

TRANSPORT FOR LONDON

BOARD

SUBJECT: TfL ENVIRONMENT REPORT 2009

DATE: 10 DECEMBER 2009

1 PURPOSE AND DECISION REQUIRED

- 1.1 The purpose of this report is to update members on the environmental performance of the TfL Group during 2008/09 as reported in the TfL Environment Report 2009. The Board is asked to note the report.

2 BACKGROUND

- 2.1 The TfL Environment Report 2009 has been produced by Group HSE based on information provided by the Modes and is produced according to government guidelines on good practice of environmental management reporting for organisations. This is the sixth year that TfL has produced an annual report on environmental performance. It covers the financial year ending 31 March 2009 and where appropriate makes comparisons with previous years.
- 2.2 Performance is reviewed against a set of environmental objectives and key performance indicators that are agreed by TfL's Modes and regularly reviewed. The report also outlines the indirect environmental impacts of TfL's wider transport policies and Mayoral environmental priorities. The environmental performance of private transport is reported in the 'Travel in London' Report.

3 INFORMATION

- 3.1 The TfL Environment Report 2009 is attached as Appendix 1. A draft of the Report was reviewed by the Environment and Planning Panel on 21 October and by the Safety Health and Environment Assurance Committee (SHEAC) on 17 November. The comments made have been addressed in the final version of the Report. The SHEAC Advisors reviewed the Report prior to its submission to the Committee and concluded the report indicates substantial commitment to the environment throughout TfL and a generally good performance. They were particularly pleased with progress made to put climate change mitigation measures in place.
- 3.2 The report highlights TfL's performance in three key environmental areas: reducing carbon emissions and adapting to climate change, providing a better quality of life for all Londoners, and making better use of resources.
- 3.3 CO₂ emissions rose by two per cent compared with the previous year due to an increase in services. However, six per cent more passengers were carried across the network and this resulted in reductions in grams of CO₂ per passenger kilometre for most modes.

- 3.4 There were also reductions in emissions of nitrogen dioxides (NOx) and particulate matter (PM10) from TfL operations.
- 3.5 London Underground recycled 40 per cent of customer-waste, principally newspapers left of trains, and ran a trial of customer recycling bins. Construction and demolition (C&D) waste increased by 38 per cent due to an increase in works but the proportion of C&D waste being recycled remained high at 87 per cent.
- 3.6 Going forward, TfL's carbon reduction initiatives will include a London Underground Low Carbon Station programme funded by TfL's Climate Change Fund and progressing with the Buildings Energy Efficiency Programme. The London Cycle Hire Scheme will be launched in 2010 as well as developing Cycle Superhighways. Work will continue on initiatives to smooth traffic flow and LED traffic signals will be trialled. Next year will also see the continued implementation of the Mayor's Electric Vehicle Delivery programme and the addition of further new hybrid buses into the fleet.
- 3.7 In line with previous practice, it is planned to publish the Report on the TfL web site and not to produce hard copies.

4 RECOMMENDATION

- 4.1 The Board is asked to NOTE the report.

5 CONTACT

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Transport for London

Environment Report

2009



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> Commissioner's foreword

In a time of economic difficulty it would be wrong to put the environmental agenda on the back burner. Long-term sustainability, climate change and environmental issues are going to be here for decades to come. Now is the time to push even harder rather than ease off.

The Mayor wants London to be recognised as a world leader on improving the environment, locally and globally. In his environment programme for the Capital, he has set out to address three key challenges: improving quality of life for Londoners; mitigating climate change; and adapting the city to the impact of irreversible climate change.

These challenges are 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 all Londoners.

The draft Mayor's Transport Strategy (MTS) sets out his vision for transport in the Capital and describes how Transport for London (TfL) and its partners will implement it. The document expands upon his environment programme and sets out how the transport sector will contribute to achieving the Mayor's environmental targets of reducing London's carbon dioxide (CO₂) emissions

by 60 per cent from their 1990 levels by 2025, and putting in place measures to meet European and UK targets for improving air quality.

Road vehicles currently account for around three quarters of ground-based transport CO₂ emissions in London. The majority of CO₂ savings will have to come from private road vehicles, through a package of integrated incentives across national, regional and local government. But TfL continues to make its contribution.

The Capital's public transport capacity is set to increase in the coming years to meet a growing London population and transport demand. However, combined investment in public transport, walking, cycling and smarter travel will result in CO₂ reduction through modal shift, and improved efficiencies across the TfL fleet.

Investing for the long-term and delivering a better, cleaner, greener and safer transport system will help to drive down costs and increase our operational efficiency, while at the same time cutting CO₂ emissions. It will also mean that London has cleaner air and less congested and quieter streets, making it a more pleasant place to live, work and visit.

TfL is taking a pioneering role in successfully encouraging Londoners to travel in less polluting ways. The Mayor's pledge to deliver a cycling revolution has begun with more than half a million

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cycle journeys made daily in the Capital and the numbers are constantly growing.

The year saw TfL launch new pilot locations for Legible London, a pedestrian signage system designed to make it easier and quicker to walk around the city. TfL has built on the success of the Smarter Travel programme in the London Borough of Sutton which saw a 50 per cent increase in the number of cycle trips in the borough in its second year; and launched a similar scheme in Richmond upon Thames in March 2008. By encouraging people to travel by the most sustainable forms of transport, residents in these boroughs are not just choosing the greenest option – they're also choosing the quickest, cheapest and easiest option.

It is vital our buses are as clean and green as possible. That is why, from summer 2009, there were 56 hybrid buses serving London's streets, more than four times the number in service the year before. The buses emit around 30 per cent fewer CO₂ emissions than a regular bus and are better for air quality and noise levels. By 2012, all new buses entering the fleet will be hybrids and the Mayor has committed that his 21st century New Bus for London will be as environmentally friendly as possible.

The year has also seen further investment in new, innovative programmes to help achieve the Mayor's CO₂ target. Energy-busting LEDs are being installed at 300 traffic signal sites across the Capital and in Tube signals, and we have identified innovative ways to improve energy efficiency across the Underground network as well as continuing our two-year Smarter Driving campaign. This communicates clear, practical methods to improve fuel

efficiency, helping Londoners save up to £120 per year and reduce CO₂.

TfL has demonstrated its commitment to reducing its environmental impact through responsible purchasing by being awarded the 'gold award' status as part of the Mayor's Green Procurement Code. Gold is the highest level an organisation can achieve and recognises the outstanding achievements that TfL has made. Procuring resources sustainably and using them more effectively will help in the fight against climate change and drive down costs.

Looking ahead, TfL will further improve delivery of its core services, enabling London's future growth and prosperity. TfL will increase the overall capacity of London's transport system by upgrading the Tube, building Crossrail and opening the East London line. We will capture the legacy of the 2012 Games and help create thousands of jobs.

TfL will continue supporting the Mayor's programme to encourage electric vehicles. We will also dramatically improve the travelling experience across the network by smoothing traffic flow, and further revolutionising walking and cycling and introducing more low emission technology through the unveiling of the New Bus for London.

We will do all of this while delivering better value in a way that protects the environment and improves Londoners' quality of life.

Peter Hendy CBE
Commissioner
Transport for London



> About this report

This is the sixth year that TfL has published its annual Environment Report. It covers the financial year ending 31 March 2009, and provides an update on TfL's environmental activities and performance to help make London a more sustainable city.

This report is based around TfL's main environmental objectives of reducing carbon emissions, enhancing the quality of life for all Londoners and making better use of resources. It concentrates on the direct environmental impacts related to TfL's operations, and

describes how the organisation is performing against a number of key performance indicators (KPIs). Some of the metrics are TfL-wide, while others are specific to parts of the organisation.

The performance data contained in this report relates to public transport, including taxis and private hire vehicles, and the support services run by TfL and its main contractors. To allow for year-on-year comparison, all data have been updated to reflect new emissions factors and the latest data available¹. As such, they may differ from those reported in previous years. TfL continues to work towards improving

the scope and quality of environmental data reported. Although KPIs are used to monitor performance across the organisation, care should be taken when considering trends over time as some business units have reported new information for the first time, and some estimated data have been replaced by actual figures. Notes accompanying the data tables explain the scope for each parameter in more detail.

The report also describes how TfL is helping to reduce the environmental impact of privately-owned vehicle through its wider transport policies. Performance data on their impact falls

outside the scope of this report. TfL publishes this information and London-wide emissions in its Travel in London Report. Additional information on financial performance and corporate structure is available on the TfL website at tfl.gov.uk

> About TfL

TfL was created in 2000 as the body responsible for managing London's transport network.

As part of the Greater London Authority (GLA) Group, it is TfL's responsibility to deliver the Mayor of London's transport vision. Namely, one that excels among global cities, provides access to opportunities for all its people and enterprises, achieves the highest environmental standards and leads the world in its approach to tackling urban transport challenges.

The transport network is crucial to daily life in the Capital and every day TfL provides transport services for more than 10 million people. It is responsible for operating the London Underground (LU) which carries around 3.5 million passengers each weekday.

TfL manages London's fleet of more than 8,000 buses, which carry almost six million passengers daily.

TfL is responsible for the management of other public transport modes including London Overground, Docklands Light Railway (DLR) and London Tramlink. To ensure greater accessibility, TfL also runs Dial-a-Ride, a door-to-door assisted transport service for people with permanent or long-term disabilities, who find it difficult to use public transport.

