

Environment Report 2010



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Message from the Commissioner

What we do at Transport for London (TfL) supports the Capital's economy, its growing population and the quality of life for Londoners and visitors.

We continue to deliver a high level of operational performance, and are making good progress in delivering both the Mayor's immediate priorities and his longer-term vision for a sustainable transport network. During the year the revised Mayor's Transport Strategy (MTS) was published. This sets out the important role of public transport, smoothing traffic flow and providing low carbon travel alternatives in reducing congestion and managing London's carbon dioxide (CO₂) emissions, air quality and noise.

We are also delivering improvements through better public transport services and improving London's principal road network. Cycling is becoming the first choice for thousands more short trips each day. In July we introduced a new mode of transport – the Barclays Cycle Hire Scheme – and the first of the new Barclays Cycle Superhighways. Walking is being encouraged with the Legible London scheme, pedestrian countdown at traffic signals and better street design.

TfL operates and licenses a wide range of transport-related services and our potential environmental impacts are complex. I am pleased that this year we set our first organisation-wide environmental targets



and this report shows some very good progress on issues like waste management, recycling and energy efficiency. For example, 10 key London Underground (LU) stations and our head office buildings have been signed up to the 10:10 campaign to reduce energy use.

We look forward to continuing our work to transform the Capital's transport system, catering for economic growth and a rising population, while reducing pollutant emissions and improving Londoners' quality of life.

A handwritten signature in black ink, which reads "Peter Hendy". The signature is written in a cursive, flowing style.

Peter Hendy CBE
Commissioner
Transport for London

About this report

This is the seventh year that TfL has published its annual Environment Report. It covers the financial year ended 31 March 2010 and provides an update on environmental activities and performance. The 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.

Performance data and scope

The performance data relates to public transport operations, taxis and the private hire trade, as well as support services run by TfL and its main contractors. Performance data on the impact of privately owned vehicles falls outside the scope of this report. TfL publishes this material in its Travel in London Report, which looks at the environmental impact of transport in the Capital as a whole, and summarises trends and progress in relation to the implementation of the MTS.

To allow for year-on-year comparison, TfL updates its performance figures annually to reflect new emissions factorsⁱ and the latest available dataⁱⁱ.

As such, the data in this report may differ from that of previous years. TfL is committed to delivering ongoing environmental enhancements and will continue to work towards improving the quality of its data.

Care should be taken when considering trends over time as some business units are now reporting new information, and some estimated data has been replaced by actual figures. Notes accompanying the data tables explain the scope for each key performance indicator (KPI) in more detail.

For further information, TfL's latest Business Plan and Annual Report are available on the TfL website at tfl.gov.uk



Operational changes to TfL in 2009/10

A number of activities to improve service capacity and quality took place during the reporting year. These affect the scope of TfL's operations and therefore its performance reporting.

- Crossrail – enabling works began and construction started at Canary Wharf Crossrail station
- LU – former Public Private Partnership organisation Metronet was integrated into LU including maintenance, projects and line upgrade activities
- LU Investment Programme – completed power and signalling upgrade of the Victoria line and started the introduction of new Victoria line trains. The new northern ticket hall at King's Cross Underground station also opened and improvement works at Tottenham Court Road station to increase capacity got under way
- East London line extension – final phase of construction took place
- London Overground – new, air-conditioned trains were rolled out and the station upgrade programme began. Imperial Wharf station opened
- Docklands Light Railway (DLR) – South Quay station opened, construction work took place to prepare for three-car operation and the extension to Woolwich Arsenal was completed
- Buses – 'iBus' was installed on all vehicles in the fleet and the trial of hybrid buses increased to include 56 vehicles
- Streets – Blackwall Tunnel northbound refurbishment commenced
- Buildings – fit-out of new Pier Walk office building took place, construction of a fuel cell tri-generation plant was completed at Palestra in Southwark



Delivering the Mayor's environment agenda

The Mayor's vision is for London to be recognised as a world leader in improving the local and global environment. This will be achieved by tackling climate change, improving the quality of the public realm, reducing pollution, developing a low carbon economy, consuming fewer resources and using them more effectively.

In 'Leading to a greener London', an environment programme for the Capital, he set out his overriding environmental strategy. It is supported by strategies focusing on air quality, water, waste, noise, biodiversity, climate change adaptation and mitigation, plus energy. TfL is committed to helping the Mayor meet the goals set out in each of these strategies by making progress in delivering his long-term vision for sustainable transport and effectively managing its business operations.

The MTS, developed for and with Londoners, seeks to ensure that the Capital's transport system can support the employment and population growth expected over the next 20 years. It also seeks to make the most of London's existing infrastructure and further transform the public transport system, which will be vital to meet growing demand, support the economy and social cohesion and protect the environment.

The Mayor aims to establish London as a role model city in addressing the climate change challenge. He has set a target to cut CO₂ emissions by 60 per cent by 2025, compared to 1990 levels, with the transport

sector required to deliver an estimated 45 to 55 per cent reduction. Given the growth in population and employment that is predicted, meeting this target will be a huge challenge.

