July 2009

Leading to a greener London

An environment programme for the capital

MAYOR OF LONDON

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1 Foreword

by Boris Johnson, Mayor of London

London is one of the greenest cities in the world. Viewed from the air, more than half of the area is green or blue – amazing for one of the world's major cities. Glass skyscrapers coexist with allotments, rivers, parks and gardens teeming with hundreds of different species. And London is already relatively energy efficient as well – Londoners' carbon footprint is nearly half the UK average.

London is also an untapped green gold mine. We consume roughly £12 billion of energy each year and produce 22 million tonnes of waste. In sheer scale, these are both tremendous opportunities for new, low-carbon technologies. If you consider this scale along with London's world-leading research institutions and financial and business services sector, the capital is tremendously well-positioned to take a lead in catalysing the green economy.

Our greenness is one of our great strengths, and we must capitalise on this. We are investing to improve existing green space, through programmes such as Help a London Park. And we are making London's grey spaces green: planting 10,000 new street trees, delivering 2,012 new food growing spaces by 2012, encouraging green roofs, and extending the Green Grid to cover all of London. We are looking after what we have through planning protection for gardens and Green Belt land. We are encouraging green volunteering to get more Londoners out enjoying what is already on their doorstep.

We must ensure that London provides an attractive and clean environment to residents and visitors alike. Many of the measures we are putting in place to reduce crime, build new housing, and improve London's transport system all contribute to making London a place people want to live in, work in and visit. We will work with the boroughs to tackle the blight of litter and chewing gum. And we will be taking robust action to reduce air pollution in London.

London's recycling rate is still low compared to many cities, and this is a huge missed economic opportunity for the city. Many Londoners want to recycle more and we need to help them do that. Together with the boroughs, we will use the London Waste and Recycling Board's £84 million fund to create new waste facilities and put London on the path to a future where the economic value in waste is exploited for London's benefit, producing energy and bringing economic benefit to London.

London has an unrivalled opportunity to benefit from the shift to low-carbon technologies. The time for trials and experiments is over; we are putting in

place large-scale programmes that can deliver significant CO_2 reductions and billions of pounds of energy savings. We are delivering an energy masterplan for London and funding significant new decentralised energy capacity, including the Thames Gateway Heat Network. We are rolling out a retrofit programme for homes that could deliver nearly two million tonnes of CO_2 savings each year. Works are already underway to make our buildings energy efficient, and we are making this programme available to the rest of the public sector, which represents fully 25 per cent of London's commercial floorspace. We are using the London Plan and our retrofit programmes to ensure that London is also prepared for climate change. We are looking to combine our funding for these programmes in a London Green Fund, which creates the opportunity to kick-start markets and attract private investment in the energy savings these programmes will deliver. Importantly, these programmes will not only save energy but will create economic value and jobs – conservatively, 10-15,000 jobs and £700 million GVA from the activity associated with the new energy economy.

I am absolutely committed to making London's transport network the greenest in the world. This will deliver cleaner air, quieter streets and cut our carbon emissions. The cycle hire scheme and superhighways will play a key part in London's cycling revolution. We will continue pumping substantial investment into the public transport network, including investing in new technologies such as converting London's buses to hybrid. London will also be the catalyst for an electric vehicle revolution: I want to see 100,000 electric vehicles on the streets of London by 2020 at the latest. We will be pushing to make as many of the Olympic vehicles as possible electric, and will be buying 1,000 electric vehicles for our own fleet.

In 2012 London will play host to the world when we host the Olympic and Paralympic Games. This is a fantastic opportunity for London, and an opportunity to mobilise London to work together to make London a greener city. I am determined that by 2012 we will have set London well on its way to being the cleanest and greenest city in the world.

This document contains some of our key programmes, but it is not an exhaustive list. Further detail on our programmes will be contained in the London Plan, Transport Strategy and the environmental strategies all coming out in draft later in 2009.

Boris Johnson, Mayor of London

2 The Mayor's vision for the environment

The Mayor wants London to be recognised as a world leader in improving the environment locally and globally, by tackling climate change, reducing pollution, developing a low carbon economy, consuming fewer resources and using resources more effectively.

In order to deliver that vision and to ensure London achieves the highest environmental standards and quality of life, we are focusing on three key challenges: improving quality of life for Londoners, mitigating climate change and adapting London to the impact of irreversible climate change. Tackling these challenges will be at the heart of all our work and will ensure that London develops sustainably, balancing environmental issues with social and economic ones to deliver improvements to the capital and for Londoners.

We are focusing on delivering real, on-the-ground change. We can, and have, set targets, but it is the action we take to meet those targets that counts. Our actions are focused on large-scale, high-impact programmes.

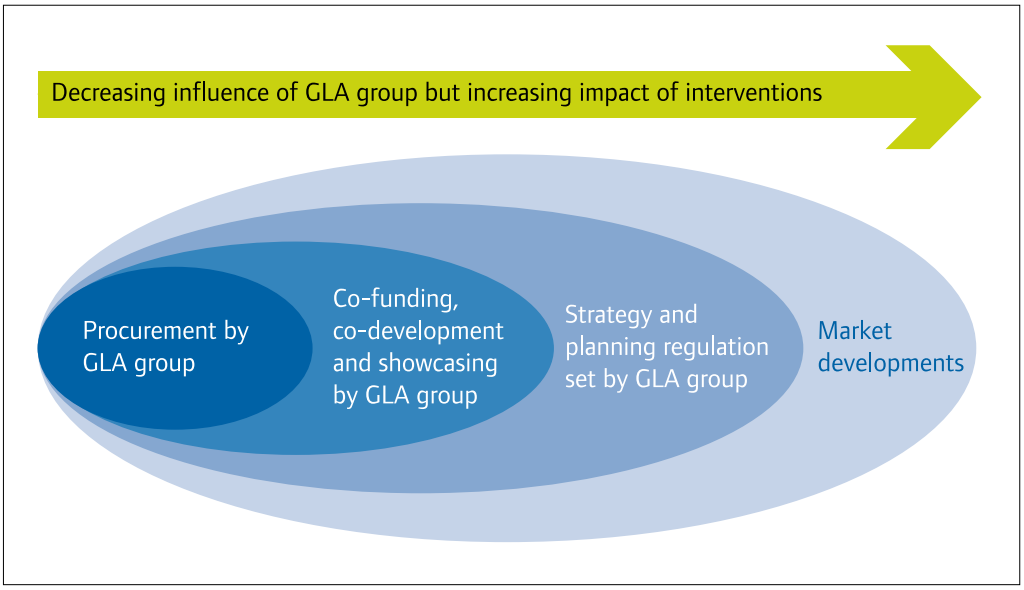
And we are working in partnership globally as well as in London with national government, the 33 London local authorities, other public sector organisations, commercial businesses and, of course, Londoners themselves. They have the greatest experience and expertise and the Mayor wishes to capitalise on this.

The Mayor will ensure his new planning, transport and economic development strategies help deliver his vision for London's environment, especially the programmes set out in this document.

We will devise and implement large-scale programmes in key areas starting with our own areas of activity in the Greater London Authority (GLA) group but then extend participation in and co-funding of these programmes wherever possible. While the impact of these improvements may be small in the context of London overall, we will use our procurement power to lead by example encouraging others to do likewise. For example, by proving on our own buildings that measures to reduce emissions work, and by being able to quantify their impact, we are creating a ripple effect to influence others to follow our example and catalysing new markets. Beyond procurement, we are creating new funding streams, helping organisations to access other funding and lobbying for the revision of regulations which are blocking our ability to speed up action in London.

The three key challenges will be tackled through four broad areas of

Spectrum of interventions open to Greater London Authority (GLA) group



work, each with its own programmes and initiatives. For each, we lay out below why we need action, our commitments, and our approach.

2.1 Improving quality of life for Londoners

Why we need action

For Londoners the environment is a key factor in their well-being. Issues such as whether there is too much litter on the streets and how green their neighbourhood, or their experience of travelling on the streets of London, will determine people's feelings about how good a quality of life they and their families have.

London has some of the finest parks of any capital city in the world. But there are many areas which lack green spaces, or where the quality of local green spaces is poor. And there are increasing pressures on London's green spaces and waterways. National funding for public parks and green spaces declined by an estimated £1.3 billion between 1979 and 2000. In the last ten years, two per cent of London's area has been paved over, whilst allotments equivalent in area to 50 football pitches have been lost. Pressure for new housing has resulted in development on back gardens and incidental spaces. In the three years to 2007, over 1,500 housing developments were built on gardens in London. This must be stopped.

London's green spaces are home to a great variety of plants and

animals. Contact with wildlife is important to people's wellbeing and quality of life. Over 1,400 sites in London have been identified as being important for wildlife. Pressure for development, coupled with the stresses of a changing climate, mean that London's wildlife is more than ever in need of conservation.

London's air quality is improving, and measures we have already put in place will improve it further. However, there is far more we can and must do to reduce air pollution in order to improve Londoners' health and enjoyment of living and working in London.

Noise is a serious issue for Londoners' quality of life, with at least 27 per cent exposed to road traffic noise over the current World Health Organisation guidelines. Up to two million people may be annoyed by aircraft noise around Heathrow[1]. Many green spaces are blighted by noise.

Litter and graffiti also frustrate Londoners and detract heavily from our environment. London's streets have become cleaner due to the efforts of the boroughs but there are areas which still need a more intensive approach.

Our commitments

We are determined to improve the quality of life for all Londoners, reinforcing our image as a world city where people clearly benefit from clean, green, civilised neighbourhoods.

We will work hard to improve the local environment in London to make it a better place by:

- Greening our streets, improving green spaces and providing better access to them as an antidote to bustling city life
- Ensuring that London's important biodiversity is protected and that all Londoners have access to wildlife and natural open spaces
- Preserving and improving London's waterways for people and wildlife
- Taking significant action to improve air quality in London
- Reducing the daily irritations which Londoners face on our streets such as litter, noise, clutter and graffiti
- Reducing the environmental impact of transport in London
- Encouraging all in London to respect and care for our environment.

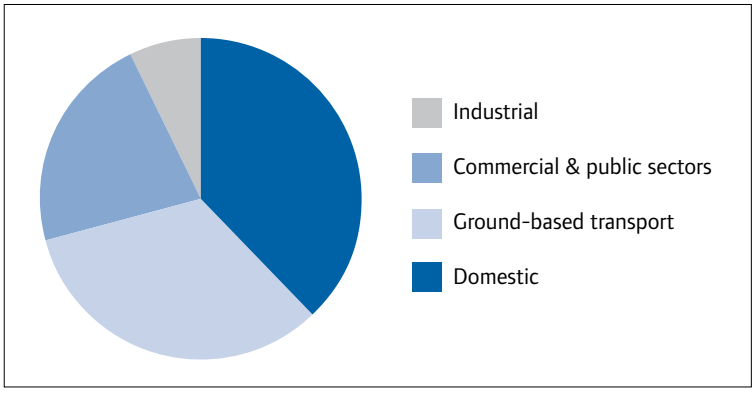
Our approach

Increasing the quantity, quality and accessibility of London's green spaces will reinforce London's image as an attractive city to live and work in. 'Urban greening' adds value to property, increases tax yield to contribute to public services, and

helps us continue to attract tourists and encourage employment and inward investment. The Mayor has already started to implement programmes on improving run-down parks, planting street trees, creating spaces for growing food in the capital and establishing an improved network of green spaces across London. The Mayor intends to address the pressure to lose green space in favour of new development in the revised London Plan.

And we should not forget about the contribution that Londoners themselves can – and want to – make. Around 11.6 million people volunteer at least once a month in the UK with an estimated benefit to the economy of £27.5 billion[2]. Voluntary activity contributes to every sphere of life. In London and particularly in urban greening programmes, we want to capitalise on this to help create a more civilised society and improve the local environment by creating a volunteer programme focusing on the environment.

Sources of CO_2 emissions from London, 2006, excluding aviation



100 per cent = 44 million tonnes[8]

2.2 Reducing our greenhouse gas emissions

Why we need action[3]

Cities have a central role to play in mitigating climate change. They consume 75 per cent of the world's energy and produce 80 per cent of its greenhouse gas emissions[4].

London is responsible for eight per cent of UK emissions, equivalent to an estimated 44 million tonnes of CO_2 in 2006[5]. Per capita, Londoners have a smaller carbon footprint than the UK average because of the high usage of public transport and the density of development. But London has an essential role to play in demonstrating and rolling out new business models that will deliver carbon reductions at scale. Unless we take action, London's CO_2 emissions will increase simply as a result of economic and population growth, and are forecast to reach an estimated 51 million tonnes per annum by 2025[6].

The economic cost of reducing greenhouse gas emissions to limit further climate change now has been estimated at one per cent of global

GDP. For London, one per cent of GDP is equivalent to over £2 billion. If we act later, it will cost between five and ten times as much[7]. The case for taking early action is clear, especially if London can capitalise quickly on the benefits of moving to a low carbon economy.

Our commitments

To mitigate climate change, the Mayor will:

- Target a 60 per cent reduction in London's CO_2 (on 1990 levels) by 2025 (equivalent to emissions of just 18 million tonnes by 2025), half through initiatives introduced and encouraged by the Mayor and half as a result of regulatory changes by national government
- Ensure that 25 per cent of London's energy is delivered through decentralised energy by 2025 through deploying a decentralised energy programme
- Dramatically improve the energy efficiency of London's homes and buildings
- Reduce emissions from London's transport
- Reduce emissions from our waste and use it to provide energy
- Drive up energy and supply efficiency in public and private sector infrastructure
- Capture the economic benefits of a moving to a low carbon London.