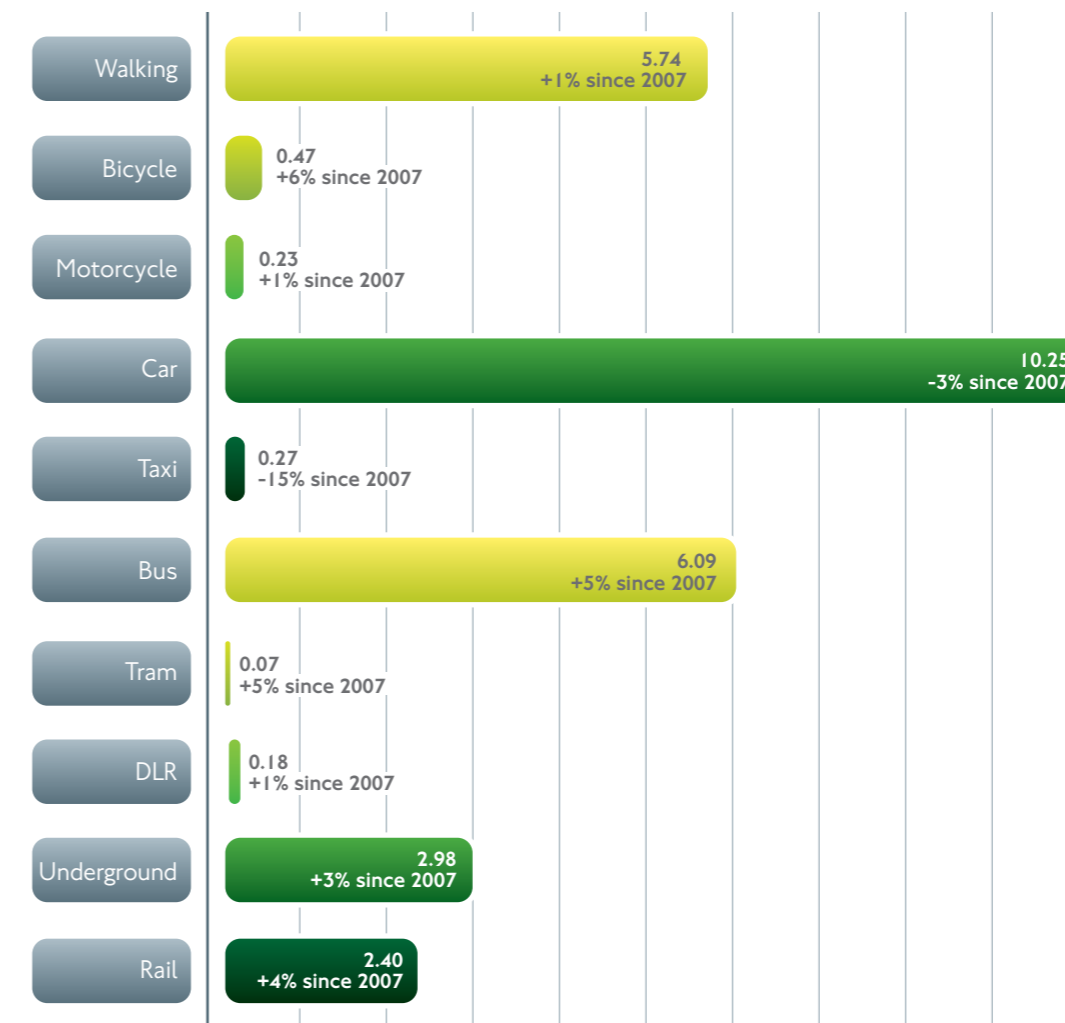
TfL licenses London's 22,000-strong black cab fleet and 46,000 private hire vehicles (PHVs), and also runs the London River Services (LRS), Victoria Coach Station (VCS) and London Transport Museum.

Crossrail is the largest civil engineering project in the UK and biggest single addition to the London transport network for more than 50 years. Crossrail preparatory works started in 2009 and major construction commences in 2010. The railway will take eight years to complete with passenger services programmed to begin in late 2017.

TfL is not just a public transport organisation. Its influence extends to private vehicles and the promotion of walking and cycling. TfL manages 580km of London's most important roads along with the Capital's 6,000 traffic signals. It also runs London's

Estimated daily average number of journey stages by mode 2008

Millions of journey stages² (Total: 38.94)



Congestion Charging scheme and Low Emission Zone (LEZ). With considerable investment to raise the profile of cycling and to provide crucial infrastructure, there has been a 91 per cent increase in the number of cyclists on London's major roads since TfL was created. Today more than half-a-million trips are made by bike each day in the city.



> Delivering the Mayor's environment agenda

In 2008/09, TfL launched a number of new initiatives targeted at delivering the Mayor's priority programmes to reduce the environmental impact of transport in London.

TfL also continued its work to improve the Capital's natural and built environment and quality of life for Londoners, and to ensure that the organisation makes better use of resources. Last year also saw

much activity aimed at reducing TfL's environmental impacts associated with its corporate activity. Examples of these achievements are given below.

A cycling revolution in London

Plans are underway to introduce a Cycle Hire Scheme to the Capital by summer 2010, starting with about 6,000 bikes for hire in the central London boroughs. It will work in a similar way to the Vélib scheme in Paris, allowing hire bikes to be picked up and returned to docking stations across the city. The scheme

will help alleviate congestion hot spots on public transport and is expected to generate an additional 40,000 cycle trips a day.

Work is also underway to develop Cycle Superhighways which will provide safe, fast, direct routes into the city from Outer London. The first two routes will open in summer 2010 with 10 more being introduced as part of a rolling programme.

A series of major cycling events were also launched throughout the year, building on the public's growing passion for pedal power. For example, London again welcomed the opening stage of the Tour of Britain, which formed part of the Mayor's Summer of Cycling campaign. TfL also launched the 2008 Workplace Cycle

Challenge designed to get more people thinking seriously about commuting by bicycle. A total of 283 teams participated from a range of organisations and around 426,000km were cycled.

Making walking count

Around half of the short journeys currently made by Tube would be quicker to walk. The problem is that the Capital can sometimes be challenging to navigate on foot. The Legible London programme has been designed to address this by creating a reliable 'wayfinding' system that makes it easier to walk in, and around, central London. The scheme has been helping to guide visitors around Bond Street for the past year and more signs have now been installed to support pedestrian journeys along Regent Street. Almost two-thirds

TfL, in partnership with others, is aiming to boost the number of electric vehicles in the Capital to 100,000 as soon as possible

of users surveyed said that the new system would encourage them to walk more; and more than 90 per cent said the system should be rolled out across the Capital. Following the success of the Bond Street prototype, TfL has begun work to extend the scheme to Covent Garden and Bloomsbury, the South Bank and Richmond.

Smarter travel

Following the success of the Smarter Travel Sutton programme (which, in its second year achieved a 50 per cent rise in cycling, a seven per cent increase in bus use and a 17 per cent decrease in reported cycle theft), TfL launched a three-year smarter travel scheme in Richmond upon Thames. It aims to cut the number of car trips to school, work or leisure. The scheme has already introduced 70 new car club bays and more than 200 new cycle parking stands. The programme aims to deliver a five per cent increase in the proportion of trips in the borough made on foot, by bike or public transport, saving the equivalent of 23 tonnes of CO₂ every day.

More children are now using public transport, cycling or walking to school than they did three years ago. London schools with a travel plan have reduced the number of car journeys by 6.4 per cent – equivalent to 3.3 million fewer car journeys every year. More than 40,000 children received cycle

training during 2008/09 and where TfL has provided schools with cycle parking, cycling to school has increased by an average of 38 per cent. TfL has continued to work with schools to develop travel plans so that they all have one in place by the end of 2009, a year ahead of the national target. It is expected that this will result in six million fewer car journeys made on London's roads, saving 3,800 tonnes of CO₂ every year.

Electric vehicles

These vehicles produce no direct emissions to air and between 30 to 40 per cent fewer carbon emissions compared to petrol or diesel cars in terms of the power generation required to charge them. TfL, in partnership with others, is aiming to boost the number of electric vehicles in the Capital to 100,000 as soon as possible. As a first step, the cars will have a 100 per cent discount from the Congestion Charge and TfL has provided funds for another 100 electric charging locations throughout the city to be in place by 2009/10³. The aim is to have 25,000 charging points across London in workplaces, retail outlets, on streets and in public and station car parks by 2015. TfL will also play its part in plans to incorporate at least 1,000 electric vehicles in the GLA support fleet by 2015, and encourage other operators to investigate electric options.



Smoothing traffic flow

TfL is working on a range of measures to smooth traffic flow. These include reviewing the timings of 1,000 sets of traffic signals, an 18-month trial allowing motorcycles to use the majority of TfL-controlled bus lanes, and working with utility companies to help reduce the impact of roadworks on traffic.

TfL also launched the Freight Operator Recognition Scheme (FORS) in April 2008. This encourages freight operators to focus on how they can adopt better working practices and make their businesses more efficient, while reducing their CO₂ emissions and improving sustainability. The GLA Group is taking the lead in requiring its own and contracted fleets to register with the scheme, as well as encouraging London's local authorities and public sector to do the same.

More carbon efficient programmes

Throughout 2008/09, TfL continued to invest in innovative, carbon efficient programmes through its three-year £25m Climate Change Fund. To date, £22m has been allocated to 12 programmes including researching new measures to improve energy efficiency across the Underground and supporting the installation of energy-busting light-emitting diodes (LEDs) at around 300 traffic signal sites in the city.

London also saw the start of a large scale roll-out of hybrid buses, with 56 in service from the summer of 2009. The buses – which have a distinctive green leaf motif – emit at least 30 per cent less CO₂ compared to conventional buses and are better for air quality and noise levels. A further 300 hybrid buses will

be in operation by 2011, and from 2012 all new buses entering the fleet will be hybrid. At a rate of 500 vehicles a year, it is expected to be the largest roll-out of hybrid buses in Europe, saving 5,000 tonnes of CO₂ by 2012. The New Bus for London project will also incorporate hybrid or other low carbon technology when on-street trials begin in 2011.

LU is researching new measures to improve energy efficiency across the network. Low carbon technologies are being investigated with a view to rolling out effective systems at stations and depots. A design study is also underway to demonstrate the feasibility of applying new rolling stock technologies to future fleet replacements. This will not only help reduce train and track maintenance costs, it will also lower CO₂ emissions compared to a conventional upgrade.

Enhancing the urban realm

TfL has set about improving London's streets through small scale local improvements, such as tree planting projects, along with wider programmes to remove unnecessary guard rails and street clutter. TfL has a target to remove more than 60km of redundant guard rail by the end of 2010. The underlying aim of these programmes is to achieve a better balance between the needs of vehicles and other road users and to improve the look, feel and quality of the urban environment.

In 2008/09, TfL provided financial support to London local authorities for a number of new urban realm improvement projects via the Local Implementation Plan funding process. The environmental improvement works

at Dagenham Heathway town centre and Tottenham town centre and the redesign of the Langdon Park DLR station area are just a few examples of how TfL is helping to improve the quality of life for all Londoners and make London's boroughs safer, greener and more accessible.

Improving air quality

In July 2008, TfL launched phase two of the LEZ. Covering most of Greater London, the LEZ aims to cut harmful emissions by deterring the most polluting vehicles from driving in the area. Initial findings show that London is already benefiting from reduced emissions as a result of the LEZ, bringing the Capital closer to achieving national and European air quality objectives. In addition to the LEZ, initiatives such as smoothing traffic flow, promoting electric vehicles and encouraging smarter travel, will help reduce emissions from private vehicles. TfL, with the

boroughs, is also implementing a package of measures to deal with remaining hot spots of air pollution.

Making better use of resources

In July 2008, TfL achieved 'gold award' status as part of the Mayor's Green Procurement Code for its responsible procurement activities. The code helps organisations reduce their environmental impact through responsible purchasing. The gold award is the highest level an organisation can achieve and demonstrates TfL's leadership in responsible procurement.

Millions of free newspapers are distributed in the Capital each week and many of these are left on Tube trains by passengers. LU (in partnership with its contractor) successfully stepped up efforts in 2008/09 and recycled 40 per cent of station and depot waste. TfL also launched a campaign in 2009, supported by a number of newspapers, to encourage London commuters to recycle their papers.



