practices of key current and potential suppliers.

The MPS and LFEPA offer two examples of such responsible procurement practices in action:

MPS

- acts as the Association of Chief Police Officers' (ACPO) national lead on responsible procurement across UK police forces
- developing a responsible procurement toolkit specifically for the police
- sending 47 of its key staff through responsible procurement training, with further training courses in 2010.

LFEPA

- working with the Association of Procurement Practitioners in the Fire Service (APPFS) to promote responsible procurement, including leading on the development of sustainable procurement training for other fire and rescue services
- working with its suppliers to help them achieve accredited certification of their environmental management systems.

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 the RE:FIT and 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 such as the London Environmental Coordinators Forum.

In addition to these activities, the GLA group will continue to implement the climate change elements of its responsible procurement policy, and will be signatories of the Mayor of London's Green Procurement Code. The GLA group will also use the central responsible procurement team and LDA business development programmes 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.

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 All figures are for 2008/2009, apart from for the LDA where figures are given for 2009/10.

ⁱⁱ Sustainable Development Commission, Public Sector Uptake of Low Carbon and Renewable Energy Technologies (2009)

ⁱⁱⁱ For more information on scopes of emissions, please see chapters 2 and 10 of this strategy.

^{iv} This is based on a 1990 baseline for organisations that existed at this date. For those organisations that came into existence after this date, a baseline of 2005 is set.

10 Evaluating and monitoring the success of the strategy

Policy 17 Measuring London's CO₂ emissions

Vision

London will be able to measure and report those CO₂ emissions for which it is responsible, and assess the progress of this strategy 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 CO₂ emissions.

Policy to action

a) Measuring London's CO₂ emissions

- **Action 17.1** - The Mayor will establish a methodology to assess London's annual energy use and CO₂ emissions with a one-year time lag.
- **Action 17.2** - The Mayor will establish a methodology to measure London's scope 3 indirect CO₂ emissions.

b) Reporting London's CO₂ emissions

- **Action 17.3** - The Mayor will publish the London Greenhouse Gas Inventory (LEGGI) online, starting with the LEGGI 2008 being published with the public consultation draft of this strategy.
- **Action 17.4** - The Mayor will produce an annual report on London's progress on meeting its CO₂ emissions reduction target, including annual estimated CO₂ emissions, and progress on Mayoral climate change mitigation programmes.

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 CO₂ emissions, alongside the 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.

The LEGGI currently has a time lag of up to three years. To validate the performance of CO₂ reduction programmes closer to delivery, the Mayor will work with government and London boroughs to develop a methodology to produce an annual estimate of London's CO₂ emissions in 2011 that reduces the time lag to one year. This will include consideration of government's annual provisional estimated results for UK GHGs.

Furthermore, the Mayor will seek to measure scope 3 emissions in order to get a thorough understanding of London's overall CO₂ 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.

To calculate scope 3 emissions, the GLA will work with partners to develop a process map for London, describe the system boundary, identify all relevant materials, activities and processes that contribute to scope 3 emissions, and define the significant sources of emissions that are to be included and excluded. A methodology will then be developed, consistent with existing carbon accounting methodologies and best practice, to collect activity and emissions data and calculate London's scope 3 emissions. This will be the sum of all material, energy and waste flows across the lifecycles of goods and services consumed in London multiplied by their emissions factors. This will be an iterative process where results will be used to update the process map and improve the methodology. Initially a high-level analysis will be carried which will be used to inform policy for reducing scope 3 emissions and to inform further detailed analytical work.

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 'Guidance on how to measure and report your greenhouse gas emissions'ⁱ. 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 CO₂ emissions) targets. The report will include information on the progress of major projects in the Mayor's climate change mitigation programmes including RE:NEW, RE:FIT, RE:CONNECT, the Green500, and operational decentralised energy projects.

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 CO₂ reduction targets. The strategy will be updated on a five-yearly basis, and more frequently if deemed necessary.

Endnotes

ⁱ Defra, Guidance on how to measure and report your greenhouse gas emissions (2009)

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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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 ফোন 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 ταχυ-
δρομικά στην παρακάτω διεύθυνση.

Urdu

اگر آپ اس دستاویز کی نقل اپنی زبان میں
چاہتے ہیں، 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 ਫੋਨ 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.