> 'By working in partnership, cities can share the best of our ideas and save money for our residents by taking advantage of our collective clout when procuring new services and technologies.'
>
> Mayor Boris Johnson, February 2009[14]

Our approach

Since 1990, the level of London's overall CO_2 emissions have remained more or less flat despite increased economic activity and population growth[9]. However, in order for London to play its full role, based on the latest science on climate change, CO_2 emissions need to fall by 60 per cent on 1990 levels by 2025. The Mayor cannot deliver measures alone to meet such a challenging target. National government must unlock the potential across a range of issues from energy efficiency, decentralised energy and renewable energy to ensure London can achieve its goals.

So how do we make sure we reach the 60 per cent target? It's not a question of technology: the technologies we need to deliver reductions of this scale are already available or well on the way to commercialisation. The problem is that existing taxation and regulation do not ensure that we fully include

the cost of CO_2 emissions when we set the prices of most products and services. As a result, there are insufficient incentives for businesses and individuals to take the kinds of action necessary to cut substantially emissions.

The Mayor's priorities for reducing carbon dioxide emissions are three-fold: to improve energy efficiency; to increase supply efficiency and to develop renewable energy sources. The Mayor is keen to move as much of London as possible away from reliance on the national grid and on to local, lower-carbon energy supply – decentralised energy, including combined cooling heat and power (CCHP), energy from waste, and onsite renewable energy, such as solar panels. He has committed to spending at least £100 million, an unprecedented amount, on environmental and climate change programmes over his four years in office[10].

London is already leading by example through our trailblazing climate change mitigation programmes, such as the Building Energy Efficiency Programme (BEEP). In addition, we see the London 2012 Olympic and Paralympic Games as a great opportunity to showcase how we are tackling climate change to make the Games the most sustainable ever[11] to a huge audience.

The Mayor is strengthening ties and mobilising action with the international community in the fight against climate change – including through the C40[12] (a group of forty of the world's largest developed and developing cities, united in their commitment to tackle climate change) and the Covenant of Mayors initiative[13] (a group of European member cities committed to exceeding the 2020 EU targets for a 20 per cent reduction in CO_2 emissions).

In addition, the Mayor is revising the London Plan which sets out policies governing new development in London. At the heart of the Plan will be policies ensuring London's new buildings are both ready for the impacts of climate change and reduce their contribution to London's overall CO_2 emissions including reviewing what London's reduction target should be.

If you are interested in reading about climate change policies for London in more detail, the Climate Change and Energy Strategy will be published in autumn 2009 for consultation.

2.3 Adapting London to the impact of irreversible climate change

Why we need action

Some changes to our climate are now inevitable and we need to prepare

for further changes throughout the century. Adaptation is about taking action to respond to these impacts, with the benefit of buffering us against extreme weather today. Adaptation goes hand-in-hand with our efforts to mitigate climate change.

London is already vulnerable to the impacts of extreme weather – as the heatwaves of 2003 and 2006, the drought of 2005-06 and the floods of 2000 and 2007 have shown. Climate change is projected to bring warmer wetter winters and hotter, drier summers, with more extreme weather and rising sea levels. This means that London will experience an increasing risk of floods, droughts and heatwaves. For example, the 2003 heatwave was responsible for at least 600 deaths in London, yet the temperatures experienced in 2003 are projected to occur most summers by mid-century.

Our commitments

To manage these growing risks and increase London's resilience to extreme weather, the Mayor will:

- Prioritise urban greening measures that help to buffer us against the impacts of extreme weather and temperature
- Work with communities at high flood risk to improve their resilience to flooding
- Work with Transport for London (TfL) and others to make key services and infrastructure more resilient to the impact of the changing climate
- Improve the water efficiency of London's homes and buildings
- Help the London boroughs undertake risk assessments and prepare their own plans to manage the key climate risks.
- Publish design guidance for architects and developers to ensure buildings are designed for the hotter summers of the future
- Produce a London-wide surface water management plan, and more detailed plans for high-risk areas.

Our approach

The Mayor believes that proactive action is almost always cheaper and more effective than retrospective actions. We must, wherever possible,

Percentage change in summer precipitation

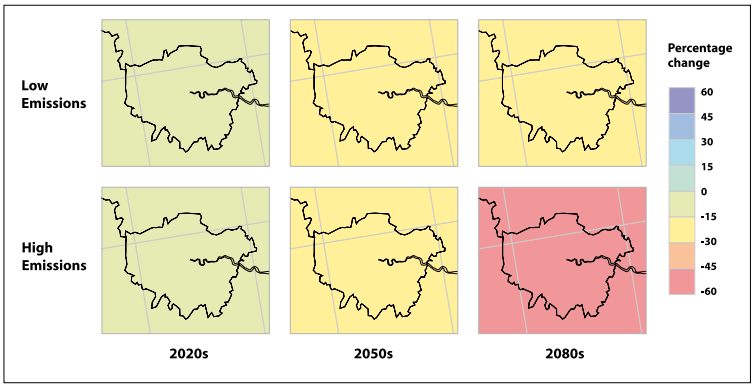


Image courtesy of UK Climate Impacts Programme

try to prevent and prepare for future climate impacts, rather than respond and recover from them. This means that new developments should be located, designed and constructed for the climate they will experience over their lifetime, but that we should also increase the resilience of existing buildings. It also means that for low-probability, but high consequence impacts (for example the failure of the tidal defences) we should have well-designed and well-rehearsed emergency plans.

We have taken a risk-based approach to identifying the main climate risks facing London. Working with key stakeholders, we have been mapping 'who and what' is at risk today from floods, drought and heatwaves, and then using climate scenarios to understand how the risks change over the coming century. Through the London Climate Change Adaptation Strategy, we are now using this understanding to identify and prioritise the actions necessary to manage these risks, highlighting those that the Mayor is uniquely placed to address and those where stakeholder collaboration or leadership is required.

This risk assessment shows that the greatest climate-related risks to London are flooding from the freshwater Thames and tributaries to the Thames, and from heavy rainfall overwhelming the drainage network. There are currently 100,000 properties which have a greater than 0.5 per cent chance of being flooded from London's rivers in any one year. One in seven properties in London have a two per cent annual chance of being flooded following heavy rainfall.

London is recognised as a world leader on adapting to climate change. The Mayor is committed to preparing London for the impacts of climate change and helping other cities adapt – both nationally and internationally. London's position as a global financial centre means that London is vulnerable to climate impacts on the global economy, but also it is uniquely placed to offer the skills, services and products the world needs to meet the challenges of climate change.

If you are interested in reading about adaptation in more detail, the next draft of the London Climate Change Adaptation Strategy will be published for three months of public consultation in summer 2009.

3 How London's environment will change

The key challenges and outcomes

In tackling these three challenges – climate change mitigation and adaptation and better quality of life for Londoners – we aim to deliver the following key outcomes:

- Created a greener, cleaner, more civilised London
- Led the way in energy efficiency, supply efficiency and renewable energy so capturing the benefits of a low carbon economy
- Turned London's waste into an opportunity
- Reduced the environmental impact of transport including air quality and noise.

In the following pages we will look at each objective in turn, and describe our proposed programmes beneath them in greater detail.

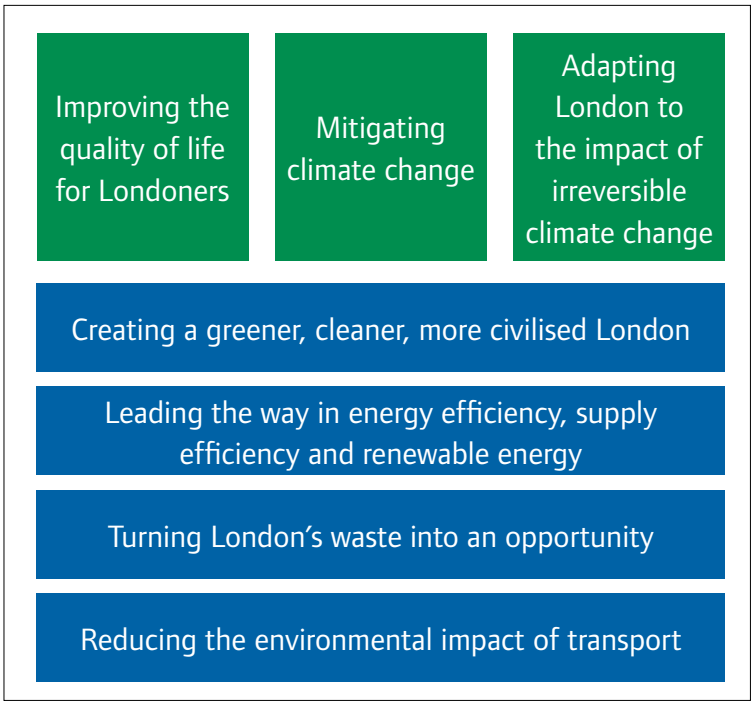
3.1 Creating a greener, cleaner, more civilised London

Improving the quality and accessibility of London's existing green space

London is one of the world's greenest major cities. If we include gardens and water, over 65 per cent of London is green[15] and we have four times more green space per Londoner than the average New Yorker enjoys[16]. Market research conducted in February 2008 showed that over 80 per cent of residents had visited a green space in the previous 12 months[17]. Although London has around 50,000 hectares of accessible open space over one hectare, this is unequally distributed across the capital. More than 1.7 million Londoners live at least one kilometre from an accessible green space which offers a significant experience of nature[18].

We want to encourage all Londoners to make more use of green space. Visiting a well-managed park or walking down a tree-lined street acts as an 'NHS' – a 'natural health service' for health problems such as obesity. In 2003 obesity contributed to approximately 4,000 deaths in London, seven per cent of all London

Our three environmental challenges and four desired outcomes for the environment



deaths. Physically active people have a 20-30 per cent reduced risk of premature death. Given the health benefits of green space, we aim to work more closely with the NHS on these issues.

We need to protect and manage better these havens of calm in our busy city[19]. We also need to protect and enhance London's biodiversity by improving wildlife areas.

Targets

We plan to make our green spaces more attractive places to visit and increase their use. We will enhance up to 1,000 hectares of green space during the Mayoral term through initiatives like the East London Green Grid, the £6 million Priority Parks programme and the Olympic Park. That's an area equivalent to Richmond Park, or six times the size of Hyde Park or Regents Park. Linking London's green spaces into a 'green network', we will further encourage walking and cycling around the city. We are working with the London Parks and Greenspaces Forum to understand better the relationship between how Londoners use parks (or don't use parks), their quality and the cost of maintaining them. Within 12 months, armed with this analysis, we will have a good basis for making decisions about further improvements to green space.

Through Capital Growth, we will create 2,012 community spaces to grow food and allow wildlife to flourish by 2012. This is equivalent to freeing up around 25 hectares of poor quality green space for growing food[20].

Greater recognition will be given to the importance of the contribution of gardens (especially back gardens) to a wide range of strategic objectives, such as biodiversity, abating the urban heat island effect and flood risk and contributing to local character and amenity. The new London Plan will set out a general presumption against the development of back gardens.

Increasing the total green and open space within London by 'greening the grey' and preventing erosion of existing green space

Green spaces can perform vital climate change adaptation services for London. Our drainage infrastructure will struggle to cope with the projected increase in rainfall, and 100,000 homes have a low standard of flood protection from the tributaries to the Thames. The right use of open space at the riverbank can provide a buffer to flooding. By greening London's grey spaces we can keep the city cooler in hot weather and reduce flood risk in wet weather – this is particularly important in inner London. Gardens, green roofs and walls and street trees will help

absorb surface water. We also believe in encouraging Londoners to discover the joy of growing their own food by allocating land for that purpose. Only 30,000 people in London currently use allotments to grow vegetables and fruit. We will help people all over London create new food-growing spaces in their neighbourhoods.

Targets

Studies show that increasing tree cover by 10 per cent can reduce the surface temperature of a city by between three and four degrees centigrade[21]. We aim to increase tree cover across London from 20 per cent today to 25 per cent by 2025 – around two million additional trees – with a further five per cent increase by 2050. We will investigate the right places to plant trees to deliver the greatest benefits, complementing our existing work that has determined the right species of tree[22] to suit local circumstances in the face of a changing climate.

Specifically in inner London we will set targets and put in place programmes to help increase green space (planting more street trees, installing green roofs) by at least five per cent by 2030 and at least an additional five per cent by 2050. Research based on Manchester's green spaces has shown that increasing urban green space by 10 per cent could help to cool high-density areas of the city, maintaining surface temperatures near current levels for most of the century instead of the significant urban heat island effect increase that is expected.

Reducing the daily environmental irritations Londoners face

Low-level antisocial behaviour, for example, littering and graffiti, leads to bigger crimes. That's why we in London should not tolerate them and we will work with the boroughs and others to focus more on tackling these problems. We will work with the London boroughs to reduce litter and graffiti in London, and will reinvigorate the work of Capital Standards, a partnership with them, Keep Britain Tidy and other key stakeholders.

The Mayor at the announcement of the winning parks. Photo courtesy of James O Jenkins

Building a more civilised London, where residents feel part of their community

Respect for local environment fosters a sense of community. We will increase environmental awareness for over 100,000 school children annually and encourage more Londoners to volunteer for green charities.