> TfL's approach to the environment

As a transport operator, TfL plays an important role in reducing the impact of its owned and directly-controlled operations on the environment, so that it can deliver a better, cleaner, greener public transport system.

Environmental management

Environmental management systems, based on the international standard of good practice, ISO 14001⁴, have been established in LU, London Streets, London Rail, Crossrail and TfL's Corporate directorates. Systems are currently being developed for the remainder of TfL.

Working with suppliers

A significant proportion of TfL's work is delivered through contracts

with suppliers or in partnership with other organisations. TfL is working cooperatively with its suppliers to reduce their environmental impact by requiring them to adhere to its principles of environmental management.

Engaging staff

TfL engages staff through regular environmental initiatives and award programmes. In 2008, TfL's first environmental awards honoured staff for their work to reduce the organisation's impact on the environment, by cutting waste through reducing, reusing and recycling. TfL ensures that employees understand that good environmental management is one of the underlying principles of its operation. Its network of 230 Head Office Environment Champions, and 200 Station Energy Champions has

continued to help colleagues to adopt more environmentally friendly behaviour. In February 2009, TfL received the Chartered Institution of Building Services Engineers' 'Champion of Low Carbon Champions' award for the work done to engage staff at its head offices.

Monitoring and reporting

TfL monitors the performance of its operations through KPIs based on its environmental objectives of reducing carbon emissions, enhancing the quality of life for all Londoners, and making better use of resources. A summary of TfL's KPIs and performance can be found on page 44. To help TfL keep on track and make the necessary progress the organisation will seek to set group-wide improvement targets for the most important environmental objectives.

TfL has reviewed its environmental objectives and KPIs over the course of the reporting year. It concluded that they remain the most appropriate and robust measures of TfL's environmental impacts, but that new KPIs should be set in some areas. These changes will

be introduced during 2009/10 so that they can be reported in next year's Environment Report.

The MTS is currently being revised and will provide a monitoring programme with strategic indicators covering a wide range of issues including the environment.

In 2008/09 environmental performance was reviewed internally through the TfL Board's Safety, Health and Environment Committee, and TfL reports its performance annually through this Environment Report. From 2009/10, environment policy and performance will be reviewed through the Board's Safety, Health and Environment Assurance Committee and Environment and Planning Panel.

The TfL Business Plan includes emissions forecast figures up until 2017/18, enabling TfL to assess the impact of projects and actions on environmental objectives. Key aspects of environmental performance are also addressed in TfL's Travel in London Report and Annual Report.



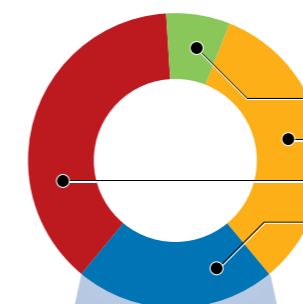


> Reducing carbon emissions and adapting to climate change

The Mayor is committed to cutting London's CO₂ emissions by 60 per cent (from 1990 levels) by 2025. Of the 44 million tonnes of CO₂ emitted in London each year (excluding emissions from aviation), the public and private transport sector contributes around 22 per cent – or 10 million tonnes. Private cars and road freight transport are the biggest source of emissions from the sector, accounting for about three quarters of the total.

For the transport sector to contribute proportionately to the Mayor's target, emissions would need to fall to around 4.5 million tonnes by 2025. This is extremely challenging, not least because of the expected increase in travel demand as a result of London's growing population. It is clear that if the Capital is to hit the target, it will require fundamental changes to the way Londoners live and travel. If this is to be achieved, it will require initiatives not just from the Mayor, TfL and the boroughs, but also from industry, Government, the EU and wider international community.

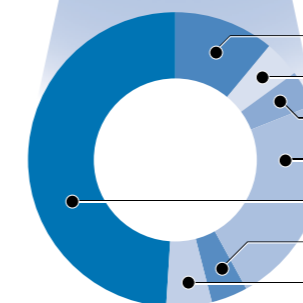
2006 London CO₂ emissions



Total 2006 London CO₂ emissions estimated at 44m tonnes

Industrial	7%
Commercial and public sector	33%
Domestic	38%
Ground-based transport	22%

2006 London ground-based transport CO₂ emissions



Ground-based aviation	11%
National Rail	4%
Underground	4%
Road freight	23%
Car and motorcycle	49%
Taxi and PHVs	4%
Bus	5%

TfL's climate change mitigation plan supports the delivery of the Mayor's 60 per cent CO₂ reduction target

London also needs to prepare for how the climate is expected to change in the future. The threats that climate change poses to transportation systems include the risk of flooding and increased frequency of extreme weather events, such as heat waves. To deliver an effective and reliable public transport service in the future, TfL needs to design and adapt the network to make it more resilient to the impacts of climate change.

TfL's approach

TfL's climate change mitigation plan supports the delivery of the Mayor's 60 per cent CO₂ reduction target through the following core themes:

- > Improved operational efficiency to minimise unnecessary CO₂ emissions
- > Development and use of low carbon vehicles, energy and design principles; all have the potential to deliver significant CO₂ reductions through working with third parties including the private sector
- > Carbon efficient travel behaviour; massive investment is underway to improve the attractiveness of low carbon modes such as walking, cycling and public transport. However, financial incentivisation to switch to low carbon modes and vehicles will be required to meet the Mayoral CO₂ target

TfL also has an important role in running its head offices, stations and depots as efficiently as possible, showing what can be achieved through low carbon technologies and energy sources.

Climate Change Fund

TfL's Climate Change Fund was set up in 2007 providing £25m over three years to help deliver its approach to climate change mitigation by supporting projects that showcase low carbon initiatives. By March 2009, £22m of TfL's Climate Change Fund was allocated to 12 initiatives highlighting ways that the impact of transport-related emissions might be mitigated. The assessment and approval for projects is undertaken by a Climate Change Fund Approval Group, comprising directors from all TfL modes. Assessment is based on a

business case and takes into account the value of carbon savings. The projects demonstrate the principles and practicalities of low carbon technologies and fuel to wider roll-out where possible.

Adapting to climate change

TfL is taking measures to ensure that its assets and operations are protected. The approach taken is to understand and prioritise the risks and put plans in place to prevent impacts of climate change, where feasible, and respond and recover as quickly as possible. An important element of this approach is partnerships with key stakeholders such as the London boroughs, London Resilience, the London Climate Change Partnership, the Environment Agency and emergency services. TfL is actively participating in the review of

> Climate Change Fund update

In 2007/08, the fund allocated £13.7m to six projects and good progress has been made throughout 2008/09:



- > **Hybrid buses**
With support from the Climate Change Fund, the number of hybrid buses in the Capital has more than quadrupled, confirming London's position as the home of the largest fleet of hybrid buses in the UK
- > **Smarter Driving campaign**
TfL continued to promote driver efficiency tips, such as keeping tyres to the right pressure and changing gears at low revs, which could help save London drivers up to £120 in fuel costs per year and cut CO₂

- > **Fuel cell combined heat and power plant at Palestra**
TfL installed the innovative fuel cell combined heat and power (CHP) system as part of a sustainable retrofit of the Palestra office building in Southwark. The CHP system includes a hydrogen fuel cell, which will reduce the building's carbon emissions by more than 30 per cent and reduce annual running costs by almost £250,000 per year
- > **LU low carbon station specification**
A feasibility study has assessed a number of potential energy and cost savings initiatives. These range from energy efficient lighting to renewable energy technologies that can be used to improve energy efficiency at Underground stations

- > **DLR regenerative braking trial**
In order to make regenerative braking more efficient and effective, an outline design of the project has been undertaken to determine how capacitors will be able to store energy recovered by decelerating trains. Storing regenerative braking energy in the capacitors can produce a 10 per cent saving of traction electricity use on top of conventional regenerative braking
- > **LDA green homes and organisations**
To encourage householders and employees to choose healthier and more environmentally friendly ways to travel, funding was given to the London Development Agency's (LDA's) Green 500 programme – the pilot project is now complete >

specifications relevant to its operations and infrastructure to ensure that they are adapted to a changing climate.

> **TfL's performance**

TfL uses the following KPIs to monitor progress in reducing its contribution to climate change:

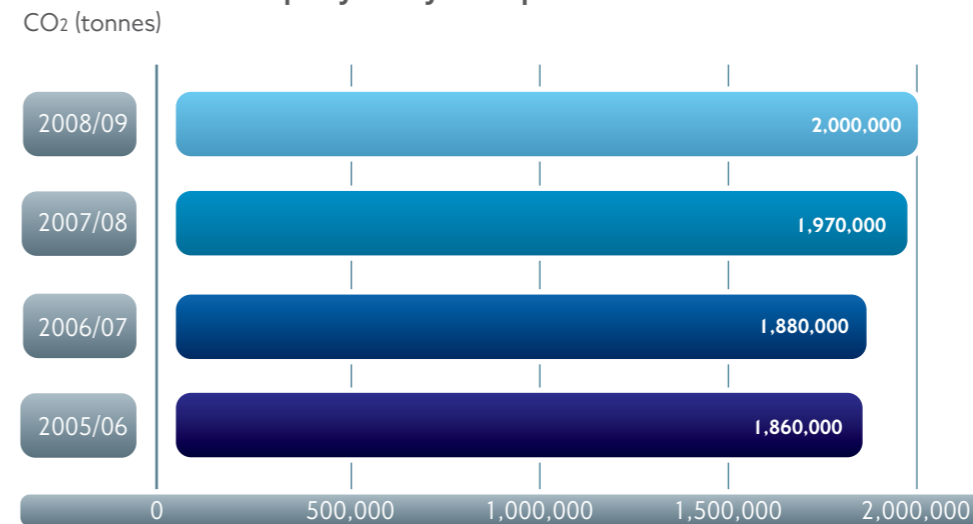
- > Absolute CO₂ emissions and CO₂ emissions per passenger kilometre
- > Energy consumption of head office buildings

CO₂ emissions

CO₂ is London's dominant greenhouse gas emission from transport. London already has one of the lowest transport carbon footprints in the UK. In part, this is because London has a world-class, well-used public transport system which produces less CO₂ for each kilometre travelled per person than comparable travel in private vehicles.