At present, road vehicles account for around 72 per cent of transport-related CO₂ emissions in London. Meeting the Mayor's target will require strong commitment from TfL, the boroughs, Government, the European Union (EU) and others to encourage the introduction and use of low carbon road vehicles. This includes a package of incentives to ensure price competitiveness, the provision of charging points for electric vehicles (EVs) and, if required, further demand management measures. The Mayor will take a lead in reducing emissions from vehicle fleets under his control by 2015 through initiatives such as low emission buses and an electric support vehicle fleet. Encouraging walking, cycling and public transport use, together with smarter travel initiatives for people and goods, will further reduce the environmental impact of transport in the Capital.

London's transport system may be vulnerable to long-term changes in climate and more frequent, extreme weather conditions. TfL and other stakeholders, on the Mayor's behalf, will assess the risk and take appropriate actions to mitigate it and help the network adapt. This will include designing and building infrastructure that can withstand future weather conditions, where appropriate featuring trees and living roofs to provide shading, insulation and enhanced biodiversity.

Air quality has improved significantly in London in recent years. However, in common with many UK and European cities, additional steps need to be taken to meet targets coming from the EU for particulate matter (PM₁₀) and nitrogen dioxide (NO₂), the most harmful pollutants.

Traditionally seen as an environmental problem, air quality is now recognised as an important public health issue as it exacerbates heart and lung conditions such as asthma, particularly in children, older people and those with poor health. The MTS, in tandem with the Mayor's new draft Air Quality Strategy, encourages behavioural changes to reduce vehicle emissions, promotes incentives to use low emission vehicles, develops the current Low Emission Zone (LEZ) and promotes a cleaner public service fleet, including buses, taxis and Greater London Authority (GLA) Group vehicles.

The strategy also aims to improve noise impacts and reduce annoyance, anxiety, sleep disruption and the health problems they can cause. The Mayor will reduce these impacts from transport by promoting smoother driving and the use of quieter vehicles. He is also looking to help London boroughs by researching the effectiveness of alternative speed control measures to road humps.

Through the MTS, he is promoting the improvement of London's streets through a combination of flagship transport schemes and good practice principles. These include well-

designed streets with less clutter, high quality materials and improved layouts that provide a better balance for all road users. The Mayor will also improve the quality of public transport services, for example, by raising standards of cleanliness, supporting biodiversity and improving the quality of the natural environment.

TfL seeks to contribute to the Mayor's environmental agenda through its wider corporate activities as well as its transport operations, and is committed to making better use of resources across the organisation.

For instance, the Mayor is keen on turning London's waste into an opportunity, and is currently developing strategies to tackle business and municipal waste. TfL seeks to minimise waste on, and from, the transport system and is committed to reducing, reusing and recycling construction and demolition (C&D) waste, as well as head office waste.

TfL is also working to reduce the use of fossil fuel throughout the organisation. In addition to transport-related efficiencies, it supports the Mayor's climate change and energy agenda through power-saving measures across its portfolio of head offices, and has a commitment to increasing off-grid, sustainable energy use where feasible. TfL is also putting measures in place to reduce water consumption in its operations and at head office buildings.

Environmental management at TfL

TfL is committed to being a responsible organisation, employer and buyer. It seeks to deliver its environmental priorities by integrating them into its day-to-day management to ensure maximum value for money.

TfL's Health, Safety and Environment (HSE) Policy commits the organisation to having HSE performance it can be proud of. The policy requires TfL to actively support the Mayor in delivering his environmental priorities and to continually improve upon HSE management and performance.

Environmental management systems (EMS) based on the principles of ISO 14001, the international EMS standard, have been established across TfL to help manage environmental responsibilities and risks.

TfL's Safety, Health and Environment Assurance Committee reviews progress on environmental performance. Environmental managers, planners and others within the organisation provide day-to-day environmental management.

TfL targets

For the first time, TfL has set long-term, Group-wide operational targets to help drive continual improvement in the areas where the organisation considers it has the biggest environmental impact. These are CO₂ emissions, air pollutants, plus waste and recycling.

This follows work to strengthen data collection processes and allows for the setting of meaningful targets against a sufficiently robust baseline.

TfL Group environmental targets

TfL's targets apply to services and operations over which it has a degree of control. They are based on funded programmes in the current TfL Business Plan and were developed through the aggregation of a series of modal forecasts. They are set for 2017/18, the period covered by the plan, against a 2005/06 baseline. TfL will look to set interim targets to assist performance monitoring.

CO₂ emissions

TfL regularly monitors, forecasts and reports on CO₂ emissions from its operations, buildings and support fleet. While total emissions are being minimised, increasing the energy efficiency of the expanding public transport system is also important.

TfL has set a target to achieve a 20 per cent reduction in grams of CO₂ per passenger km, across the Group, by 2017/18 (from 88g in 2005/06 to 70g in 2017/18). The target covers TfL activities for which CO₂ emissions can be



normalised by passenger km – LU, London Buses, London Overground, DLR and London Tramlink.