Priority programmes

We have prioritised three programmes to deliver these targets:

1 Making London greener
2 Making London cleaner
3 Making London more civilised.

The Mayor planting a street tree. Photo courtesy of James O Jenkins

Below we describe each of these programmes in more detail, then summarise our progress to date and milestones against each programme.

Making London greener

Public spaces, streets and parks give London its unique heritage and identity; they are a fundamental component of the city's eco-system. We will be working in the following areas.

All London Green Grid

The East London Green Grid is a programme to create new and improve existing green spaces as part of the regeneration of East London. The vision is to create a network of green spaces that not only provide a beautiful environment for people and wildlife, but to design and locate green spaces to help reduce flood risk and keep London cool in summer. Nearly £80 million has already been raised to design and deliver green space improvements[23]. The Mayor aims to extend the success of the East London Green Grid across all of London, subsidising landscape designers to work with London boroughs to enhance existing spaces and with TfL to turn these green spaces into a 'green network', such as the Strategic Walk Network, to further encourage walking and cycling around the city. We will also work with developers, architects, engineers,

builders and local authorities to make sure new housing provides adequate green space for residents.

Priority parks
In 2008, the Mayor pledged to upgrade eleven run-down parks in London, equivalent to over 400 hectares of green space improvements. We are investing £6 million (from efficiency savings across the GLA group including the axing of The Londoner newspaper) over the next four years upgrading selected parks, by improving the quality of the landscaping including, foot and cycle paths, adding more lighting for safety, building new playgrounds and refurbishing toilets. Included in the 11 parks are one premier park selected by the Mayor and ten parks nominated by boroughs and chosen by public vote. The winning parks were announced in March 2009 following a public vote in which more than 110,000 Londoners took part.

Over the next 12 months the Mayor will explore ways to further improve London's green spaces and increase their use.

10,000 more street trees
In the last few years a third of boroughs have seen a decline in the numbers of street trees. Many London streets, particularly in deprived areas, have no street trees at all. The Mayor has pledged to get 10,000 trees planted on streets in 40 priority areas, with at least one area in each borough, by 2012. This initiative has been given £4 million in funding over the next four years by the GLA, London Development Agency (LDA) and TfL using money saved by scrapping the budget for The Londoner. The 10,000 street trees initiative, operated as a grant scheme by the Forestry Commission, has already funded 1,400 new street trees in ten boroughs. Londoners can nominate areas where they would like to see more trees. This is in addition to ongoing work by the boroughs and TfL to plant and maintain new street trees.

Over the next 12 months the Mayor will identify more options to increase tree cover in the capital where it can deliver the greatest benefits. His ambition is to increase tree cover from 20 per cent to 25 per cent by

> 'Although most of our borough councils are doing their best to maintain green spaces, the funding they work with is often limited… we will… inject much-needed money into improving the most neglected parks and gardens across London as well as planting 10,000 new street trees.'
>
> Mayor Boris Johnson, June 2008[24]

2025. This equates to approximately two million trees.

Capital Growth
This is one of a suite of initiatives from the London Food Board to improve Londoners' access to healthy, locally produced and affordable food. Capital Growth identifies suitable places for growing food around London and offers practical and financial support to groups of enthusiastic gardeners or organisations who want to grow food for themselves and the local community. A range of organisations are already opening up land for the scheme, including borough councils, schools, hospitals, housing estates and transport networks. Specifically, we will add 2,012 new growing spaces by 2012. These growing spaces will include pocket parks in urban environments and green roofs.

'Linking up currently unloved patches of land with people who want to discover the wonders of growing their own food, delivers massive benefits. It will help make London a greener, more pleasant place to live whilst providing healthy and affordable food.'

Mayor Boris Johnson, November 2008[25].

The Mayor and Rosie Boycott launching Capital Growth. Photo courtesy of James O Jenkins

Green roofs and walls
Green roofs and walls are designed to be covered by vegetation so they can provide insulation, keeping buildings warm in winter and cool in summer; absorb rain and so help reduce flooding; support biodiversity; and keep the city cool. In high-density areas, where it may not be possible to create new parks, we can replicate the effect through green roofs and walls. The thermal insulation provided by a green roof saves approximately 1.6 kilograms of CO_2 per square metre, and can reduce the energy required for air-conditioning by over 75 per cent. Every ten hectares of green roof can reduce CO_2 emissions by 160 tonnes[27]. Sixteen per cent of London's area is roofs, and green roofs in London totalled 93,000 square metres – the equivalent of 12 football pitches – in 2004[28].

We will implement a new portfolio of actions for green roofs and walls, using the planning system to encourage green roofs and walls on major new developments and preparing a prospectus for raising a fund to subsidise green roofs on new and existing buildings. We will prioritise subsidies for roofs in flood risk and heat management areas. TfL is already putting green roofs on a number of buildings. For example, Palestra, Southwark, the headquarters of TfL Surface Transport and the LDA, has a small living planted area; West Ham Bus Garage has almost completed a large living roof; and 55 Broadway, the listed headquarters of the Tube, should have installed a green roof, part-sponsored by the charity Bug Life, by late summer 2009. The Mayor will work to encourage some of London's iconic buildings to have green roofs or roof gardens.

Making London cleaner

Revitalised programme to reduce litter and graffiti in London

By waging war on litter and graffiti we will improve Londoners' quality of life and, we hope, reduce crime and the fear of crime. We are reviewing and restructuring the Capital Standards Programme in discussion with London's local authorities.

In addition, we will strengthen the current partnership with the Metropolitan Police and local authorities, and form new partnerships with Safer Neighbourhood Teams, Safer Transport Teams, residents, business owners and other key stakeholders to develop a series of programmes that deliver robust responses to environmental crime. Initiatives being considered include litter, graffiti and fly-tipping free zones, park wardens, rapid response cleansing and enforcement teams and work with the London Anti-Social Behaviour Board to implement the Responsible Retailers Agreement.

'People from all over London are already contacting us, keen to be involved in Capital Growth.'

Ben Reynolds, Coordinator of London Food Link, which is administering the scheme, November 2008[26]

The green roof on West Ham Bus Garage

Reducing the blight of chewing gum on our streets
The Mayor is committed to tackling the sticky problem of chewing gum on our pavements which costs London's local authorities millions of pounds in cleaning costs each year. We will be supporting trials of next-generation gum technologies, particularly biodegradable gum, and putting pressure on the big gum companies to switch to these new technologies.

Making London more civilised

Green Volunteering
Londoners have a wide range of skills and experiences that can contribute to the development of the city. The Mayor wants to ensure that the skills of citizens are tapped into by encouraging volunteering. We want more people helping to improve the local environment by clearing litter, planting trees or doing other work for green charities.

To lead the way we will encourage employees of the GLA group to volunteer for one day a year, where practicable, for one of the many charities that are dedicated to protect and enhance the environment.

We would like to see the concept of green volunteering embraced by more commercial businesses as well as London residents and we will be looking at ways of making it easier to volunteer.

Programmes for schools to raise awareness of environmental issues
Children are often the greatest advocates of the environment but unfortunately not all of them are able to learn about or encounter wildlife. We are promoting two main programmes for schools:

- Providing free school visits for children to London Zoo and the London Wetland Centre. A minimum of 110,000 primary and secondary children in London have an animal encounter either at the environmental centre or within their school each year.
- Working with the London Grid for Learning Trust, Imperial College and London schools to extend a network of weather stations across London and raise awareness of climate change[29]. The Big Lottery is funding 30 new weather stations in schools in London, and putting the data online through the London Grid for Learning Trust. We will develop a prospectus to raise funding for more weather stations in schools.

If you are interested in reading more about improving the quality of life in London, you can pick up the London Plan 2008, the Biodiversity Strategy 2002 and the Trees and Woodlands

Programmes and initiatives: progress and milestones		
Priority Programme	Progress since May 2008	Milestones through 2012
1 Making London greener		
All London Green Grid	• Developing plans to broaden East London Green Grid out to other parts of London	• At least 280 hectares of East London Green Grid new or enhanced green space by 2012 • At least 30 kilometres of new or upgraded walking and cycling pathways by 2012 • Completion of Strategic Walk Network by 2012
Priority parks	• Announced in March 2009 which 11 run-down parks covering 450 hectares will be improved, making them cleaner, safer and more attractive	• First works in some parks to start in 2009-10 • All Priority Parks to be reinvigorated by early 2012
10,000 more street trees	• First round completed: over 1,400 trees planted in ten boroughs • All 40 priority areas selected • Second round open May 2009	• 1,500 new trees in 2008-09 • 3,500 new trees in 2009-10 • 3,500 new trees in 2010-11 • 1,500 new trees in 2011-12
Capital Growth	• Developing relationships and agreements to use land with key stakeholders including British Waterways and Metropolitan Housing • Pilot ended March 2009 • First 15 organisations pledging land signed up by February 2009 • 100 spaces signed up including City Hall	• 2,012 new growing spaces in place and 10,000 people involved in these growing spaces by 2012
Green roofs and walls	• Developing plans for a new programme to subsidise priority buildings to create green roofs and walls • Discussions in train with iconic buildings	• TfL green roof on 55 Broadway completed summer 2009 • Prospectus developed by end 2009 to raise funding • At least 100,000 square metres of new green roofs London-wide by 2012
2 Making London cleaner		
Revitalised programme to reduce litter and graffiti in London	• Planning to restructure Capital Standards programme (joint work with London's boroughs) • Piloting one-stop contact number for Londoners to report non-emergency issues	• New Capital Standards Programme up and running by April 2010 • Series of programmes responding to environmental crime developed with stakeholders by April 2010 and implemented 2010-2011

Programmes and initiatives: progress and milestones		
Priority Programme	Progress since May 2008	Milestones through 2012
Reducing the blight of chewing gum on our streets	• Holding initial discussions with chewing gum companies regarding uptake of more biodegradable gum. Applying for national funding for campaign to help Londoners dispose of gum properly	• Launch of manufacturer-funded campaign in 2010/11 in run up to the Olympic Games • Trials of biodegradable gum start in 2010
3 Making London more civilised		
Green Volunteering	• Launch of GLA volunteering and Volunteer London portal (June 2009) • Holding initial discussions about setting up a broader Green Volunteering Programme to get more Londoners helping to improve the local environment	• 100 GLA staff to volunteer for one day in 2009/10 • Increase the rate of green volunteering in London by 2012
Programmes for schools	• Continuing to provide free school visits to London Zoo and the London Wetland Centre • First draft prospectus for Schools Weather Station Network to send to insurance companies for funding in 2009	• At least 110,000 schoolchildren in London to enjoy a visit each year • Funding for Schools Weather Station Network by 2010.

Framework 2005. These documents are available online at www.london.gov.uk

3.2 Leading the way in energy efficiency, supply efficiency and renewable energy and capturing the benefits of a low carbon economy

In order to make London an international role model in energy efficiency, supply efficiency and renewable energy we must lead by example and focus on large-scale delivery. The key barriers to greater energy and supply efficiency and the uptake of renewable energy are commercial and financial rather than technical and the GLA will focus our efforts on rolling out effective business models that are deliverable at scale.

The overarching target for energy efficiency and renewable energy is a reduction in CO_2 emissions. Through our priority programmes, detailed below, we must stimulate the market and other public organisations to deliver a large proportion of the current target of 60 per cent CO_2 emission reductions by 2025, and our target for 25 per cent of London's energy to come from decentralised sources by 2025. Meeting this target will require generation capacity of around 1,800MW and a heat output of about 3,400MW[31]. Current capacity is around 200MW.

Priority programmes

We are focusing on five energy programmes to deliver CO_2 savings, as well as lower energy bills to London residents, businesses and the public sector and help create jobs in London:

- Improving the energy and water efficiency of residential properties
- Making efficiency upgrades to public sector infrastructure and engaging with commercial businesses to drive the energy efficiency, supply efficiency and renewable energy
- Creating ten low carbon zones to test innovative measures for reducing emissions
- Deploying a decentralised energy programme
- Capturing the benefits of a low-carbon economy.

Below we describe each of these programmes, then summarise our progress to date and provide milestones against each programme and the initiatives it comprises.

Improving the energy and water efficiency of residential properties

Housing contributes 38 per cent of the total CO_2 emitted from London each year – over half of it from heating[32]. We have already introduced planning requirements for new buildings in London to make them more sustainable, but existing homes must be made more energy efficient since, even in 25 years' time, they will be the majority of London's housing stock.

New homes

We have been working with developers, architects, engineers, builders, housing associations and local authorities and the Homes and Communities Agency to make sure new homes have as little impact as possible on climate change.

- We engage with stakeholders as early as possible in the planning process to ensure their schemes make the fullest contribution to minimising CO_2 emissions through the following energy approach: firstly, use less energy ('be lean'), then supply energy efficiently ('be clean') and finally, use renewable energy ('be green'). We also ensure that they are located, designed and constructed for the climate they will experience over their lifetime
- TfL is also implementing residential and workplace travel plans through the planning process, to ensure that new developments provide easy access, through walking,

'We must achieve CO_2 emission savings urgently to avoid catastrophic climate change.'[30]

Price of Wales, March 2009

cycling and public transport, to services and opportunities.
- Where it is appropriate we have refused planning permission if plans fail to address these measures where feasible
- We have made it a requirement that all new publicly funded homes will meet at least level 3 of the Code for Sustainable Homes immediately. This means homes that are 25 per cent more energy efficient than current building regulations and, through the Targeted Funding Stream, the Mayor is supporting developers to reach higher levels of the Code
- We also work with local authorities on their area master plans to confirm that they have thoroughly tested the potential of district heating.