In 2008/09 public transport in London produced two million tonnes of CO₂. Total emissions have risen by two per cent on the previous year as more >

Carbon emissions per year by TfL operations



> **Climate Change Fund update (continued)**

In 2008/09, six additional projects were allocated £8.3m worth of funding:

> **LU low carbon depot**

Neasden depot, the largest on the Underground network, is due to undergo a major redevelopment within the next year. The fund has sponsored a project to assess the feasibility of a number of low carbon measures, such as on-site renewable and low carbon energy generation. A scoping study has identified a list of low carbon technologies that could be applied to the depot and work is under way to understand the potential costs and benefits of the identified options. Once completed, the project will help LU identify technologies and

measures that can be used at other depot redevelopments, leading to significant carbon and cost savings across the network

> **LU line upgrades energy efficiency**

The programme to expand transport capacity on the Tube will result in 30 per cent more energy demand as a result of line upgrades and service enhancements. Studies have been undertaken to identify energy efficiency initiatives with a good business case, capable of reducing the predicted energy increase to between 10 and 20 per cent

> **West Ham bus garage wind turbine**

This bus garage is being constructed as a replacement for two garages in Hackney. The garage has been designed

to exemplify a good approach to sustainable design and thanks to the TfL fund, a 100kW wind turbine will be installed on the site, saving 41 tonnes of CO₂ each year. The wind turbine will give a clear indication of TfL's commitment to on-site renewable energy at the high-visibility bus garage on the route into the Olympic Park

> **Traffic signal LED lamps**

The Climate Change Fund is supporting a project to procure and prove LED lamps. After proving, the intention is to install these traffic signal heads at about 300 sites between spring 2010 and early 2012. The electricity consumption of these traffic signal lamps is 60 per cent less than the existing lamps. The 300 LED-fitted sites will save about 600 tonnes of CO₂ emissions and more than £100,000 in energy costs per year. The Mayor has stated his aim to make all London's traffic signals LED as soon as possible, and the ramifications of this will be looked into as part of next year's business planning process

> **Energy and Water Revolving Fund**

TfL has set up an Energy and Water Revolving Fund through the Climate Change Fund. An initial injection of £1.2m was used to ensure a number of energy and water efficiency projects could be implemented. Savings generated by the projects will be put back into the fund to finance additional efficiency initiatives. It is anticipated that the project will help deliver more than 9,000 tonnes of CO₂ savings, and almost £2m in cost savings

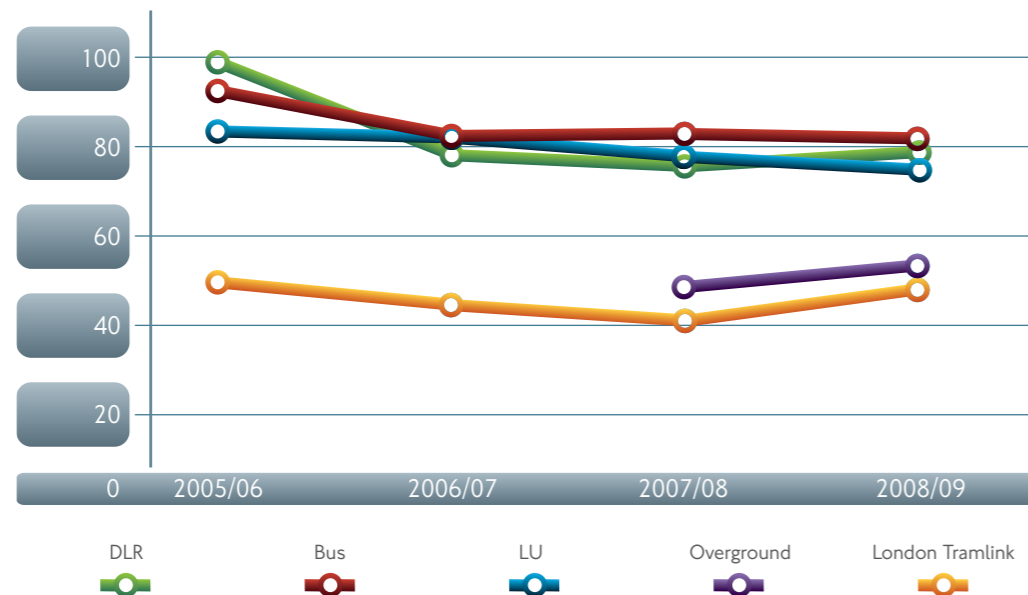
> **LU train systems development**

The fund supported a design study which is being used by industry to demonstrate the feasibility of applying new rolling stock technologies to future fleet replacements. Implementing the new technologies will help reduce train and track maintenance costs and lower energy use by some 30 per cent compared to a conventional upgrade. The first opportunity to apply the proven technologies will be on the Bakerloo line and this will inform all future upgrades



Comparative emissions of CO₂ by mode of public transport

CO₂ per passenger km (grams)



energy was required to carry a six per cent rise in passengers⁵.

LU, London Buses and taxi services account for more than 90 per cent of TfL's total CO₂ emissions. The remainder is spread evenly across other public transport modes and construction of the East London line (ELL).

CO₂ emissions from electricity use were calculated using latest Government guidance. Government policy on carbon accounting means that purchased renewable energy is not classed as carbon-free.

Normalising emissions data provides a measure of the CO₂ impact per unit of activity (passenger kilometres travelled) and reflects the overall efficiency of the transport mode enabling like-for-like comparison.

Rail-based modes, such as the Overground and London Tramlink, have the lowest normalised emissions and,

on average, buses continue to emit around 25 per cent lower emissions per passenger kilometre than cars⁶. Compared with last year, the Overground and London Tramlink saw a nine and 18 per cent rise in emissions per passenger kilometre respectively, as estimated or partial data has been replaced with more accurate figures which now better reflect the actual scale of emissions. Normalised emissions have also increased by four per cent on the DLR. This is due to weekend station closures for service enhancements and job losses in the city, resulting in fewer passenger journeys on the network. Furthermore, additional energy was required to serve the extended network to Woolwich Arsenal.

Importantly, LU – which accounts for 32 per cent of TfL's total CO₂ emissions – saw a five per cent decrease in emissions per passenger kilometre. This was achieved despite carrying almost 1.1 billion passengers, the highest in its 146-year history, while only using one per

Once the fuel cell CHP system is operational at Palestra, the building will generate a quarter of its own power at peak times, and most of its heating and hot water

cent more traction energy. Tube trains use energy efficient 'regenerative braking' which recovers electric power during braking to feed back into the system as energy to power the next train. This type of braking provides between 20 and 25 per cent saving in electricity, and is currently used on 15 per cent of the network. This will rise to 50 per cent by 2012 with the entire network covered by 2020 which will help to reduce the expected rise in emissions as a result of the service and capacity improvements delivered by the upgrades.

As well as regenerative braking, the upgrades also include other technologies to reduce energy consumption and carbon emissions, these include more efficient motors, higher voltage traction supplies, and special low resistance conductor rails on the track. Regenerative braking is also in use on the DLR, and

Overground trains will also be equipped with the technology.

Energy consumption of head office buildings

By addressing energy consumption, TfL can mitigate the financial impacts of rising energy costs as well as reducing emissions. Energy efficiency is measured in TfL's head offices, and during 2008/09, efficiency improved by three per cent. This was achieved by implementing a range of energy efficiency measures over the year, for example, installing sensors which automatically turn lights on and off and by getting staff to play their part. More energy efficiency improvements are underway. For instance, once the fuel cell CHP system is operational at Palestra, the building will generate a quarter of its own power at peak times, and most of its heating and hot water, saving hundreds of tonnes of CO₂ each year.

> The Building Energy Efficiency Programme

In March 2008, London became the first city in the world to sign up to an energy efficiency retrofit programme for public sector buildings with the Clinton Climate Initiative and the C40 group of world cities⁷. The Building Energy Efficiency Programme (BEEP) is the London-based part of this global programme, and is a joint GLA-wide retrofit programme involving 42 GLA buildings.

Twenty-two TfL office buildings with the highest energy consumption and running costs have been included in the programme. TfL expects to deliver 24 per cent energy savings, leading to annual utility savings of more than £700,000 and annual reductions in CO₂ in excess of 3,500 tonnes from this programme. It will also reduce maintenance costs, extend the life of building assets and improve comfort for staff.

> Next steps

Plans to further improve TfL's operational performance on CO₂ emissions, include:

- > Introducing a small fleet of hydrogen buses. This is part of ongoing efforts to help accelerate the commercialisation of hydrogen vehicles
- > Providing driver training and automatic train control, to help smooth train acceleration, braking and make greater use of coasting to reduce energy consumption on the London Overground and Underground respectively
- > Upgrading the Tube traction power supply so it can operate at higher voltages with reduced losses, where technically and financially feasible
- > Incorporating at least 1,000 electric vehicles in the GLA support fleet by 2015, and encouraging other operators to investigate electric options
- > Using the UK climate projections published in 2009 to inform its risk assessments and asset studies going forward. TfL will work towards publishing its plans and progress on assessing and addressing risks from the changing climate on its services and infrastructure



> Enhancing the quality of life for all Londoners

The local environment has a strong bearing on the health and wellbeing of people. Minimising the adverse impacts of transport can enhance the quality of people's lives and improve the environment locally and globally.

TfL's approach

TfL encourages Londoners to make smarter travel choices – more walking, cycling and greater use of public

transport where possible – as these are the easiest and quickest solutions to bring about environmental benefits. As a transport network provider with operations and services spanning the Capital, TfL recognises that it must ensure its activities enhance the quality of London's environment as much as possible. TfL does this through:

- > Using new technologies that improve air quality and reduce noise impacts, such as hybrid and electric vehicles,

- using lower noise road surface materials, quieter engines and exhaust treatment technology

- > Identifying and assessing the local environmental impacts of projects and operations using techniques such as traffic modelling, emissions modelling, noise measurement and biodiversity surveys, and developing targeted plans to mitigate these impacts

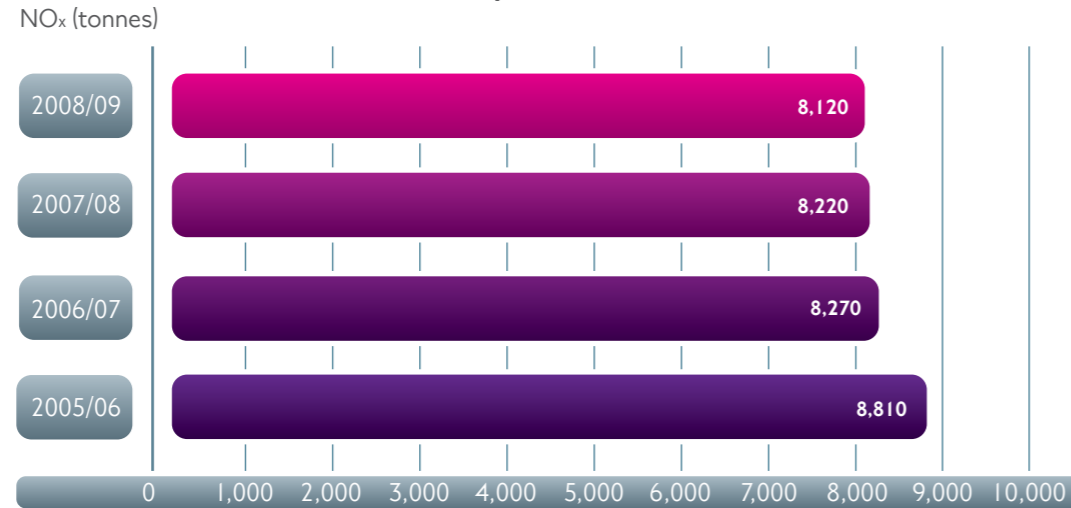
- > Managing existing assets, for example, by improving maintenance of rail tracks, road surfaces and engines; preserving historic buildings and infrastructure; cleaning up litter and graffiti at stations; and repairing vandalised infrastructure