However, the homes that are with us today will represent roughly two thirds of the homes that will still be with us in 2025. New buildings account for just one to two per cent of London's building stock in any year[33]. Therefore, the 60 per cent carbon reduction target cannot possibly be met without a major programme of retrofitting this stock.

Existing homes

London faces some unique challenges in upgrading existing homes – there is a higher proportion of 'hard to treat' homes in the capital than in other regions, mainly because of the number of flats in London (43 per cent of residences here are flats)[34], and the higher proportion of both flats and houses in London which have solid walls[35]. Nevertheless, we still believe there is plenty we can do both to reduce emissions and combat fuel poverty. By deploying retrofitting measures, most London homes can save from £60 to £300 a year or more on energy bills[36].

In terms of water savings, if one million London homes were retrofitted with water-efficient shower heads, the city could save 27,000ml of water and 166,000 tonnes of CO_2 each year. For homeowners this would mean that each water-metered house would save around £53 on their annual water bill.

The Mayor believes that the future of home energy efficiency retrofit lies with properly structured area-based schemes with ambitious targets for emission reductions from that area. The GLA is currently working with London Councils, London Futures and the LDA on a joint home retrofit programme across all of London, based in the first instance around simple energy efficiency measures coupled with cavity and loft insultation[37]. Our analysis shows that if 1.8 million homes in London took up some of

these easy measures, the overall CO_2 saving would be 900,000 tonnes per annum over the lifetime of the measures, before addressing harder measures such as solid wall insulation. We want this programme to sell itself to the consumers – it should be hassle-free and have zero upfront cost.

The Mayor also believes the package of energy and water efficiency measures should be supplemented by face-to-face home energy advice to residents as part of this whole-house approach to energy efficiency.

A further 340 thousand tonnes of CO_2 per annum can be saved if 0.5 million loft insulations and 0.5 million cavity wall insulations were also delivered in London, with a further million tonnes of CO_2 savings possible from harder measures such as installing double-glazing,[38] solid wall insulation, boiler upgrades where boilers are F- or G-graded and renewable energy technologies. Replacing old domestic boilers with new efficient ones and upgrading communal boilers will also contribute to reducing emissions of air quality pollutants. And double-glazing will also reduce many problems with noise.

Our ambition is to retrofit over half of London's three million homes by 2025. By 2015 we hope to have annual CO_2 emission savings of over one million tonnes from this programme alone.

Driving up energy and supply efficiency in public sector and business buildings

Building Energy Efficiency Programme (BEEP)

Just as we can reduce CO_2 emissions in residential properties, so we can and must improve the energy efficiency of public sector and commercial buildings, which generate around 28 per cent of London's emissions[39].

The London Buildings Energy Efficiency Programme (BEEP) is a world-leading approach that is being eagerly watched by cities from around the UK and overseas. It uses

Installer fitting cavity wall insulation. Photo courtesy of Eaga Partnership.

an innovative commercial model to create a cost neutral means for upgrading buildings with energy efficient measures to reduce bills and their carbon footprint.

Our pilot of the approach on 42 GLA group buildings will reduce emissions by an average of about 25 per cent and has guaranteed energy savings worth over £1 million per annum. Amongst the pilot buildings were ten operational fire stations, six police stations and TfL's Windsor House and 55 Broadway head offices.

Following the successful pilot, we are developing the approach further to cover a further 58 GLA group buildings and are also putting in place a procurement framework of energy service companies to enable all public sector organisations across London to participate in the programme to reduce carbon emissions, save on their energy costs and create jobs. There has been significant interest across London's boroughs, universities and NHS Trusts. A major tendering programme was launched in May 2009 to help this important market grow rapidly and deliver cost-effectively millions of pounds of investment in London's buildings.

'These energy busting zones will create an armada of flagships across London, focussed on finding the most effective ways to rapidly cut carbon and slash energy bills.'

Mayor Boris Johnson, May 2009[43].

Better Buildings Partnership

The Better Buildings Partnership brings 11 of the largest commercial and public property owners in London together to deliver a building upgrade programme alongside the occupiers of their buildings, looking at energy, waste and water, for the private sector. The Partnership has CO_2 emissions reduction targets it must deliver in exchange for LDA funding[40]. The Partnership also produces guidance such as the recently published Green Lease toolkit.

Green 500 Scheme

The Green500 is a membership scheme for London's biggest organisations with the greatest carbon saving potential. One hundred and eighty five members have signed up so far including TfL, Marks & Spencer and Chelsea Football Club. Twenty-two member companies have signed off detailed carbon reduction action plans committing to making improvements and saving CO_2. For example, Addison Lee, one of London's leading minicab companies, is cutting pick-up distances by half, saving 16,000 miles per day[41]. Another member, Pret a

Manger are increasing the percentage of their packaging that can be recycled (already at 96 per cent; they are aiming for 100 per cent); saving over eight tonnes of packaging material a year; and swapping from plastic salad bowls to sustainable cardboard packaging, saving seven tonnes of plastic a year[42].

Green procurement

The GLA group is leading the way in green procurement. We are delivering pioneering approaches to ensure our procurement is low carbon, resource efficient and environmentally friendly. We are helping our suppliers to adopt best environmental practice and providing a free support service to London-based organisations wanting to make 'greener' purchases. Based on their reported purchases, the Green Procurement Code signatories have made the following environmental savings already: over 72,000 tonnes of material diverted from landfill; over 22,000 tonnes of CO_2 emissions avoided; over 65 billion litres of water saved.

Rolling out LEDs to traffic light junctions

The TfL Climate Change Fund has provided £2.4 million over the next three years to roll out light emitting diodes (LEDs) to 300 traffic light junctions in London. The diodes are about 40 per cent more energy efficient than traditional sodium lamps. This is expected to result in CO_2 savings of 500-600 tonnes per annum.The Mayor has stated his aim to make all of London's traffic lights LED as soon as possible.

Creating ten low carbon zones to test innovative measures of reducing emissions

The Mayor has pledged £3 million to support the development of up to ten Low Carbon Zones in London. A Low Carbon Zone (LCZ) is a local geographic area with concentrated activity to try out innovative ways of reducing CO_2 emissions. The LCZ programme will bring together local authorities, business and industry, public sector and community organisations to develop, demonstrate and measure the impact of initiatives that create a big reduction in CO_2 emissions. The initiatives will comprise technological innovations and programmes accelerating established measures and encouraging behavioural change, covering areas such as:

- Residential and commercial building retrofit solutions including 'easy measures' such as loft and cavity wall insulation as well as 'harder measures' such as solid wall insulation and double-glazing and measures that are still under development like smart meters

- Decentralised energy to produce heat and electricity locally for example using energy from waste
- Use of renewable energy and microgeneration
- Community engagement, events and marketing to drive behavioural change including transport mode shifts to cycling and walking.

LCZs will act as exemplars for London, showcasing technological solutions and catalysing long-term reductions in CO_2 more broadly across the capital. We plan to announce the ten Low Carbon Zones within London in September 2009. Each zone will involve a group of partners working in close collaboration. delivering projects towards a target of 20.12 per cent by 2012.

Deploying a decentralised energy programme

Tackling climate change will require a fundamental change in the way we use fuels to generate heat and power. The majority of London's electricity is 'imported' from remote, large-scale power plants. These typically operate at efficiencies of below 50 per cent, principally because they reject vast amounts of useful heat and also because they have to transmit power over long distances.

Our solution is to decentralise power, generating it locally so that the heat, otherwise wasted, can be used to warm (and cool) our buildings. London has over 200MW of existing combined heat and power CHP capacity, with the potential for many times that if the right delivery and investment framework was set in place[44]. This means we can have a huge impact on reducing emissions and saving money.

The Mayor supports a significant increase in investment in high efficiency decentralised energy schemes , providing electricity,, heating and cooling from a neighbourhood scale power plant (CCHP), and in areas of high density, piping this heat through district energy networks[45]. Using gas and, in the future, renewable fuels will help ensure London not only reduces CO_2 emissions but also enhances security of energy supply through generating more of its own energy needs.

Over two per cent of Britain's houses are already heated by district heating[46]. We have set a target to deliver 25 per cent of London's energy via decentralised plants by 2025, thereby improving London's energy security[47]. Decentralising a quarter of London's energy could save 3.5 million tonnes of CO_2 a year – the equivalent of the annual emissions from heating 1.1 million homes[48]. TfL has recently installed an innovative CCHP system

at its Palestra offices in Southwark utilising new fuel cell technology. The London Fire and Emergency Planning Authority (LFEPA) has installed over the past year 18 mini-CHP plants in its fire stations.

The LDA, with partners, is working on 12 strategic projects which will deliver local area district heating networks. These could deliver 68,000 tonnes of CO_2 savings per year. The largest project is the London Thames Gateway Heat Network (LTGHN) which has the potential to carry low carbon heat from Barking power station and other heat supply plant across East London. The LTGHN will require a £100 million investment to capture and channel this heat.

Capturing the benefits of a low-carbon economy

Developing a prospectus for London in the low-carbon economy

We have created a prospectus for investment in London's green economy. The report has analysed the opportunities for London in the green economy and where London's key business sectors are: financial and business services, our academic institutions and our ability to offer VC and clean technology funding. We estimate that London could gain up to £4 billion of investment growth and 10-15,000 green jobs (gross) through to 2025[49].

> 'Volatile oil prices and an economic downturn are coming together to make action on climate change a potential boom industry. I want to unleash the potential to create a thriving eco-economy in London providing new 'green collar' jobs, skills and businesses.'
>
> Mayor Boris Johnson, November 2008[50]

The Mayor recognises that more needs to be done to capture London's share of the green economy. To that end, he will set up a Low Carbon Taskforce to make sure London succeeds in attracting green investment and creating new jobs, set up a public/private 'London Green Fund' and pilot a new Green Enterprise District (including Olympic Legacy).

Establishing a green fund to capture savings from reducing emissions and reinvest them in new projects

We are investigating the opportunity of creating a 'revolving' green fund of £100-£200 million that will invest in environment programmes focused on CO_2 emission reductions. The programmes will repay this investment so that it can be reinvested in new projects. We are seeking funding and investment from the EU, European Investment Bank, national government, private sector and offsetting. The GLA group will

Combined Heating Plant. Photo courtesy of UTC, part of United Technology.

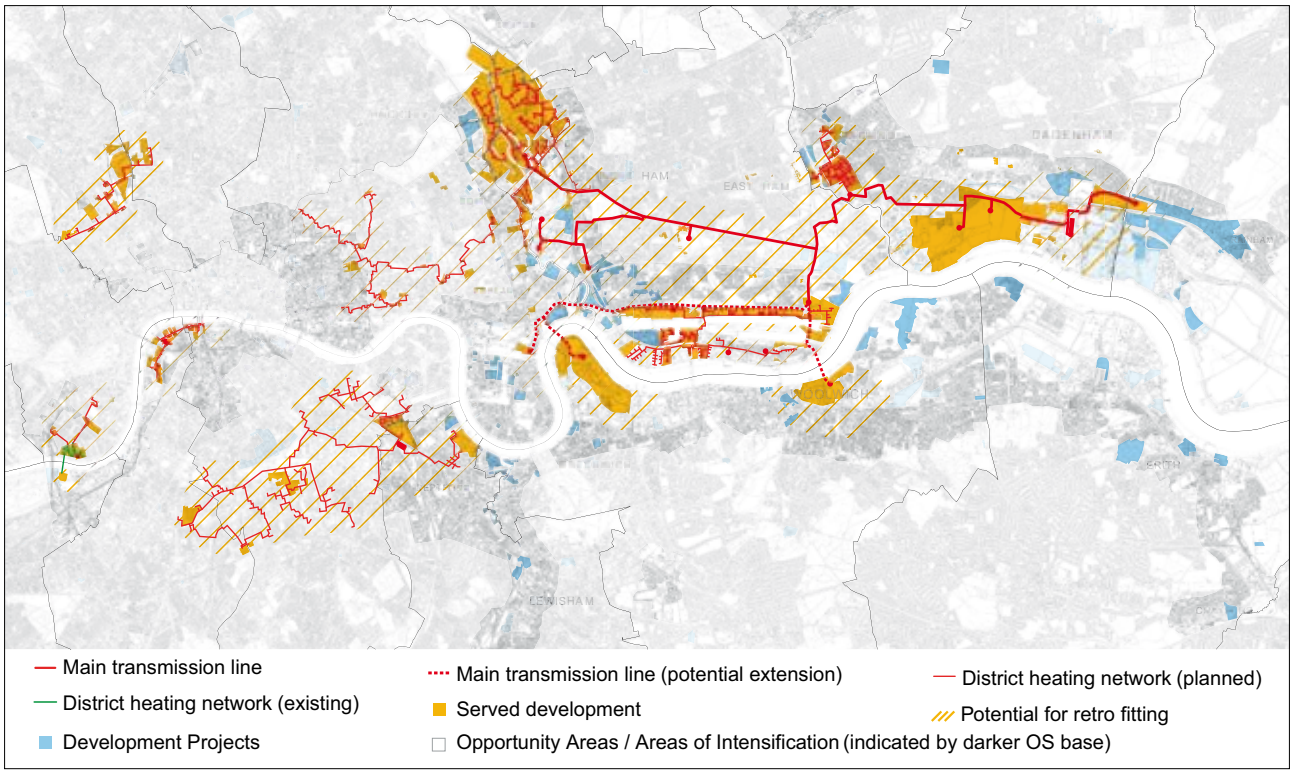
put forward £4 million in initial seed capital to start up this fund.