- > Improving the built and natural environment that TfL manages by implementing design quality standards for buildings and other assets, and where possible, improving the landscape to protect and enhance areas rich in biodiversity

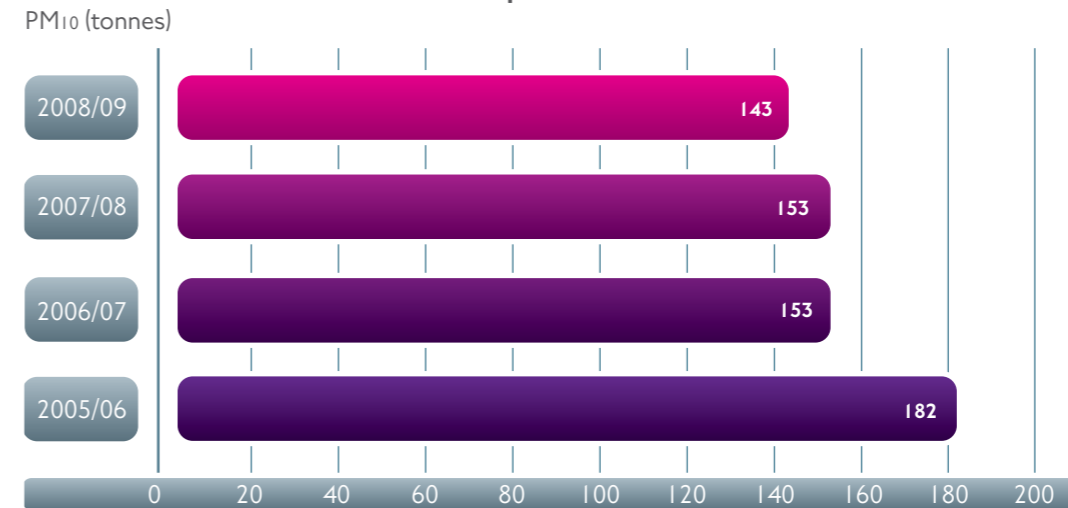
Where possible, opportunities are sought to achieve wider air quality and noise benefits through climate change initiatives. For example, hybrid buses emit at least 30 per cent less CO₂ compared to conventional buses and are better for air quality and noise levels.



Annual NO_x emissions from TfL operations



Annual PM₁₀ emissions from TfL operations



TfL's performance

TfL monitors the impact of public transport modes on the local environment through the following KPIs:

- > Total nitrogen oxides (NO_x) from TfL operations, emissions per bus passenger kilometre and total fine particle (PM₁₀) emissions from TfL operations, as measures of air pollution
- > For noise, the number of noise complaints related to TfL's operations

received, the proportion of the Transport for London Road Network (TLRN) which is covered with quieter surface materials, and the proportion of the bus fleet which is at least two decibels quieter than the legal noise test limit⁸

- > Mystery shopper surveys, customer satisfaction surveys and the Local Environmental Quality Survey (LEQS) of England, as measures of monitoring the quality of the built environment and operational ambience

> Low Emission Zone

In July 2008, the second phase of the LEZ came into force. The LEZ requires lorries weighing more than 3.5 tonnes, plus buses and coaches weighing in excess of five tonnes with more than nine seats, to meet an emissions standard of Euro III for particulate matter, or pay a £200 daily charge to drive within the zone. At the time of

publication, the compliance rate for vehicles affected by phase two of the scheme was 96 per cent against a target of 90 per cent.

The key benefit arising from the scheme will be better outdoor air quality and associated health benefits, with improvements brought forward three to four years from when they would otherwise occur.

Air pollution

Despite improvements, in some locations air quality in London continues to breach the EU objectives which are designed to protect human health. Private transport is a major source of London's NO_x and PM₁₀ emissions, but increasing use of public transport can offer significant opportunities to reduce these. Its emissions per passenger journey are far lower than from typical private cars due to the number of passengers carried and number of car journeys replaced.

In 2008/09, public transport was responsible for 8,120 tonnes of

NO_x emissions, with the bus fleet accounting for 78 per cent of TfL's reported emissions. Normalised NO_x emissions on buses fell by two per cent as older vehicles are being replaced with modern, low emission buses – such as hybrid vehicles.

PM₁₀ emissions from TfL operations fell by seven per cent on the previous year. Taxis account for around 44 per cent of all reported particulates emissions, and since 30 June 2008, licences have only been issued to taxis that meet Euro III standards (for PM and NO_x), resulting in a 14 per cent fall in PM₁₀ and 19 per cent fall in NO_x emissions.

Private transport is a major source of London's NO_x and PM₁₀ emissions, but increasing use of public transport can offer significant opportunities to reduce these

Noise

Noise is a serious quality of life issue for Londoners, with at least 27 per cent exposed to road traffic noise above the current World Health Organisation guidelines. TfL is reducing traffic noise from the road network. Around 70 per cent of the TLRN is covered by textured surface material, which has noise reducing properties. TfL is also reducing the noise from its buses. The proportion that is at least two decibels quieter than the legal limit has risen to 14 per cent.

The number of noise-related complaints received by TfL fell last year by 22 per cent to 411. Construction and public address system noise continues to be the most significant source of complaint. TfL aims to ensure that effective noise measures are in place and that all complaints are addressed in an effective and timely manner.

Quality of the built environment

A high-quality built environment is key to making sustainable transport modes more attractive and encouraging modal

shift. Investment in a modernised, well maintained and efficient public transport system, together with the provision of accessible areas where people can walk and cycle without risk of conflict with other road users, is helping to encourage this shift. Through the planning process TfL is also able to advise boroughs and developers on measures to improve the design of roads and pavements to achieve a better balance between the needs of service vehicles and other users.

Customer satisfaction with the quality of the built environment managed by TfL, for example trains and station cleanliness, shows a general year-on-year improvement across all modes and remains consistently positive. In August 2008, TfL completed the first major step in improving the recently acquired London Overground. All 34 London Overground-managed stations have been refurbished and cleaned, and customer satisfaction figures show that passengers have recognised

> Biodiversity – East London line

To ensure impacts on existing biodiversity were limited and opportunities for enhancement were embedded within the design, construction and operation of the ELL, the project developed both an ecology and a landscape strategy in consultation with stakeholders.

These strategies have ensured that landscaping designs have been developed to diversify and enhance the species composition of existing habitats. This has

included bird-nesting boxes for species such as black redstarts and kestrels in addition to bat boxes and improving habitats suitable for a variety of reptiles and small mammals.



the improvements on the network and its services.

Natural environment

TfL is a significant land owner and is working hard to ensure that it maintains and, where possible, enhances the quality of London's natural environment. For instance, LU owns and is responsible for managing 4,000 hectares of land where more than 1,100 different species of flora and fauna have been recorded and 200 locations identified as Sites of Importance for Nature Conservation.

TfL looks to identify any areas where the potential exists for increasing biodiversity and has a number of

initiatives to achieve this. Examples include tree-planting projects on the TLRN; building habitats for wildlife, including working with contractors to install bee boxes on the Jubilee line between Wembley Park and Kingsbury; and creating two small living roof areas at TfL's Palestra head office building. Living roofs are cultivated with vegetation so they can support biodiversity. They can also help keep buildings cooler in the summer and warmer in winter, and can absorb rain to help reduce flooding and keep the city cool.

Land surrounding the TLRN represents a significant ecological resource for



The Oystercatcher Bird Race competition in May 2008 aimed to show how easy it is for Londoners to have access to wildlife and natural open spaces

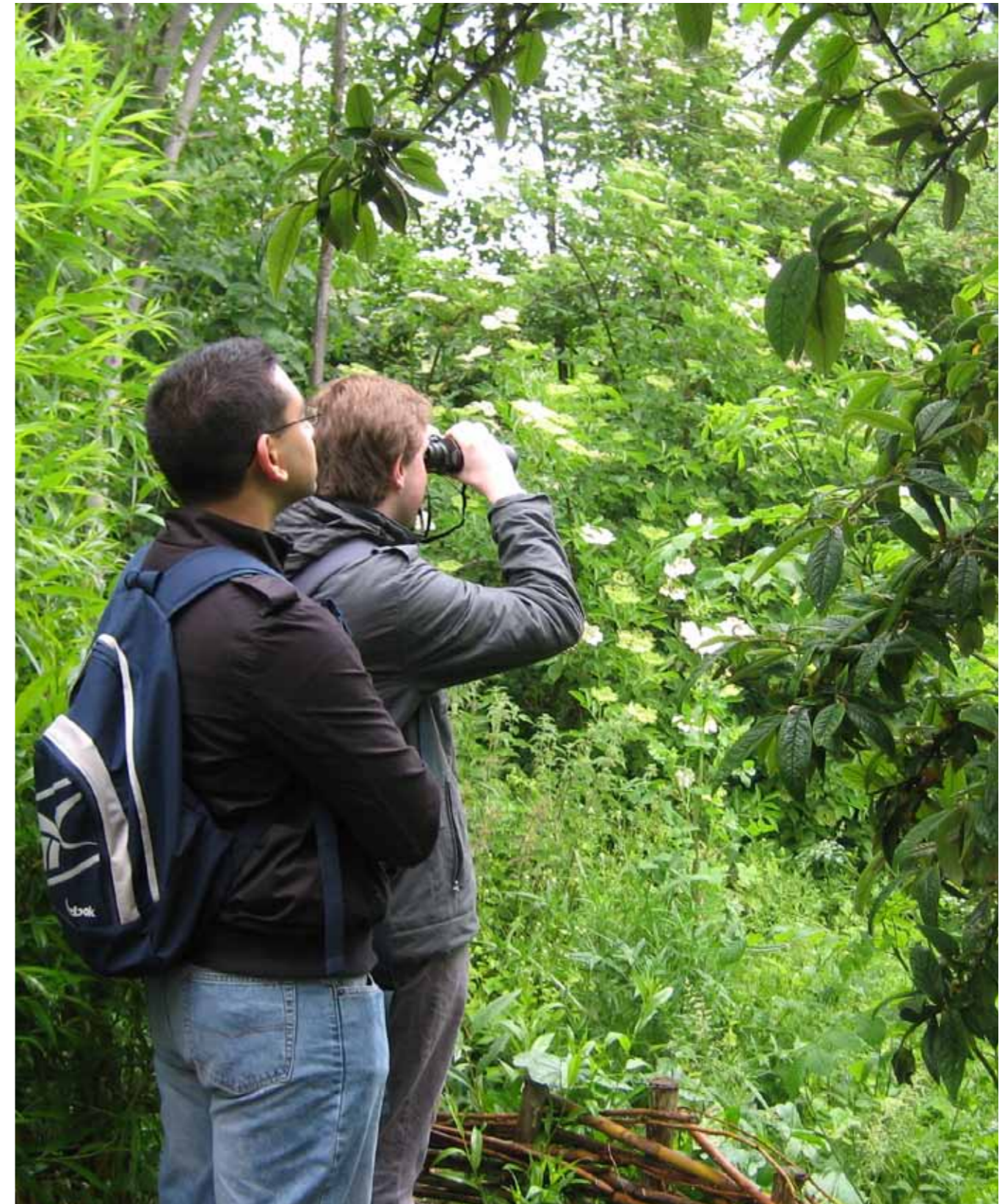
London. In August, TfL completed the Green Estate Management Plan for the TLRN. The plan encompasses a tree strategy, a landscape management plan and a biodiversity action plan.