Regenerating the Thames Gateway with a Green Enterprise District

In London attempts have been made to promote the green economy, but these have largely been piecemeal and slow to get started. The LDA will use the long-lease on 24 hectares of government-owned sites in Thames Gateway to create a showcase Green Enterprise District, bringing forward investment in the green economy and creating a growth area in East London. We envisage a series of projects in close proximity to one another with good public and freight transport links, forming a working cluster of 'clean-tech' uses and a live demonstration of how green industry can be an integral part of the modern society. We are looking at various elements for the Green Enterprise District, for instance: a faculty from a major university or consortium of universities, specialising in teaching and research around clean technology and green industry; a clean technology cluster to allow spin-off research and development activities; a lower technology green industrial park like Barking Sustainable Industrial Park – already home to a Visi closed-loop recycling plant for plastic bottles; a sustainable skills academy; Green Grid green spaces; and a small number of exemplar sustainable housing developments showcasing London's new standards. That said, the Green Enterprise District cannot happen unless there is strong commitment across London Government and the boroughs. It will require central government buy-in, backing and financial support but will principally be delivered by private sector capital and entrepreneurial skills. Our role will be to create the conditions that allow it to happen: land provision, transport and other core infrastructure investment and de-risking the planning system.

Setting up a Retrofit Academy

We cannot put big residential and commercial retrofitting programmes in place without ensuring we have enough skilled assessors and installers to deliver the programmes. We will work with the LDA, boroughs, universities and companies to make sure the right numbers of assessors and installers are in place. This could involve measures as simple as giving suppliers confidence that there will



Thames Gateway Heat Network

be a steady stream of work for cavity wall and loft insulation installers through to creating or endorsing short training courses to increase the numbers of assessors and installers of easy through to specialised measures.

This is an opportunity to create new jobs at a time when the economic climate is extremely difficult.[51]

Mayor's Prize for the best new ideas for low carbon technology from London's students

We are working with the Carbon Trust and other organisations to determine the right vehicle for the Mayor's Prize. The prize will be open to all students at school and university within London.

If you are interested in reading more about mitigation, the Climate Change Mitigation and Energy Strategy, a statutory report by the Mayor's Office, will be published in Autumn 2009.

3.3 Turning London's waste into an opportunity

London produces about 22 million tonnes of waste each year. Municipal waste, which accounts for 19 per cent of this total, is collected by the boroughs from homes and small

Programmes and initiatives: progress and milestones		
Priority Programme	Progress since May 2008	Milestones through 2012
1 Improving the energy and water efficiency of residential properties		
Home Retrofit	• Designing pan-London programme to retrofit residential properties for energy and water efficiency in concert with boroughs	• Launch of programme in 2009-2010 • Small-scale trials launched in 2009, 2010 for rollout in 2010 and 2011 • 1.8M homes retrofitted with simple measures by 2015; harder measures by 2025
2 Driving up energy and supply efficiency in public sector and business infrastructure		
Building Energy Efficiency Programme (BEEP)	• Tranche 1: BEEP pilot to retrofit 42 Greater London Authority (GLA) has proved concept • Tranche 2: Plans progressing to retrofit a further 58 GLA group buildings • Tranche 3: Extension of BEEP to be available for all of London's public sector bodies currently being developed with 15 early adopter organisations	• Tranche 1 completion by 2010 and delivering £1 million of energy savings • Tranche 2 further retrofit of 58 GLA buildings to be completed by 2012 • Tranche 3 formally launched in late 2009 / early 2010
Better Buildings Partnership	• Published a suite of 'green' lease best practice guidance for occupiers and landlords to use in partnership • Developing building retrofit financial model options for commercial landlords through collaboration between commercial property owners and occupiers	• Develop building retrofit financial model options for commercial landlords in 2009 • Contribute significantly towards 500,000 tonnes of CO_2 emissions savings by 2011
Green 500 Scheme	• 22 members have signed up to detailed carbon reduction action plans and more than half the members have completed assessments to identify specific carbon savings	• Deliver 1.5 million tonnes of CO_2 savings (and save £2.5 million in energy bills) by March 2011 (end of initial contract period)
Green Procurement	• London's Green Procurement Code established with 126 signatories	
Rolling out LEDs to traffic light junctions	• Funding in place for next 3 years	• 300 traffic light junctions replaced with LEDs by 2012; further rollout commenced if technical and financial issues resolved
3 Creating ten low carbon zones to test innovative measures of reducing emissions		
	• Up to £3 million announced for ten low carbon zones	• 10 low carbon zones announced and zones to be designated by September 2009 • LCZs deliver 20.12 per cent CO_2 emission reductions by 2012 in the zone areas

Programmes and initiatives: progress and milestones		
Priority Programme	Progress since May 2008	Milestones through 2012
4 Deploying a centralised energy programme		
•	• Initial analysis for project to sell waste heat from Barking Power Station to companies/ public bodies • Identifying other CCHP opportunities • Kicked off process to restructure activities of decentralised energy team	• Barking CHP up and running by 2012 • 25 per cent London's energy provided within London by 2025
5 Capturing the benefits of a low carbon economy		
Developing a prospectus for London in the low-carbon economy	• Prospectus completed March 2009	• Establish taskforce in 2009 • Produce action plan in 2010
Establishing a green fund to capture savings from reducing emissions and reinvest them in new projects	• Conducting initial analysis to determine feasibility of Green Fund	
Regenerating the Thames Gateway with a Green Enterprise District	• Initial study for Thames Gateway Green Enterprise District being commissioned to test the economic viability of different scenarios • Assessment of the land take and potential sites underway • Discussions underway with the Homes and Communities Agency (HCA), the London Thames Gateway Development Corporation (LTGDC) and the boroughs of Newham, Barking & Dagenham and Havering	• Initial study to be completed by June 2009 • Larger study to define the strategy for the Green Enterprise District to be completed in 2009-2010
Setting up Retrofit Academy	• Drawing up plan • Speaking with possible stakeholders	• Academy launched in 2010/11 • 1,300 'Energy Experts' trained to deliver easy measures by 2013 • 650 new loft and cavity wall insulation installers trained by 2013
Mayor's Prize for the best new ideas for low carbon technology from London's students	• Initial discussions with The Carbon Trust about Mayoral sponsorship of a low carbon prize	• Develop proposal by end 2009 • Implement 2010/11

businesses. The remaining 80 per cent comes from offices and factories (34 per cent), and from construction, demolition and excavation activities (47 per cent). This waste is collected by waste management companies under contract with the businesses that generate the waste. Consumer attitudes towards waste have started to shift and new cleaner technologies for handling waste are emerging and improving with every year.

Today 57 per cent of total London waste gets recycled. This figure is skewed by the very large percentage of construction, demolition and excavation waste that is reused or recycled. Only 21 per cent of London's municipal waste is recycled, even though over 60 per cent of the rubbish we throw away could be[53]. Boosting the recycling rate for municipal waste is a big opportunity for us. That said, even though businesses already deliver higher recycling rates than we achieve with municipal waste, given the sheer amount of waste they generate, we need to improve the proportion they recycle too.

By increasing the proportion of waste that is reused, recycled or converted to energy/fuel, London stands to benefit in two ways. Firstly, we will save money. It generally costs more to landfill waste than it does to recycle or convert waste, and that differential (£40 per tonne per year) is increasing dramatically as the landfill tax rises Secondly, we reap environmental benefits in the form of reduced greenhouse gas emissions by diverting waste from landfill or incineration or by reducing the transport movements associated with waste.

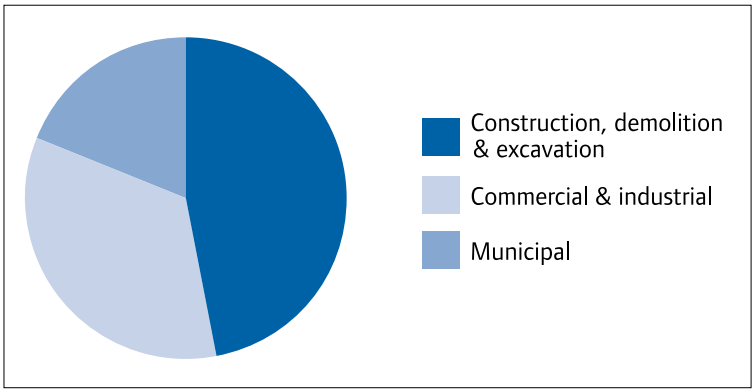
The Mayor will be publishing a revised London Waste Management Strategy, which will address all of London's waste not just our municipal waste. London is currently not on course to hit the 2010 recycling targets in the current London Plan, but the Mayor is keen to work with the boroughs and businesses to redouble our efforts to ensure the 2015 and 2020 targets are met. In doing so the Mayor intends to focus on the following approaches.

We need to promote a more business-like and entrepreneurial approach to recycling to boost recycling rates and capture the full environmental and economic benefits of recycling. London's recycling performance compares poorly to other international cities like San Francisco, Los Angeles, New York, Zurich, Berlin and Sydney. Some London boroughs lead the way, and are amongst the best in the country, but overall London's recycling performance can and must improve. While the performance of

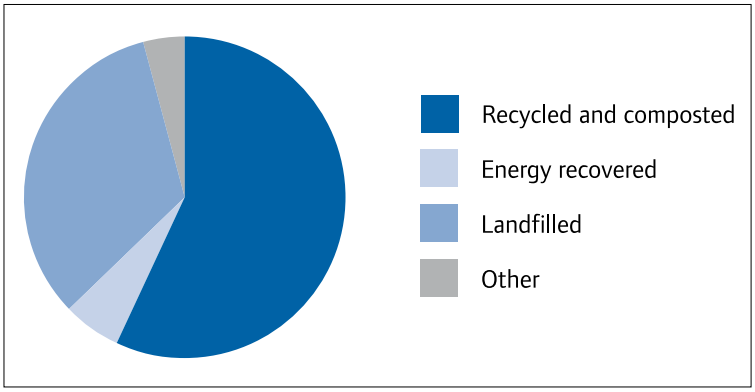
London's commercial and industrial companies appears better, more could still be done, particularly by smaller businesses. The Mayor will work together with businesses and London's boroughs to ensure that we recycle as much waste as possible and aim at the best levels of recycling achieved abroad. We believe that London's boroughs and therefore Londoners do not always share the economic benefits of recycling. We will work closely with boroughs and the waste industry to promote ways of working that might unlock some of these benefits. This may include promoting the use of profit-sharing agreements with the private sector; the direct delivery of recyclable rubbish to reprocessors; or that boroughs own their own Materials Reclamation Facilities (MRFs), where recyclable waste is sorted.

We must decide how to handle the proportion of waste that is not recycled or is not suitable for recycling based on the outcomes which offer the best environmental performance in London rather than by specifying technologies. The Mayor wishes to promote waste technologies that offer the best environmental performance in London, so the capital becomes a global beacon of best practice waste management. Rather than focusing exclusively on which technologies to invest in or use in London the Mayor will instead develop a lifecycle CO_2 performance requirement. All waste treatment technologies will need to meet this level, or demonstrate that they can practically meet it in the future in order to gain Mayoral support. This will incentivise moving towards whatever clean technologies are new and emerging, including anaerobic digestion, pyrolysis and gasification. The Mayor is currently reviewing the number and types

Breakdown of London's waste by source, 2008



Breakdown of London's waste disposal by destination, 2008



100 per cent = 22 million tonnes[54]

of facilities that may be needed to manage non-recyclable waste, to ensure that the most efficient use is made of London's land, that such facilities offer the best value for money, and that communities take responsibility for the waste that they produce.

We should manage as much of London's waste as practicable within London and aspire that zero waste goes to landfill outside London. It is especially important that we stop the practice of dumping unsorted rubbish in landfill sites outside the capital. The London landfill sites will be full by 2025. We realise that we cannot shift waste management practices overnight and need to plan for the transition especially with the boroughs and the regions surrounding London. Apart from the environmental case against shipping waste to landfill, the rise in landfill costs means this would lead to a rise in Londoners' council tax.

We aim to collaborate better with the boroughs. Through his Chairmanship of the London Waste and Recycling Board (LWaRB), the Mayor wants to unlock the value in waste. The Board has an £84 million fund which runs through to 2011-12 to turn waste from a cost into an opportunity. We hope this money will be supplemented by a further £18 million match funding from JESSICA[67] and leveraged by around five times by private investment. The Board has identified priority materials that will offer the maximum CO_2 benefits and will work towards these materials being recycled or converted to energy, and reduce London's reliance on expensive virgin materials. For example, currently 500,000 tonnes of wood and one million tonnes of food waste are being sent from London to landfill, where they cause further environmental damage, for example through the release of methane, a greenhouse gas that is over 20 times more harmful than CO_2. Instead, this waste could be used to create energy and reduce London's reliance on expensive virgin materials.

'Boosting London's recycling rate and sending less waste to landfill is a top priority for my administration.'

Mayor Boris Johnson, August 2008[55].

Priority programmes

We will be focusing on four waste priorities to shift our mindset on waste from inevitable cost to golden opportunity:

- Improving consumer and business awareness of the value of reduce/

reuse/recycle and how to implement it
- Facilitating reduction, reuse and higher recycling rates by putting the right incentives in place and improving services for waste producers
- Focusing on the opportunity that waste can bring, rather than the cost
- Catalysing waste infrastructure in London, particularly new technologies.