TfL and Natural England ran the Oystercatcher Bird Race competition in May 2008. Teams from various organisations visited different wildlife sites and green spaces within London, using only public transport, to spot as many bird species as possible. The event aimed to show how easy it is for Londoners to have access to wildlife and natural open spaces.

> Next steps

Plans to continually improve TfL's operational performance, include:

- > Identifying how to further reduce air pollutants across the bus fleet, for instance, from 2012 all new buses entering the fleet will be hybrid
- > Installing large living roof areas at TfL's 55 Broadway head office building in St James's Park and at 14 Pier Walk in North Greenwich



> Making better use of resources

Reducing fossil fuel use, improving water efficiency, reducing waste and increasing reuse and recycling can all help to save money, preserve natural resources, manage waste sustainably and tackle climate change. The challenge is to find better ways of doing more with less.

TfL's approach

Through its adoption of the GLA's Responsible Procurement Policy

and implementation of the Mayor of London's Green Procurement Code, TfL is committed to buying goods and services in a way that delivers value for money and offers environmental and social benefits. TfL ensures that environmental sustainability is addressed in all aspects of the procurement process by seeking to minimise CO₂ emissions, source green energy, reduce waste and review the environmental management practices of its suppliers.

Waste is produced as a consequence of operating, maintaining and investing in TfL's network and business operations. Primary sources include rubbish left by passengers on TfL services, waste water from vehicle cleaning operations, station and depot waste, plus that associated with station, track, road and infrastructure projects. TfL aims to minimise negative impacts on the environment by reducing, reusing or recycling waste from its operations and construction activities, along with increasing the proportion of purchased recycled products.

TfL will continue to work with its suppliers to embed waste management requirements into contracts so that building materials and resulting waste is effectively managed during

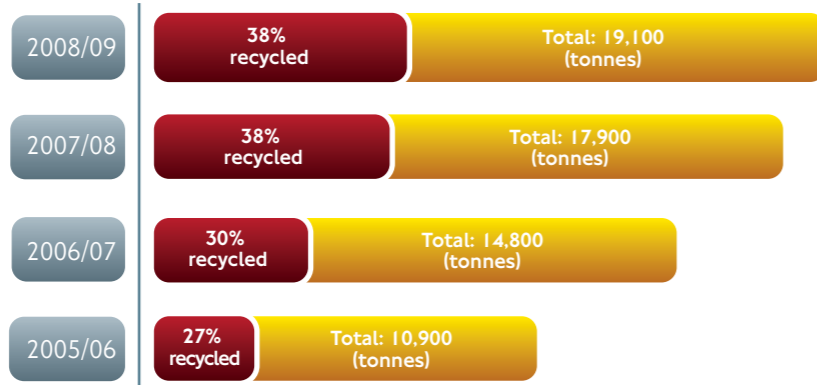
construction projects. TfL also requires its construction projects to have a Construction Logistics Plan, which provides a framework to better manage all types of freight vehicle movement to, and from, construction sites. The plan allows for construction materials to be sourced, planned and delivered, and waste recycled or removed in a safe, efficient and more sustainable way.

TfL's performance

Fuel and electricity are the main resources used by TfL and the organisation's performance on energy consumption is detailed earlier in this report. In terms of other resource use, TfL monitors the impact of its operations and support services through the following KPIs:



Annual total C&I waste from TfL operations



- > Amount of office paper consumed across TfL and the proportion supplied from recycled sources
- > Total amount of waste produced by TfL activities and the proportion of waste recycled
- > Amount of water consumed and water consumed per occupant, in head office buildings

Head office paper consumption

Through awareness campaigns among staff and combining its waste and recycling contracts, TfL has reduced paper use in head office buildings by 22 per cent. In addition, all office paper now comes from recycled material.

Waste generation and waste management

Commercial and industrial (C&I) waste, primarily passenger waste, rose by seven per cent in 2008/09 compared with the previous year, however this was due to more extensive data being collected, and the total volume of

waste that was recycled also rose by seven per cent.

The rise since 2005/06 in waste is due to more waste being collected across the business. TfL will continue to work with its customers to minimise waste and increase recycling.

Construction and demolition (C&D) waste accounts for much of the waste generated across the TfL Group. Reported waste increased by 38 per cent due to more work being done to expand and improve the transport network. Waste associated with delivering projects and maintaining the TLRN, upgrading the Tube and the major infrastructure project on the ELL accounted for 99.8 per cent of TfL's reported C&D waste.

The proportion of total C&D waste being recycled remained high as 87 per cent of the waste generated was either recycled or reused on-site by LU, London Streets and the ELL. >

> Mayor of London's Green Procurement Code

In July 2008, TfL achieved 'gold award' status in the Mayor of London's Green Procurement Code for its responsible procurement activities. The code helps organisations reduce their environmental impact through responsible purchasing. Organisations that sign up to it commit to achieving progressive targets and are awarded bronze, silver or gold status as a mark of their success.

The gold award is the highest level an organisation can achieve and supports TfL's ambition to be a leader in responsible procurement. The successes of TfL's responsible procurement programme include:

- > Increasing the variety and quantity of recycled materials used in construction, highway works and maintenance contracts. For example, during the 2007/08 financial year 29 per cent of materials procured by TfL's highway

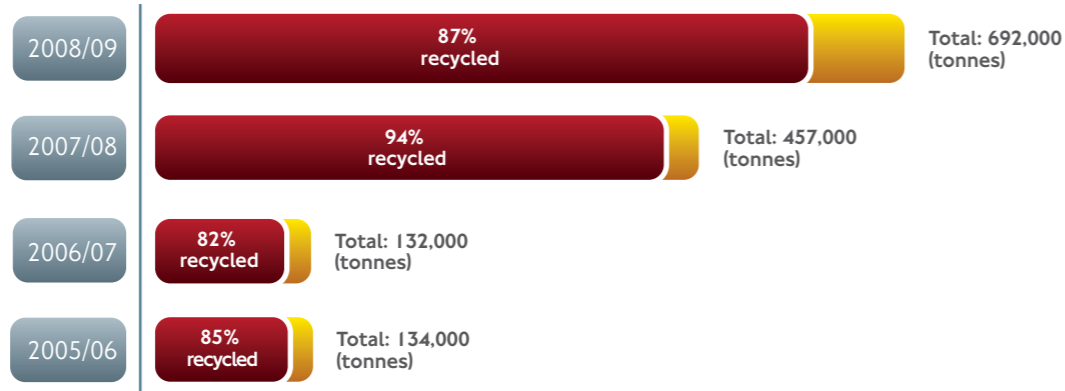
maintenance contractors were from recycled or certified environmentally responsible materials

- > Requiring contractors bidding to provide information management technology to address environmental impacts, equality and diversity dynamics of their organisation and supply chain, and ethical issues such as workforce welfare in their tender submissions
- > Ensuring contractors bidding for TfL's mobile telecommunications contract worth more than £14m address the environmental impact of handsets and seek innovative reuse and recycling initiatives to deliver environmental savings and social benefits

In addition to being one of only three organisations awarded gold status, TfL received the award for 'supplier engagement' for its work in embedding responsible procurement in the supply chain.



Annual total C&D waste from TfL operations



Water use per occupant in head office buildings has decreased by 16 per cent and now reflects best practice thanks to the continued roll-out of water-saving devices

The proportion being recycled fell slightly on the previous year but the total amount being recycled rose by 27 per cent, with more than half a million tonnes of C&D waste being recycled in 2008/09.

Waste that is classified as hazardous accounts for around two per cent of waste generated across the TfL Group. Where sections of LU track are being upgraded or maintained, used ballast (which serves the purpose of holding the track in place and allows rain to drain freely from it) is often removed and replaced. Some of this material may be contaminated with oil and greases, but LU is now converting it to non-hazardous waste for use as secondary aggregate. In 2008/09, more than 97 per cent of ballast was reused or recycled.

Water consumption

TfL uses water in its offices, stations, depot workshops and bus cleaning and train washing depots. TfL aims to minimise the consumption of water by turning to low-water usage systems, rainwater harvesting at office buildings and recycling water for train and vehicle washing. In 2008/09, reported water consumption rose by four per cent compared to the previous year due to more data being collected across the business.

Water use per occupant in head office buildings has decreased by 16 per cent and now reflects best practice thanks to the continued roll-out of water-saving devices.

> Recycling passenger newspapers

TfL launched a London-wide campaign in 2009, supported by a number of newspapers, to encourage London commuters to recycle their papers. Advertisements were placed across the transport network encouraging passengers to take their newspapers with them.

LU (in partnership with its contractor) recycled 40 per cent of station and depot waste in 2008/09. This was achieved by expanding a dedicated paper recycling collection scheme at terminus stations, encouraging passengers to take their newspapers with them to recycle, and appointing newspaper collecting

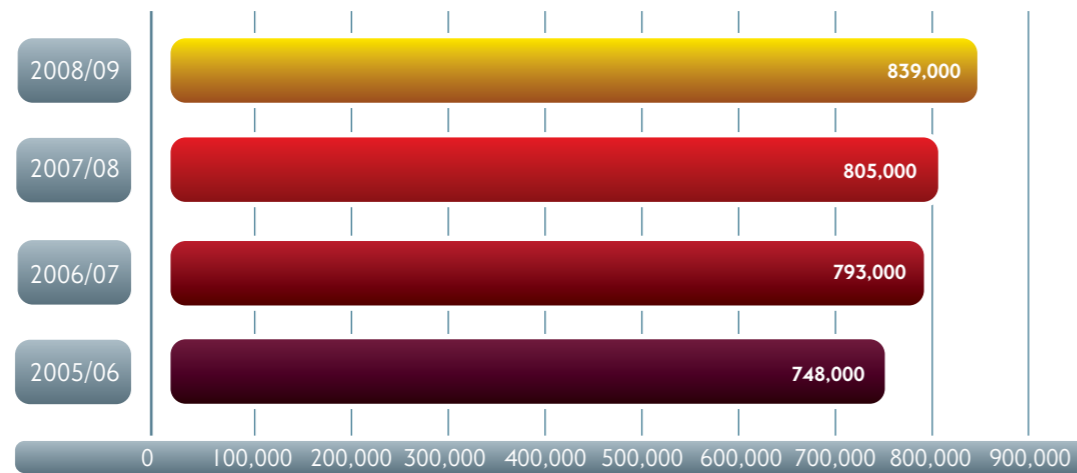
staff at certain stations. A recycling bin trial took place at six Underground stations, in partnership with the Metro newspaper, and a poster campaign also encouraged passengers to recycle. The trial began in October 2008 and is currently ongoing. LU will continue to investigate options for improving recycling across the network.

Recycling facilities for passengers have also been provided at virtually all London Overground stations since May 2009. Initially these are for paper materials, and if successful, additional facilities will be installed for other materials such as cans and plastic bottles. TfL expects these facilities to result in a reduction of waste collected from platforms and trains.



Annual water consumption within TfL operations

Water consumption (m³)



> Next steps

Plans for continually improving TfL's operational performance include:

- > Extending recycling of customer waste at Tube and Overground stations
- > Transferring Crossrail-excavated material to Wallesea Island (an RSPB nature conservation project) for reuse
- > Further reducing head office water consumption through the installation of low-water usage systems



> Summary of TfL Group environmental objectives and KPIs

To aid the implementation of environmental policy and strategy, and assist in the monitoring of environmental performance, TfL has a suite of environmental objectives and KPIs (see table opposite).

The previous sections provide a more detailed explanation of the data and trends. All data have been updated to reflect new emissions factors and the latest available data. See 'About this report' on page 6 for more details.

Objective	KPI	Data			
		2005/06	2006/07	2007/08	2008/09
Reduce greenhouse gas emissions	Total CO2 emissions (tonnes)	1,860,000	1,880,000	1,970,000	2,000,000
	CO2 emissions from the main public transport modes (g per passenger km):				
	LU	83	82	78	74
	London bus services	93	83	83	82
	DLR	99	78	76	79
	London Overground			48	53
	London Tramlink	49	44	40	47
	Consumption (million kWh) of:				
	Standard grid supplied electricity	1,050	1,020	1,040	1,080
	Green tariff supplied electricity	248	256	310	313
	Electricity from good quality CHP	18	37	0	0
	Renewable electricity generated on-site	0	0.25	0.29	0.36
	Natural gas	111	93	96	106
	Diesel	3,850	3,910	4,090	4,150
	Marine diesel	48	43	48	40
	Biodiesel (as part of a 5% blend in diesel)	0	89	92	113
	Ultra low sulphur fuel ⁹	0	0	0	15
	Petrol	417	391	428	401
	Liquid propane gas (LPG)	0.7	2.5	0.5	1.7
	Fuel oil	0	1.9	2.2	2.0
Energy consumption in head office buildings (kWh/m ²)	413	357	317	308	
Proportion of electricity obtained from green tariff (%)	19	20	23	23	

Objective	KPI	Data			
		2005/06	2006/07	2007/08	2008/09
Reduce pollutant emissions to air	Total NO _x emissions (tonnes)	8,810	8,270	8,220	8,120
	NO _x emissions from buses (g per passenger km)	0.96	0.84	0.82	0.80
	Total PM ₁₀ emissions (tonnes)	182	153	153	143
	PM ₁₀ emissions from buses (g per passenger km)	0.0018	0.0015	0.0016	0.0016
Reduce transport-related noise and vibration	Number of noise complaints received	479	458	529	411
	Percentage of TLRN with lower noise surface material	70	70	70	70
	Percentage of buses in fleet at least two decibels quieter than the required legal limit	0	4	8	14
Maintain and, where possible, enhance the quality of London's built environment	No Group KPI has yet been developed				
Maintain and, where possible, enhance the quality of London's natural environment	No Group KPI has yet been developed				
Reduce resource consumption and improve green procurement	Amount of office paper consumed across TfL Group (tonnes)	312	393	343	266
	Proportion of office paper supplied from recycled sources (%)	19	13	99	100

Objective	KPI	Data			
		2005/06	2006/07	2007/08	2008/09
Reduce the waste generated by TfL activities by applying the principles of reduce, reuse and recycle	Total C&I waste (tonnes)	10,900	14,800	17,900	19,100
	Proportion of C&I waste recycled (%)	27	30	38	38
	Total C&D waste (tonnes)	134,000	132,000	457,000	629,000
	Proportion of C&D waste recycled (%)	85	82	94	87
	Proportion of total waste that is classified as hazardous (%)	2	9	1	2
Reduce water consumption	Amount of water consumed (total m ³)	748,000	793,000	805,000	839,000
	Water consumed per occupant in head office buildings (m ³ per person)	11.3	9.4	7.7	6.5

> Endnotes

- 1 All figures in this report have been rounded to a maximum of three significant numbers
- 2 The figures quoted this year will differ from those in previous reports. In previous years, TfL has reported the annual passenger journeys by mode. This year, the figures refer to the daily average numbers of journey stages by mode: (1) a journey stage is a part of a trip made by a single mode of transport; (2) rail interchanges between train operating companies start a new journey stage; (3) bus journey stages are counted as starting a new journey stage each time a new bus is boarded; (4) Underground journey stages are counted by station entries, interchanges within stations are ignored; (5) walks are counted only when they form complete trips (ie walking all the way), not when they are part of trips using other modes of transport
- 3 London currently has a network of more than 200 charge points on the highway and in public car parks – mostly located in central London. Further information can be found at www.london.gov.uk/electricvehicles
- 4 ISO 14001 is the international standard for an environmental management system
- 5 Based on passenger kilometres travelled across LU, DLR, London Tramlink, Dial-a-Ride and buses
- 6 Based on an average of 110 grams of CO₂ emitted per passenger kilometre
- 7 www.c40cities.org
- 8 The legal requirement for noise from buses varies with the type of vehicle (ie the legal requirement for single-decker buses is different to that for double-decker buses)
- 9 From October 2008, London River Services has been working with Thames Clippers to use ultra low sulphur fuel on their river boats



> Further information

TfL's Travel in London Report:

tfl.gov.uk/travelandperformance

The UK Government's outlook on climate change and energy:

www.decc.gov.uk

Guidelines to the Department for Environment, Food and Rural Affairs' (Defra's) greenhouse gas conversion factors for company reporting (June 2009): www.defra.gov.uk/environment/business/reporting/conversion-factors.htm

The Mayor's priorities for reducing emissions and improving the Capital's environment:

www.london.gov.uk/mayor/priorities/environment.jsp

See TfL's Climate Change factsheet for further information on what the organisation is doing to address climate change:

tfl.gov.uk/factsheets

FORS: tfl.gov.uk/fors

The UK Air Quality Archive contains an explanation of air pollution and national and European air quality objectives:

www.airquality.co.uk

Defra's Noise Mapping England provides more information on how noise is mapped in the UK:

www.defra.gov.uk/noisemapping

The London Air Quality Network (run by King's College London) provides information on air quality across the city:

www.londonair.org.uk

The Mayor's Draft Air Quality Strategy:

www.london.gov.uk/mayor/environment/air_quality/index.jsp

The sustainable development pages on TfL's website outline its overall environmental approach and contain further details on air quality, noise, wildlife and habitats:

tfl.gov.uk/sustainabledevelopment

The Mayor of London's Green Procurement Code and Responsible Procurement Policy: www.london.gov.uk/rp

Waste and Resources Action Programme: www.wrap.org.uk

Environment Agency (including information on water):

www.environment-agency.gov.uk

> Abbreviations

BEEP	Building Energy Efficiency Programme
C&D	Construction and demolition (waste)
C&I	Commercial and industrial (waste)
CO₂	Carbon dioxide
Defra	Department for the Environment, Food and Rural Affairs
DLR	Docklands Light Railway
ELL	East London line
FORS	Freight Operator Recognition Scheme
GLA	Greater London Authority
KPI	Key Performance Indicator
kWh	Kilowatt hour
LED	Light-emitting diode
LEZ	Low Emission Zone
LRS	London River Services
LU	London Underground
NO_x	Nitrogen oxides
PM₁₀	Particles less than 0.01mm in diameter
TfL	Transport for London
TLRN	Transport for London Road Network
VCS	Victoria Coach Station

TfL welcomes your views to help improve its environmental performance, including feedback on this report.

Please send your comments to:

Sustainability Unit

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Transport for London
Windsor House
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Alternatively, email philipturner@tfl.gov.uk

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Data tables

2009



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> Energy consumption by mode and source

Mode	Total energy consumption (million kWh)				2008/09 Energy source (%)	Notes
	2005/06	2006/07	2007/08	2008/09		
Head office buildings	59	53	56	61	Green tariff electricity (57.3), natural gas (37), grid supplied electricity (5.5), petrol (0.1), LPG (0.1), on-site renewables (0.05)	Includes buildings and fuel for support vehicles. Support vehicles were not reported on in 2005/06
LU	1,220	1,220	1,230	1,240	Grid supplied electricity (79), green tariff electricity (14.6), natural gas (4.5), petrol (0.4), diesel (1.4), fuel oil (0.2)	Includes traction, stations, depots, support fleet, contractor vehicles and LU's back-up power station. Fuel consumption from support fleet and contractor vehicles first reported in 2006/07
London Overground	–	–	22	62	Grid supplied electricity (46.6), natural gas (36.9), diesel (16.5)	Includes traction, stations and depots. Diesel consumption for Gospel Oak – Barking line services
DLR	51	45	48	49	Grid supplied electricity (92.8), natural gas (7.2)	Includes traction, stations and depots. Electricity consumption was estimated in 2005/06
London Tramlink	11	11	11	12	Grid supplied electricity (97.2), natural gas (2.4), diesel (0.4)	Includes traction, stops and depot. Consumption estimated in 2007/08
London Streets	73	92	98	108	Green tariff electricity (84.2), petrol (0.6), diesel (15), LPG (0.1)	Includes street lighting, traffic signals, support fleet and some contractors. Contractor vehicles did not report fuel consumption in 2005/06
Taxis	903	921	949	944	Diesel (97.5), biodiesel (2.5)	–
PHVs	935	969	1,060	1,070	Diesel (60.3), petrol (37), biodiesel (2.5), LPG (0.1)	–
Dial-a-Ride	10	11	12	10	Diesel (91.8), grid supplied electricity (5.5), natural gas (2.7)	Includes vehicle fuel and depots