All of these programmes have an added benefit of reducing the carbon footprint of London's waste. By selecting the optimal means of dealing with waste materials, London could save approximately 12 million tonnes of CO_2 emissions per year and these programmes will be able to put us on track to achieve this.

Raising awareness: recycling/reuse/ minimisation campaigns

In order to manage our waste better a key factor is to improve the awareness of London's residents and business of the value in financial and carbon terms in reducing, re-using and recycling waste. However, we recognise that London is a complex city in terms of housing mix and cultural and social diversity, factors that make communicating with households and collecting waste difficult. We will be working with the boroughs to

Top: Daniel Moylan, Member of the London Waste and Recycling Board, with the Mayor launching Recycle for London 2009, photo courtesy of Rogan Macdonald. Bottom: the Mayor at the opening of Bywaters Recycling plant, photo courtesy of Bywaters.

understand what drives best practice and barriers to implementation.

We are also reviewing and revitalising the Recycle for London behavioural change campaign, which raises awareness of the importance of recycling and explains how Londoners can recycle.

Incentivising better waste management

RecycleBank

We are working actively with interested boroughs to develop a number of RecycleBank pilots in 2010, covering approximately 20,000 homes per borough. RecycleBank is a scheme that delivers a sustained increase in recycled municipal waste by giving households more incentive to recycle. Householders receive money-off vouchers for chains and local stores, cash, council tax rebates (council permitting) or can choose to donate the money to charity, according to how much additional waste they recycle each month.

The typical financial benefit to households in London could be about £14 a month, assuming they recycle an additional 100-200 kilograms a year. Householders will be able to track their recycling levels online and boroughs and the GLA will also be able to use the database to analyse the impact of the programme.

Visi closed-loop plastic bottle recycling plant in Dagenham. Photo courtesy of Closed Loop Recycling Ltd.

Other incentive programmes and sponsors

The Mayor is keen to work with major companies and the official sponsors of the 2012 Olympic and Paralympic Games, to improve recycling in London. We are already in discussions with Coca-Cola, which has direct links with Closed Loop Recycling's facility in Dagenham. This is the UK's first food grade, mixed plastic bottle recycling plant. Every year, 35,000 tonnes of plastic bottles are sorted, granulated, washed and super-cleaned back into food grade quality material. Coca-Cola is keen to collect more used plastic bottles to feed the closed-loop plant particularly through on-the-go collection systems. We are also looking at possible pan-London recycling incentives that could be put in place.

Supporting boroughs
Until recently local authority waste functions have been a relatively small percentage of total local authority expenditure. However, the opportunity (and the cost) has increased in recent years and we want London boroughs to benefit from this.

Best practice review of revenue-sharing opportunities in waste management
We will review revenue-sharing contracts and direct operation arrangements both in the UK and in Europe to identify best practice and the opportunity for boroughs to capture some of the value of recyclable and non-recyclable waste. We will also investigate the business models of existing energy recovery to determine the economic and social benefit of waste-derived heat used in local authority buildings. We will hold a cross-sector event to share best practice, showcase the best models and discuss our learnings with industry.

We will develop a series of revenue-sharing recycling contracts in partnership with London boroughs and industry that London boroughs can easily adapt to their specific situations.

Understanding the economics of recycling collections
We will further investigate the economics of co-mingled collection

Recycling collection. Photo courtesy of RecycleNow Partners

of recyclable waste versus sorting waste at the kerbside and a blend of the two. We will also investigate the opportunities for cross-boundary material collection contracts/service agreements for recyclable municipal waste. In addition to municipal waste, we will investigate the substantial opportunity in commercial and industrial recyclable waste. This will inform the Waste Strategy and the London Plan.

Catalysing waste infrastructure in London, particularly new technologies
An important role for the LWaRB is to facilitate the construction by the private sector of new waste infrastructure. We want the first plants to act as exemplars to encourage further investment in new waste technologies within London.

Many of London's existing waste facilities are old, high CO_2 producing waste disposal methods that ultimately need to be phased out. Instead, we need to be putting in place new, clean waste facilities that can handle London's waste with much lower environmental impact and lower cost, and create green jobs at the same time.[56]

We would like to get an exemplar anaerobic digestion facility set up to convert around 30,000 tonnes of London food waste into vehicle fuel (or energy) and compost as soon as possible. Anaerobic digestion plants exist in the UK but currently there are none in London; they are widely used to treat wastewater sludges and organic waste in Europe, particularly Germany. To this end, the GLA has established the Food Waste to Fuel Alliance to speed up the delivery of at least one anaerobic digestion facility in London, which will take a fraction of London's one million tonnes of organic waste[57] (at least half of which is food waste) and convert it into energy/transport fuel and compost material suitable for farms, parks and gardens. Sending this waste to landfill currently costs about £30 million a year, at an average cost of over £60 per tonne[58]. This is expected to increase to roughly £70 per tonne when landfill tax rises to £48 per tonne in 2010.

Twinwoods anaerobic digestion plant. Photo courtesy of Biogen-Greenfinch

If you are interested in reading more about waste and the environment, the Assembly Draft of the Mayor's Waste Strategy will be made available for the public for comments in autumn 2009.

3.4 Reducing the environmental impact of the way we travel

We need high quality public transport to support London's growth and ensure we maintain our position as a world-leading city. But London's transport can have a great impact on our environment.

Ground transport is a significant source of CO_2 in London at about one-fifth of overall emissions. It is also responsible for around two-thirds of emissions of particulate matter in London, which is one of the air quality pollutants most harmful to health.

Although the population and economy have grown historically, transport emissions have not increased in parallel due to a combination of traffic management policies, aggressive investment in the public transport network and technological advances. However, continued growth will put renewed pressure on the public transport network and could increase emissions substantially, both CO_2 and air pollutants.

Programmes and initiatives: progress and milestones		
Priority Programme	Progress since May 2008	Milestones through 2012
1 Improving consumer and business awareness of the value of reduce/reuse/recycle and how to implement it		
Recycling/reuse campaigns	• Recycle for London 2009 campaign underway, funded by LWaRB • Developing proposals for a three-year pan-London Recycle for London campaign from next year	• Review of recycling initiatives with London Councils to start autumn 2009 • Results of review shared with boroughs in 2009 • Funding for next year's Recycle for London campaign being sought from LWaRB • Other campaigns funded through LWARB
2 Incentivising better waste management		
RecycleBank	• Planning pilot of RecycleBank to provide positive incentives for Londoners to recycle	• Secure RecycleBank pilots in 2010/11
Other incentive programmes and sponsors	• 'On the Go' recycling initiative in development with Coca-Cola • Investigating recycling incentives that could apply pan-London	• Implement 'On the Go' recycling bins from 2010 • Launch local community-based recycling incentive programme in 2010
3 Supporting boroughs		
Best practice review of revenue-sharing opportunities in waste management	• Developing initial thoughts on revenue-sharing opportunities in waste management • Analysing existing contracts with boroughs to understand spectrum of different waste management contracts	• Best practice review completed by end 2009 • Cross-sector event to share findings and discuss implications in spring 2010 • Template contracts drafted summer 2010
Understanding the economics of recycling collection	• Analysing different waste collection schemes within London and the overall implications for making money from waste with London Councils	• Analysis completed by end 2009 • Findings shared with boroughs in early 2010
4 Catalysing waste infrastructure in London, particularly new technologies		
Waste infrastructure	• Working with LDA to catalyse development of waste infrastructure in East London as part of the London 2012 Olympic and Paralympic Games legacy • Working up plans to get exemplar plants (eg anaerobic digestion, autoclave, gasification) built in London through LWaRB	• Aim for 20-30 next-generation waste plants to be built in London by 2020 (equivalent to two million tonnes of waste being processed through new technology plants)

It is time we collectively recognised that we need to move beyond our dependence on the internal combustion engine. The greatest potential in terms of reducing the environmental impact of transport exists through influencing the road vehicles that are used in London. Road vehicles account for around 80 per cent of transport-related CO_2 emissions. An improvement of one third in efficiency, which is perfectly feasible given price-competitive vehicles on the market to purchase today, has the potential to achieve a 25 per cent reduction in London's transport CO_2 emissions. A key role of the GLA family is to support the shift to lower environmental impact road vehicles through providing support infrastructure, incentives and leading by example. We are promoting new, cleaner technologies, encouraging people to use cleaner modes of transport wherever possible and, when they do drive, to adopt 'eco-driving' measures.

Tackling air pollution is critical to improving Londoners quality of life – air quality in parts of London is poor, usually in areas where there is a lot of traffic. While great strides have been taken to reduce diesel fumes from London's buses and taxis, we need to do more and the Mayor is intent on putting in place measures to meet our air quality targets. But we cannot do this without significant UK-wide measures as well and we will be working with Government to develop a shared approach as the only way to deliver clean air for London.

In the 2009 Annual London Survey, 12 per cent of respondents said that transport noise was a problem or a major problem compared with eight per cent for neighbour noise. Over a quarter of Londoners are exposed to road traffic noise above World Health Organisation guidelines[60].

TfL can play a pioneering role in introducing new technologies that will help to produce a cleaner, greener, healthier and quieter city.

In summary, there are three arguments for improving transportation in London. Firstly, it will enhance quality of life: reducing congestion, improving air quality and noise levels, upgrading local environments and encouraging healthier and safer lifestyles. Secondly, transport can also offer opportunities for reducing CO_2 emissions. Thirdly, improvements can drive costs down. Times are tight: it is absolutely essential for TfL to bear down on costs and do whatever we can to alleviate the burden on the travelling public.

London is targeting a 60 per cent reduction in CO_2 emissions. With

ground transport accounting for more than one fifth of current emissions, swift and radical action is clearly required in this sector.

We also have to work towards strict European and UK legal targets for improving air quality. There are no sector-specific targets, but road transport is a major source of particulate matter and nitrogen dioxide, two of the pollutants for which there are EU and UK targets.

The Transport Strategy is currently being revised and will address the target for transport and the programme of measures to achieve the sector share.

Priority programmes

We have prioritised three transportation programmes to deliver CO_2 reductions and improvements in air quality and noise levels.

- Encouraging walking, cycling and public transport as active alternatives to motorised transport
- Accelerating the uptake of greener vehicles, starting with public sector fleets, and promoting smoother driving
- Making public transport more environmentally-friendly through large-scale adoption of low-carbon and low emission vehicles, employment of energy-efficient operating practices, and increasing use of renewable and low-carbon energy.

These programmes will be developed further in the Mayor's Transport Strategy.

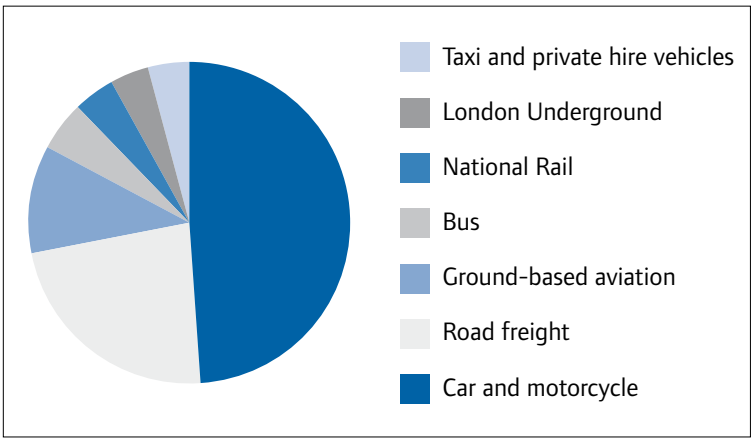
Encouraging walking, cycling and public transport as active alternatives to motorised transport

By 2025 up to 750,000 tonnes of CO_2 emissions could be saved each year as a result of shifts in modes of transport.

Creating a cycling revolution in London

Cycling should be the most efficient and exhilarating way of getting around town. Though cycling has

Sources of CO_2 emissions from London ground transport by mode, 2007-2008[59]



100 per cent = 9.7 million tonnes of CO_2 emissions

increased in popularity in London it still only represents two per cent of journeys – compared to 20 per cent for Copenhagen and 30 per cent for Amsterdam. To reach a level of even five per cent of journeys by bike, we will need a step change – and that can only be accomplished with a broad, coordinated series of improvements:

- The first is a cycle hire scheme. We are on a very tight timetable, aiming to introduce the new scheme in 2010, starting with about 6,000 bikes in central London. A similar scheme operating in Paris has met with great success and has therefore expanded rapidly
- We are also building 12 new Cycle Superhighways by the end of 2012 – dedicated routes that give cyclists the confidence they need and direct routes to central London
- We will deliver 66,000 more cycle parking spaces, within London to accommodate increasing numbers of cyclists
- To continue to grow recruits to the cycling revolution, we will work with the boroughs and other partners to offer more cycling training, particularly in schools, and local community based schemes designed to make cycling accessible to all. We will continue to support these with safe and convenient cycle routes and other facilities on roads and in parks and by canals. Mass participation cycling events, such as the annual Mayor of London's Skyride, when roads are closed to other traffic, will enable cyclists to enjoy fresh experiences among familiar landmarks like the Tower of London, the Houses of Parliament and Buckingham Palace.

Making walking count

London can become a more walkable city by enhancing the urban landscape and promoting effective initatives that encourage people to walk more often. With the nation engaged in a struggle against obesity, TfL is going to do everything in its power to make walking through this city as attractive, accessible and enjoyable as possible. Walking is, of course, a healthy and sustainable means of getting around but in much of London it also offers a quick, direct and convenient way of getting from A to B. Working with the Mayor's Design Panel and Outer London Commission, we will improve the public realm across London.