Mode	Total energy consumption (million kWh)				2008/09 Energy source (%)	Notes
	2005/06	2006/07	2007/08	2008/09		
Victoria Coach Station	2	2	2	2	Green tariff electricity (76.9), natural gas (23.1)	Includes energy for operating the building. It does not include fuel consumption associated with coaches travelling to, or from, it (see bus permits and agreements)
LRS	49	45	49	57	Marine diesel (70.8), ultra low sulphur fuel (26.7), green tariff electricity (1.1), grid supplied electricity (0.9), natural gas (0.6)	Includes fuel from boats using LRS piers and electricity used for piers
Community Safety, Enforcement and Policing	–	0.4	0.3	0.3	Petrol (48.7), diesel (51.3)	Data for 2005/06 included in London Streets
Bus permits and agreements	77	85	95	85	Diesel (100)	Includes the impact of coaches with London Service Permits, for the proportion of their journeys that take place in London. Also includes buses operating under London Local Service Agreements
London bus network	2,350	2,390	2,470	2,560	Diesel (97.1), biodiesel (2.4), grid supplied electricity (0.3), green tariff electricity (0.1)	Includes London Buses, support fleet, bus stops, stations, roadside ticketing machines and shelters. Since 2007/08, emissions factors are fleet weighted so are more accurate
New capital works	–	–	11	20	Diesel (90.9), grid supplied electricity (9), petrol (0.2)	Includes construction works associated with the ELL extension

> CO₂ emissions by mode

Mode	Total CO ₂ emissions (tonnes)				Notes
	2005/06	2006/07	2007/08	2008/09	
Head office buildings	22,900	21,700	23,700	24,800	Includes emissions associated with buildings and support vehicles. Support vehicles were not reported on in 2005/06
LU	633,000	628,000	637,000	642,000	Includes emissions associated with traction, stations, depots, support fleet, contractor vehicles and Greenwich Power Station
London Overground	–	–	8,200	22,600	Includes emissions associated with traction, stations and depots
DLR	25,400	23,400	24,700	25,000	Includes emissions associated with traction, stations and depots
London Tramlink	5,700	5,570	5,570	6,570	Includes emissions associated with traction, stops and depot Figures for 2007/2008 are estimated
London Streets	35,000	39,600	50,300	53,700	Includes street lighting, traffic signals, and vehicles run by London Streets' employees and some contractors. Contractors did not report emissions in 2005/06
Taxis	238,000	243,000	250,000	247,000	–
PHVs	242,000	251,000	275,000	274,000	–
Dial-a-Ride	2,880	3,130	3,330	3,360	Includes emissions from vehicles and depots
Victoria Coach Station	779	681	674	1,080	Only includes emissions from operating the building, does not include coaches travelling to or from it
LRS	13,500	12,600	13,700	15,900	Includes emissions from LRS piers and boats that use them
Community Safety, Enforcement and Policing	–	97	65	84	Includes emissions from vehicles. Transport Policing and Enforcement directorate was included in Streets data for 2005/06
Bus permits and agreements	20,400	22,400	25,100	22,300	Includes emissions from coaches with London Service Permits, for the portion of their journeys that take place in London. Also includes emissions from buses operating under London Local Service Agreements

Mode	Total CO ₂ emissions (tonnes)				Notes
	2005/06	2006/07	2007/08	2008/09	
London bus network	621,000	624,000	646,000	657,000	Includes emissions from London Buses, stations, bus stops, ticketing machines and shelters. Since 2007/2008, CO ₂ emissions per unit of biodiesel have been assumed to be 40 per cent less than emissions per unit of diesel, on a 'well to wheel' basis which takes into account overall emissions from production to consumption
New capital works	–	–	2,920	5,640	Includes construction works associated with the ELL extension
Grey fleet	–	–	80	45	Grey fleet refers to business miles travelled by employees in their own cars

> NO_x and PM₁₀ emissions by mode

Mode	NO _x (tonnes)				PM ₁₀ (tonnes)				Notes
	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	
Head office buildings	–	–	–	–	–	–	–	–	Negligible
LU	13	7	8	7	1	–	–	–	Includes back-up power station only
London Overground	–	–	17	39	–	–	0.5	1	Emissions from electric traction, diesel traction and non-traction uses
DLR	–	–	–	–	–	–	–	–	Negligible
London Tramlink	0.1	0.1	0.1	11	0	0	0	0.2	Includes emissions from boilers in the depot. Figures for 2007/08 are estimated
London Streets	4	–	–	–	0.3	–	–	–	Includes emissions from support fleet. Emissions were not reported since 2006/07
Taxis	1,320	911	866	703	97	78	74	63	–
PHVs	645	618	563	470	35	32	32	31	–
Dial-a-Ride	36	36	37	37	0.6	0.6	0.7	0.5	Emissions from vehicles and boilers in depots
Victoria Coach Station	0.1	0.1	0.1	0.1	0.02	0	0	0	Includes emissions from boilers in the building, does not include coaches travelling to, or from, it
LRS	298	265	295	327	32	29	32	31	Emissions from boats using LRS piers

Mode	NO _x (tonnes)				PM ₁₀ (tonnes)				Notes
	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	
Community Safety, Enforcement and Policing	–	–	–	–	–	–	–	–	Negligible
Bus permits and agreements	123	137	146	191	3	2	2	3	Includes emissions from coaches with London Service Permits, for the portion of their journeys that take place in London. Also includes emissions from buses operating under London Local Service Agreements
London bus network	6,360	6,290	6,290	6,330	12	11	12	13	–
New capital works	–	–	–	–	–	–	–	–	Negligible

> Built environment quality indicators

Mode		Score				Notes
		2005/06	2006/07	2007/08	2008/09	
Head office buildings		No KPI				
LU	Station graffiti	78%	81%	81%	82%	Mystery shopper survey (MSS) score
	Train graffiti	72%	74%	74%	76%	
	Station cleanliness	67%	70%	67%	67%	
	Train cleanliness	66%	67%	64%	66%	
London Overground	Station cleanliness and condition	–	–	71%	78%	Customer satisfaction survey (CSS) score
	Train cleanliness and condition	–	–	60%	67%	
DLR	Station cleanliness and condition	–	95%	96%	93%	CSS score. DLR reported these figures for the first time in 2006/07
	Train cleanliness and condition	–	95%	96%	93%	
London Tramlink	Tram cleanliness and condition	85%	–	–	–	CSS score. No figure reported since 2006/07
London Streets	Quality of the street environment	3.8	3.4	3.2	3.2	LEQS score for TLRN streets
Taxis	Vehicle cleanliness	88%	88%	87%	89%	
PHVs	Vehicle cleanliness	83%	83%	84%	83%	
Dial-a-Ride	Vehicle cleanliness	93%	92%	93%	92%	CSS score
Victoria Coach Station	Station cleanliness and condition	76%	73%	74%	74%	CSS score. No figure was reported for 2006/07
LRS	Station cleanliness	87%	88%	88%	90%	CSS scores that cover all river boats covered by LRS. The figures do not include Woolwich Ferry
	Boat cleanliness and condition	87%	88%	88%	89%	

Mode	Score				Notes	
	2005/06	2006/07	2007/08	2008/09		
Community Safety, Enforcement and Policing	No KPI					
Bus permits and agreements	No KPI					
London bus network	Bus cleanliness and condition	80%	79%	80%	81%	CSS score
	Station cleanliness and condition	75%	75%	76%	78%	

The MSS and CSS award scores of up to 100, based on perception of cleanliness and condition. The higher the MSS and CSS score, the better the performance

The LEQS is conducted by the environmental charity Capital Standards at many sites across London. Scores range from minus eight to eight, with a score between zero and four classed as satisfactory, and from four to eight as good

> Waste production and recycling

Mode	Total C&I waste (tonnes)				Total C&I waste recycled (tonnes)				Total C&D waste (tonnes)				Total C&D waste recycled (tonnes)				Proportion hazardous waste (%)				Notes
	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	
Head office buildings	852	1,090	1,760	1,990	290	421	737	1,040	–	–	90	380	–	–	83	336	0.01%	0.06%	0.26%	0.01%	
LU	9,050	11,700	14,200	14,200	2,420	3,680	5,740	5,650	134,000	131,000	71,700	118,000	115,000	108,000	51,100	84,800	2%	9%	8%	5%	Includes waste from stations, depots, trains and Investment Programme works
London Overground	–	–	58	486	–	–	14	31	–	–	–	–	–	–	–	–	–	–	13%	7%	Waste from stations and depots
DLR	–	294	300	310	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Waste from stations and depots. No recycling data collected
London Tramlink	–	–	–	528	–	–	–	206	–	–	–	–	–	–	–	–	–	–	–	–	Waste from stations and depots
London Streets	–	–	–	–	–	–	–	–	–	–	65,400	134,000	–	–	59,400	132,000	–	–	0%	1.5%	
Taxis	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Not applicable

Mode	Total C&I waste (tonnes)				Total C&I waste recycled (tonnes)				Total C&D waste (tonnes)				Total C&D waste recycled (tonnes)				Proportion hazardous waste (%)				Notes
	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	2005/06	2006/07	2007/08	2008/09	
PHVs	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not applicable
Dial-a-Ride	153	104	89	109	98	6	6	25	-	-	-	-	-	-	-	-	-	0%	0%	0%	Includes waste from depots
Victoria Coach Station	350	360	349	338	0.1	0	0.05	0.05	-	-	-	-	-	-	-	-	10%	14%	7%	5%	Includes waste from the station
LRS	215	260	366	376	53	120	56	56	-	-	-	-	-	-	-	-	25%	38%	17%	17%	Includes waste from LRS piers, Woolwich Ferry and grid boat waste
Community Safety, Enforcement and Policing	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not applicable
Bus permits and agreements	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Not applicable
London bus network	229	1,050	707	645	57	254	199	123	-	670	669	658	-	659	669	640	33%	6%	11%	17%	Waste from bus stops, shelters, stations and East Thames Buses

> Water consumption

Mode	Total water consumed (m ³)				Notes
	2005/06	2006/07	2007/08	2008/09	
Head office buildings	91,200	89,900	84,700	79,600	–
LU	604,000	570,000	586,000	606,000	Includes water used in train washes, stations and depots
London Overground	–	–	10,400	15,900	Includes water used in stations and depots
DLR	–	27,200	28,000	28,500	Includes water used in stations and depots
London Tramlink	–	–	–	9,960	Includes water used in train washes, stations and depots
London Streets	–	–	–	–	No figures reported
Taxis	–	–	–	–	Not applicable
PHVs	–	–	–	–	Not applicable
Dial-a-Ride	5,090	5,100	4,340	4,770	Includes water used in depots
Victoria Coach Station	24,600	26,400	19,700	18,300	–
LRS	15,700	19,300	19,700	19,600	Includes water used on LRS piers and Woolwich Ferry
Community Safety, Enforcement and Policing	–	–	–	–	Not applicable
Bus permits and agreements	–	–	–	–	Not applicable
London bus network	8,060	55,500	51,900	56,000	Includes water used in stations and depots, including East Thames Buses
New capital works	–	–	–	278	Includes water use associated with ELL construction

TfL welcomes your views to help improve its environmental performance, including feedback on this report.

Please send your comments to:

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