Good design means streets and places that not only look smart but are also easy to reach and navigate for people of all ages and abilities. That means removing obstacles such as guard

railings and posts that have sprouted in the pavements; shifting the utility boxes planted just where pedestrians want to go. The Key Walking Routes initiative will provide accessible, usable and attractive streets that people want to use.

And it means encouraging some of the wonderful urban realm projects that are now being pioneered in boroughs across London. Urban realm projects allow us to consider how space might be shared between motorists, cyclists and pedestrians and will add greatly to the whole sense of living in London.

We will also make walking quicker and easier through such programmes as the pilot Legible London way-finding scheme, local improvement schemes that focus on people and places and in schools and workplaces through TfL's Smarter Travel programmes. We will tackle severance caused by railways (whereby railways cut off communities on either side of the tracks) and improve river bridges and access to rail stations. We will also provide an exemplary and high quality walking experience through the completion of the seven Strategic Walk Network routes that offer unique walking opportunities to all Londoners, be it for commuting, trips to school or pleasure.

Top: London Freewheel 2008 mass participation cycling event.
Bottom: Legible London sign

Encouraging people to swap their cars for public transport, cycling or walking

The Smarter Travel Unit (STU) works across TfL and with external partners to encourage people to make smarter travel choices. The STU raises awareness and promotes behavioural change: reducing overall travel, for example by working from home, and increasing walking, cycling and public transport use. The programmes delivered by the STU focus on the people, organisations and trip types likely to have the greatest impact on travel behaviour across London, such as commuters, car clubs and school journey schemes. The School Travel Plan, for instance, produces on average a seven per cent cut in the number of car journeys to schools. As of December 2008, 29 per cent of residents live within five minutes walk of a car club vehicle. Each new car club vehicle avoids six privately-owned cars and leads to an average 36 per cent reduction in car mileage by members[62].

Accelerating the uptake of greener vehicles, starting with public sector fleets, and promoting smoother driving

Encouraging uptake of less polluting vehicles

Electric vehicles account for much less CO_2 and other pollutants such as PM_{10} overall than cars with internal combustion engines and have zero emissions at point of use. The Mayor has set up the London Electric Vehicle Partnership and has recently published his Electric Vehicle Delivery Plan to promote their uptake. In addition, we strongly support hybrid vehicles, a stepping-stone towards fully electric vehicles. Hybrid vehicles are already becoming widely available and offer CO_2 reductions of about 30 per cent. We are also trialling hydrogen fuel cell vehicles, which also have zero emissions at point of use and are likely to play a significant role over the longer term.

We have five important initiatives to encourage the public and private sector to catalyse the roll-out of low-carbon vehicles:

- Firstly, we will promote less polluting vehicles, in particular zero direct emission electric vehicles. We plan to convert 25 per cent of all non-emergency response vehicles in the GLA fleet – equivalent to 1000 cars and vans – to electric by 2015.
- Furthermore, we will aim to help London councils, car clubs, car pools and private company fleets to follow suit. TfL is working with the Government's low carbon vehicle promoters, Cenex, on a programme worth over £1 million to deliver reduced carbon emissions from

the London's taxi and private hire vehicle fleets. We have set up a partnership with commercial fleet operators to work together on electric vehicle uptake.

- Of course, electric vehicles only reach their full potential once the infrastructure is in place (and the energy to power them comes from renewable or lower carbon sources). We will work with boroughs and the private sector to deliver 25,000 recharging points for electric vehicles by 2015
- We will encourage cross-London policies that promote ownership of electric vehicles, such as free or discounted parking. Alternative fuel vehicles have been given a discount on the congestion charge from the scheme's inception, and the 100 per cent exemption for electric vehicles will continue.
- As well as encouraging people to take up new low-carbon vehicles, we are lobbying national government to offer incentives to people to remove old polluting vehicles from the roads and to ensure electric vehicles are the most attractive financial alternative for new buyers
- We need to educate consumers that electric vehicles are a valid alternative to their traditional internal combustion engine cars
- Forward-looking freight operators are already looking at using hybrid and electric vehicles for their London operations. CO_2 emissions from freight will be reduced by a range of initiatives such as driver behaviour profiling, driver training and efficiency advice as part of the new Freight Operator Recognition Scheme, consolidating delivery trips and promoting out-of-hours deliveries, and switching freight from road to rail where possible.

We estimate that these measures could deliver a reduction in CO_2 emissions of up to 2.4 million tonnes per annum in 2025[63] as well as associated noise benefits.

Smoothing traffic flow

Despite the introduction of congestion charging, congestion remains high in London, creating frustration and raising pollution levels. By making sure traffic flows more smoothly, we can reduce CO_2, air pollution and noise caused by 'stop-start' traffic conditions and improve the driving experience. We have four key initiatives to smooth traffic flows in London:

- Adjusting traffic lights. We are reviewing traffic light timings to improve efficiency: we will review 1,000 traffic lights a year (out of 6,000) to improve the efficiency of junctions, thus smoothing the flow of traffic. This will be achieved

without affecting pedestrian safety or prejudicing the needs of vulnerable road users.
- War on roadworks. The utility companies and others need to understand the true cost of the chaos they cause with their excavations. TfL and 18 boroughs are in the first wave of a permit scheme, to be rolled out across London, whereby utility companies will be required to seek approval before they start works, enabling the highway authorities to better plan impacts on the network. This will also help reduce local nuisance such as noise and air pollution from lengthy roadworks.
- More considered use of road space. We need to consider more carefully the traffic flow impacts implications of the work we undertake on the network.
- Prioritising maintenance where there is evidence that road surface conditions deter cycling, increase noise levels and add to rolling resistance, aggravating CO_2 emissions. We will review how best to achieve smoother, safer, quieter road surfaces as maintenance budgets come under pressure.

Based on existing evidence on the impact of driver training to promote smoother driving, we would expect the above initiatives to reduce CO_2 emissions by more than five per cent.

Making public transport more environmentally-friendly through large-scale adoption of low-carbon vehicles, employment of energy-efficient operating practices, and increasing use of renewable and low-carbon energy

The three public transport initiatives below could reduce CO_2 emissions by up to 550,000 tonnes per annum by 2025[64].

Public transport emits significantly less CO_2 than private cars – more can be done, however, to make public transport more environmentally-friendly and we will focus on the following four priorities:

Introducing low-emission buses

Key initiatives to boost the environmental-friendliness of our buses include:

1 We have commenced the large scale roll-out of hybrid buses, with 56 currently on the road and a further 300 by 2012. Hybrid buses are cleaner and greener than their diesel counterparts. Their combination of a conventional engine and electric motor uses less fuel and is better for air quality and noise levels. Hybrid buses reduce CO_2 emissions by up to 30 per cent. From 2012, all new buses introduced into the fleet will be hybrid[65]. This is expected to be

the largest roll-out of hybrid buses in Europe. The initial 56 buses are identified by a green leaf livery.

2 The New Bus for London will also feature hybrid technology and will start to be seen on our streets in 2011.

3 We will be training bus drivers in smoother, more fuel-efficient driving techniques, specifically smoother braking and acceleration

4 TfL will trial at least five hydrogen buses for a period of three years from 2010. This is part of ongoing efforts to help accelerate the commercialisation of hydrogen vehicles.

5 We are continually looking at how we can further improve the bus fleet's performance; further measures will be highlighted in the Mayor's Air Quality Strategy.

Increasing energy efficiency at London Underground, London Overground, DLR and London Rail

Five key initiatives will improve the efficiency with which these modes operate, to reduce CO_2 emissions:

- TfL will roll out regenerative braking across all London Underground and London Overground lines. When a train brakes regeneratively, its kinetic energy is converted to electricity that can be used by another train, rather than lost as heat and noise. Regenerative braking is already in use on the DLR, and delivers energy savings of at least ten per cent.
- The TfL Climate Change Fund has approved work to review London Underground's Bakerloo line upgrade of rolling stock, with a view to making significant carbon savings through upgrade and train design.
- By providing driver training and automatic train control, we will smooth train acceleration and braking, and make greater use of coasting, to reduce energy consumption on London Underground, London Overground

> 'A wonderful alliance of fuel efficiency and fume deficiency makes hybrid engines the way to go for buses in our city.'
>
> Mayor Boris Johnson, December 2008[66]

Hybrid bus with green leaf livery

and the National Rail network (Thameslink, Crossrail).

- We will upgrade track quality by replacing steel with low-loss conductor rails and improving the condition of the rail (through maintenance, use of long or continuous welded track, which will also reduce noise and vibration). Low-loss conductor rails are already in place on the Waterloo & City line, small sections of other underground lines and most of the DLR network. Low-loss rail will also be installed on sections of the Overground.
- Finally, we will upgrade the London Underground traction power supply so it can operate at higher voltages with reduced losses.

Catalysing renewable energy and energy from waste infrastructure through London Underground's purchasing power

TfL is keen to investigate and pursue opportunities that will boost London's and the UK's renewable energy and energy from waste infrastructure. Through their low carbon energy sourcing strategy, London Underground and TfL are already investigating wind and CHP opportunities in (and outside) London. By using the Underground's market power, we believe it will be possible to catalyse the building of infrastructure that would not otherwise exist.

Reducing noise and vibration

Noise pollution from transport can seriously affect the life of Londoners. Measures such as the introduction of hybrid buses and electric vehicles, construction management plans, low vibration track (as used on the East London Line extension), better management of public address systems at stations to minimise the number and noise level of announcements, and the use of quieter road surface material and noise barriers on the road network will help tackle noise pollution, as will all initiatives to promote smoother driving in London.

Programmes and initiatives: progress and milestones		
Priority Programme	Progress since May 2008	Milestones through 2012
1 Encouraging walking, cycling and public transport as alternatives to motorised transport		
Creating a cycling revolution in London	• Cycle hire feasibility study published in November 2008 • Invitation to Tender on cycle hire scheme published in March 2009 • Cycle Superhighways concept launched by the Mayor in April 2009 • London Freewheel event held in September 2008	• Introduce new cycle hire scheme in 2010 • Launch first two Cycle Superhighways to coincide with launch of cycle hire, with a total of 12 highways completed by end 2012 • TfL on track to provide 26,000 extra secure bike parking spaces by May 2012 • Hold annual Mayor of London's Skyride events
Making walking count	• Key walking routes being implemented • Legible London prototype scheme completed in central London • Funding for Exhibition Road and other shared space schemes confirmed • Changes made to borough transport funding process to enable a more holistic approach to improving urban streetscapes • Commitment to accelerate removal of unnecessary guardrails etc such as at Marble Arch	• Legible London scheme to be expanded to cover the West End, South Bank and Bankside, and Richmond and Twickenham in 2009 • 60km of guardrail removed by end July 2010 • Oxford Circus makeover completed • Exhibition Road projected completed by 2011 • Strategic Walk Network completed by 2012
Encouraging people to swap their cars for public transport, cycling or walking	• Additional 79,000 employees covered by TfL travel plans during 2008-2009 • School Travel Planning annual report published September 2008 • Richmond selected as second Smarter Travel Town	• London 2012 Smarter Travel Delivery Strategy complete and agreed by mid-2009 • 420 new car club bays across 19 boroughs by March 2010 • Approved travel plans in place for all schools in 2009; 800 schools with accredited TfL travel plans by March 2010

Programmes and initiatives: progress and milestones		
Priority Programme	Progress since May 2008	Milestones through 2012
2 Accelerating the uptake of greener vehicles, starting with public sector fleets, and promoting smoother driving		
Encouraging uptake of less polluting vehicles	• Mayoral commitment to make London the 'electric vehicle capital of Europe' • London Electric Vehicle Partnership set up in late 2008. Members from automotive manufacturers, utilities and boroughs • Electric Vehicles Delivery Plan published May 2009 • Mayor agreement to provide funding for 100 more charging points across the capital in July 2008 • Congestion charge exemption for electric vehicles confirmed • Lobbying national government to offer incentives to remove old polluting vehicles underway	• Electric vehicle roadmap published autumn 2009 • Convert 1,000 GLA fleet vehicles to electric by 2015 • Deliver 25,000 charging spaces in London's workplaces, retail outlets, streets, public car parks and station car parks by 2015 • Continuation of congestion charging discounts for electric vehicles • 100,000 electric vehicles on London's streets by 2020
Smoothing traffic flow	• Key stakeholders invited to assist with efforts to smooth traffic flow • 713 junctions with signals reviewed to identify opportunities to increase traffic flow by mid February 2009 • Trial of motorcycles in bus lanes launched January • Public consultation on road works permit scheme launched March 2009	• Review of next 1,000 traffic lights completed by end March 2010 • Road works permit scheme expected to be in place in the New Year 2010 • SCOOT (traffic light management system) installed at 200 sites on the Olympic Route Network by March 2010 – roll out to an additional 1,000 sites by 2015/16
3 Making public transport more environmentally-friendly through large-scale adoption of low-carbon vehicles, employment of energy-efficient operating practices, and increasing use of renewable and low-carbon energy		
Introducing low-emission buses	• Rollout of hybrid buses in process. 56 are already in service • Competition held to design a new bus for London, to be hybrid • Proposal to fit fuel consumption monitoring equipment to buses being considered	• Further 300 hybrid buses in operation by 2012; all new buses to be hybrid by 2012 • Large scale roll-out of hybrid buses from 2012 – all new buses to be hybrid from 2012 • Introduction of the New Bus for London from 2011 • Up to eight hydrogen buses to be trialled for three years from end 2010 • Further measures in Air Quality Strategy

Programmes and initiatives: progress and milestones		
Priority Programme	Progress since May 2008	Milestones through 2012
Increasing energy efficiency at London Underground, London Overground, DLR and London Rail	• Regenerative braking rolled out on Central, Northern and Jubilee lines and in use on DLR • Track upgrades underway • Low-loss conductor rail on Waterloo & City line, small sections of other underground lines and DLR across much of network • Upgrading power supply and transformers to operate at higher voltages to reduce loss through resistance underway • 24% of London Underground fleet on Automatic Train Operation (Central & Victoria) • Produced carbon footprint report on London Tramlink	• Regenerative braking across most of London Underground fleet by 2020 (50% by 2012) • Regenerative braking activated on new Overground trains when they start running over the course of next year, on East London Line and sections of Overground powered by overhead wires (55% of electric Overground network) • Low-loss conductor rail laid on core section of East London Line in 2010 • Underground power supply upgraded by 2020 (30% upgraded by 2012) • Launch of automatic train operation for Thameslink (late 2015) and Crossrail (2017) • 50% of London Underground fleet under Automatic train operation by end 2013, with vast majority of train running under ATO by 2020
	• Catalysing renewable energy and energy from waste infrastructure through London Underground's purchasing power	• Investigation of opportunities to boost renewable energy infrastructure underway in conjunction with Waste Team
Reducing noise and vibrations	• Investigation of noise-related complaints related to transport upgrades, maintenance and construction • Roll out of hybrid buses • Management of noise in maintenance contracts for red routes and construction programmes such as East London Line and Crossrail	• Improved public address systems as part of PPP station upgrade programme, with better ongoing management • Considering opportunities to minimise noise as part of sustainability appraisals of new projects and programmes

4 Conclusion and next steps

This programme sets out key elements of the Mayor's vision for improvements in London's environment. It is not fully comprehensive, and other programmes and policies will be reflected in the full, detailed range of Mayoral policies. We will be publishing a number of key environment strategies during the course of the year which will develop the ideas in more detail. We are also continuing to lobby for regulatory and fiscal changes to enable the programmes set out in this document and in other Mayoral strategies to be implemented.

If you have any comments please send your thoughts to **envdot@london.gov.uk**. These will be taken into account when the Environment Team prepares the strategies for the Mayor and you will have another chance to comment when the strategies are formally published for consultation.

Endnotes

1 Wandsworth Borough Council response to 'Adding Capacity at Heathrow' January 2008, para 22, see http://www.wandsworth.gov.uk/moderngov/Published/C00000297/M00002854/AI00008112/$PaperNo08118airportnoise.docA.ps.pdf

2 http://www.lga.gov.uk/lga/aio/1577798, p7.

3 Failing to reduce CO_2 emissions globally will lead to catastrophic climate change. As humans cause more greenhouse gases to be released into the atmosphere – for example, by burning fossil fuels – the greenhouse effect becomes stronger: more heat is trapped and the earth's climate begins to change more rapidly. Global rises in temperature bring with them extreme weather events like flooding and drought. If no action is taken to cut CO_2 emissions we face temperature rises of over five degrees towards the end of this century.

4 www.c40cities.org

5 Climate Change Action Plan, February 2007, p51. Excludes emissions from aviation.

6 Climate Change Action Plan, February 2007, p53.

7 Housing Strategy, November 2008, p61.

8 London Energy and CO_2 Emissions Inventory; DEFRA. Note 2006 figures are based on latest available LECI data (for 2003) projected to 2006 based on projections for each sector.

9 Climate Change Action Plan, February 2007, p53.

10 Statement from Mayor, January 2009.

11 In 2007 the London 2012 stakeholders produced 'Towards a One Planet 2012', the sustainability plan that sets out our shared vision for London's Games. The plan identifies five sustainability themes where London 2012 can have the most impact. Three of these themes relate specifically to the environment: climate change, waste and biodiversity. *Climate change* – we will minimise greenhouse gas emissions, from construction through to after the Games, and by ensuring that permanent facilities are able to cope with the impacts of climate change. *Waste* – London 2012 and its partners are committed to minimising construction waste. No waste produced during the Games will be sent to landfill. The Games will act as a catalyst for encouraging the development of new waste processing infrastructure in east London and promoting changes in public attitudes and behaviour. *Biodiversity* – London 2012 and its partners will minimise the impact of the Games on the ecology of the Lower Lea Valley and at other Games venues during the planning, construction and operational phases. They will leave a legacy of enhanced habitats within the Olympic Park. They will also foster an understanding of the importance of biodiversity in supporting healthy lifestyles. Work is already underway to ensure we deliver on these priorities.

12 The C40 has partnered with the Clinton Climate Initiative to develop and implement large-scale projects to improve energy efficiency and directly reduce greenhouse gas emissions in buildings, waste management, transportation, outdoor lighting, ports and other areas. That is why it is so important for cities to work together, set the agenda on this issue and show leadership. London is the honorary deputy chair of the C40 and is already trailblazing with its public sector retrofit programme (BEEP). See www.C40cities.org for more information.

13 Mayor Boris Johnson signed up to the Covenant of Mayors in February 2009.

14 Greater London Authority press release, 'London joins with European cities to cut CO_2 emissions', 10 February 2009.

15 National Land Use Database.

16 GLA Economics report on London's Environmental Effectiveness.

17 Aurora Market Research report, February, 2008.

18 Based on Office for National Statistics mid-2007 estimates for Lower Super Output Areas.

19 Environmental Noise Directive 2002/49/EC and Environmental Noise Regulations 2006, require protection of quiet areas; we will work with DEFRA on practical implementation.

20 Assumes the typical Capital Growth space is the same size as the average allotment – 125m2. However, there is a wide variation in the plot sizes of Capital Growth land.

21 http://www.atypon-link.com/ALEX/doi/abs/10.2148/benv.33.1.115

22 www.http://www.right-trees.org.uk/

23 Design for London.

24 Greater London Authority press release, 'Mayor announces £6 million to revitalise London's parks and green spaces', 26 June 2008.

25 Greater London Authority press release, 'Mayor launches 'Capital Growth' to boost locally grown food in London', 4 November 2008.

26 Greater London Authority press release, 'Mayor launches 'Capital Growth' to boost locally grown food in London', 4 November 2008.

27 GLA analysis based on work by Living Roofs.

28 'Holistic View of Green Roofs in London', presentation by Dusty Gedge, livingroofs.org, World Green Roof Congress, London, 2008.

29 The purpose of this initiative is threefold: to create a network of weather stations to provide more detailed data on how London's climate varies across the capital; to enable all London Schools to access local weather information to encourage understanding of climate and climate change issues; to use this information to plan, prioritise urban greening interventions and monitor their effectiveness in managing the urban heat island.

30 In a statement to two hundred business leaders in Rio de Janeiro in March 2009, the Prince of Wales warned that global warming has reached a defining moment, and that humanity has less than 100 months to save the planet. The Economic Times, March 2009.

31 London First 'Cutting the Capital's Carbon Footprint', 2008.

32 Climate Change Action Plan, February 2007, p20.

33 Greater London Authority press release, 'Mayor calls for more London businesses to 'go green' and save money in downturn', 7 January 2009.

34 Communities and Local Government, based on the Survey of English Housing, 2007.

35 Fifty-seven per cent of flats are solid-walled, which precludes the easy measure of cavity- wall insulation.

36 Greater London Authority press release, 'Mayor outlines massive opportunities to create 'green economy for London', 25 November 2008. Typical savings of £230 for 'easy' measures (including cavity wall and loft installation); £110 for solid wall insulation, boiler upgrades and double-glazing and £115 for micro-generation of energy.

37 These ten easy measures are low energy lightbulbs, block gaps, radiator panels, draft proofing, hot water tank insulation, stand by switches, real time display units, shower heads, aerator taps and advice.

38 Also gives noise benefits. Old London sash windows are so leaky that adding energy and noise benefits together gives us a good return on investment.

39 This figure excludes catering and other areas not included in the BEEP programme.

40 Greater London Authority press release, 'Mayor calls for more London businesses to 'go green' and save money in downturn', 7 January 2009.

41 Greater London Authority press release, 'Mayor calls for more London businesses to 'go green' and save money in downturn', 7 January 2009.

42 www.green500.org.uk case study.

43 Greater London Authority press release, 'Mayor announces ten flagship 'green' energy 'Low Carbon' zones for London', 3 July 2008.

44 Defra, 'Analysis of the UK Potential for Combined Heat and Power', 2007.

45 CCHP is the simultaneous production of mechanical power (often converted to electricity), heat and cooling from fossil or renewable fuel. The 'waste heat' by-product that results from power generation is harnessed, increasing the efficiency of the system to over 70 per cent, nearly double the efficiency of a conventional power station. The efficiency of conventional coal-fired and gas-fired power stations, which discard this heat, is typically around 38 per cent and 48 per cent respectively at the power station. Efficiency at the point of use is lower still because of the losses that occur during transmission and distribution. CCHP systems are suitable for decentralised, smaller-scale electricity generation at the point of use. The electricity can be used either wholly or partially on-site and the heat produced during power generation is recovered to provide hot water for heating.

Since the electricity is not transmitted and distributed over great distances, CCHP avoids efficiency losses through transmission and distribution.

46 Combined Heat & Power Association, UK. http://www.chpa.co.uk/

47 Greater London Authority press release, 'Mayor outlines massive opportunities to create 'green economy' for London', 25 November 2008.

48 London First 'Cutting the Capital's Carbon Footprint', 2008.

49 Prospectus for London, the Low Carbon Capital, March 2009.

50 Greater London Authority press release, 'Mayor outlines massive opportunities to create 'green economy for London', 25 November 2008.

51 'Boris Johnson suggests retraining unemployed as green energy experts', telegraph.co.uk, January 2009.

52 Defra, The Environment Agency, Capital Symonds; best estimates by Waste Team.

53 Greater London Authority press release, 'Cutting edge technology to boost recycling and change behaviour', 9 February 2009.

54 Defra, The Environment Agency, Capital Symonds; best estimates by Waste Team.

55 Greater London Authority press release, 'Mayor and London Councils announce members of Board set to boost recycling in the capital', 15 August 2008.

56 Specifically the types of plants we need to see are: mechanical biological treatment (MBT) plants (which separate recyclables and rejects out to leave an organic fraction suitable for anaerobic digestion); anaerobic digestion plants (provide biological degradation of organic materials in the absence of oxygen, producing biogas) and gasification plants (treat organic waste to produce a gaseous mixture containing carbon oxides, methane and/or hydrogen).

57 2009/10 Business Plan, a priorities plan for the London Waste and Recycling Board, February 2009.

58 Average landfill cost for London combining £20 per tonne gate fee and £40 per tonne landfill tax from April 2009.

59 Climate Change Action Plan, 2007.

60 DEFRA Noise Map, 2004, 55 dB LAeq is World Health Organisation Guideline for onset of 'serious community annoyance' outside homes, daytime.

62 TfL's Smarter Travel Unit.

63 Based on CO_2 modelling tool using 'business as usual' as base case – growth but no technological improvements.

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65 Greater London Authority press release, 'New hybrid buses unveiled for London fleet', 2 December 2008.

66 Greater London Authority press release, 'New hybrid buses unveiled for London fleet', 2 December 2008.

67 JESSICA stands for Joint European Support for Sustainable Investment in City Areas and is a joint initiative between the European Commission and the European Investment Bank (EIB), in collaboration with the Council of Europe Development Bank (CEB). It allows Member States to use some of their EU grant funding to make repayable investments in projects forming part of an integrated plan for sustainable urban development.

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Chinese
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Hindi
यदि आप इस दस्तावेज की प्रति अपनी भाषा में चाहते हैं, तो कृपया निम्नलिखित नंबर पर फोन करें अथवा नीचे दिये गये पते पर संपर्क करें

Vietnamese
Nếu bạn muốn có văn bản tài liệu này bằng ngôn ngữ của mình, hãy liên hệ theo số điện thoại hoặc địa chỉ dưới đây.

Bengali
আপনি যদি আপনার ভাষায় এই দলিলের প্রতিলিপি (কপি) চান, তা হলে নীচের ফোন্ নম্বরে বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Greek
Αν θέλετε να αποκτήσετε αντίγραφο του παρόντος εγγράφου στη δική σας γλώσσα, παρακαλείστε να επικοινωνήσετε τηλεφωνικά στον αριθμό αυτό ή ταχυδρομικά στην παρακάτω διεύθυνση.

Urdu
اگر آپ اِس دستاویز کی نقل اپنی زبان میں چاھتے ھیں، تو براہ کرم نیچے دئے گئے نمبر پر فون کریں یا دیئے گئے پتے پر رابطہ کریں

Turkish
Bu belgenin kendi dilinizde hazırlanmış bir nüshasını edinmek için, lütfen aşağıdaki telefon numarasını arayınız veya adrese başvurunuz.

Arabic
إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى الاتصال برقم الهاتف أو مراسلة العنوان أدناه

Punjabi
ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ ਲਿਖੇ ਪਤੇ 'ਤੇ ਰਾਬਤਾ ਕਰੋ:

Gujarati
જો તમને આ દસ્તાવેજની નકલ તમારી ભાષામાં જોઈતી હોય તો, કૃપા કરી આપેલ નંબર ઉપર ફોન કરો અથવા નીચેના સરનામે સંપર્ક સાધો.

MoL/Jun09/MR D&P/GLA1276