Data for Crossrail will be available after it begins operation in 2017. In due course, Crossrail will specify a CO₂ emissions target for its train design.

Air pollutants

TfL has set two air quality targets covering total emissions of nitrogen oxides (NO_x) and PM₁₀ to monitor its delivery of a cleaner public transport system. Engine emissions are the main source of NO_x and PM₁₀ emissions from TfL's operations. Air pollution also arises from sources such as dust from construction sites or fine particles released due to the wear of brake pads on vehicles. As these emissions are less significant for TfL, and more difficult to calculate or measure, they are not currently included in the scope of the target.

For NO_x, TfL is committed to achieving a 40 per cent reduction in emissions by 2017/18 against the baseline, while for PM₁₀ the target is a 50 per cent reduction in emissions over the same period. The targets apply to all TfL

public transport services, including taxis and private hire vehicles (PHVs).

Waste and recycling

Waste generated by TfL comes from operating, maintaining and investing in its network and business operations. Primary sources include C&D waste that is associated with infrastructure projects, litter left by passengers on TfL's services and office, station and depot waste, known as commercial and industrial (C&I) waste.

TfL has committed to increasing the recycling rate of C&I waste to 70 per cent by 2017/18. The target, which applies to all public transport services and head offices, is aligned to the Mayor's proposals on business waste and the draft replacement London Plan, which requires 70 per cent recycling of C&I waste by 2020.

TfL has a target to reuse or recycle at least 90 per cent of C&D waste by 2017/18, and to achieve 95 per cent by 2017/18 in line with those proposed in the draft Mayor's Vision for Waste in London.

Monitoring and reporting

TfL monitors the environmental performance of its direct operations against KPIs based around eight environmental objectives. It regularly reviews its KPIs to ensure they continue to reflect TfL's environmental priorities. A new KPI is being introduced to monitor the amount of waste that is sent to landfill. TfL will publish information on this KPI from next year onwards.

A summary of objectives, KPIs and performance dating back to 2005/06 can be found on page 39. Some of the metrics are Group-wide, while others relate to specific parts of the organisation.

Working with suppliers

TfL's environmental impacts extend beyond its direct operations and into its supply chain – much of its work is delivered through suppliers or in partnership with other organisations. TfL works collaboratively with suppliers to ensure they adhere to its principles of environmental management.

TfL takes full account of the Mayor's Responsible Procurement Policy and Green Procurement Code, and embeds sustainable procurement practices in the supply chain.

Engaging staff

TfL has networks of more than 200 Head Office Champions and in LU, 200 Station Energy Champions continue to help staff reduce waste and energy use in the workplace.

TfL regularly runs staff environmental engagement campaigns and, in 2009, these were consolidated under a new 'Destination Green' brand. The year's initiatives included the annual TfL Environment Awards and a manager's guide to environmental improvements in the office. Support was given to TfL Environmental Champions, through a series of workshops on engaging colleagues about climate change, resources such as posters, local campaign ideas and screenings of a climate change awareness film.

Environment Awards 2009

These annual awards encourage, recognise and congratulate staff initiatives that deliver environmental improvements. Award-winning activities included:

- Securing the rights to show the film Age of Stupid – 2009's most talked about climate change film – to staff on TfL premises
- Working with a leading fabric manufacturer to create a recycled fleece uniform jacket
- Introducing an 'eco-induction' for new staff covering issues such as reducing, reusing and recycling waste; energy efficiency; and buying products with less packaging
- Identifying and trialling a new engineering solution that reduced energy use for track points on the Central line



Reducing carbon emissions and adapting to climate change

Target

- A 20 per cent reduction in grams of CO₂ per passenger km by 2017/18, against 2005/06 levels

KPIs

- Total CO₂ emissions
- CO₂ per passenger km
- Energy consumption at head offices

Background

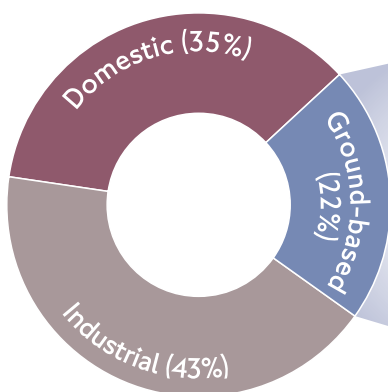
The Mayor has set a target to deliver a 60 per cent reduction in the Capital's CO₂ emissions by 2025, compared to 1990 levels. His approach to reducing CO₂ emissions from transport is set out in his new MTS and draft Climate Change

Mitigation and Energy Strategy (CCMES). Detailed proposals regarding the reduction of public and private transport's contribution to climate change are contained in the MTS. The draft CCMES includes initiatives for the domestic, commercial, industrial and transport sectors in London. It also outlines initiatives planned by the GLA functional bodies.

TfL is making improvements to its public transport operations to cater for rising passenger numbers, while seeking to ensure that services continue to be a low carbon alternative to the car.

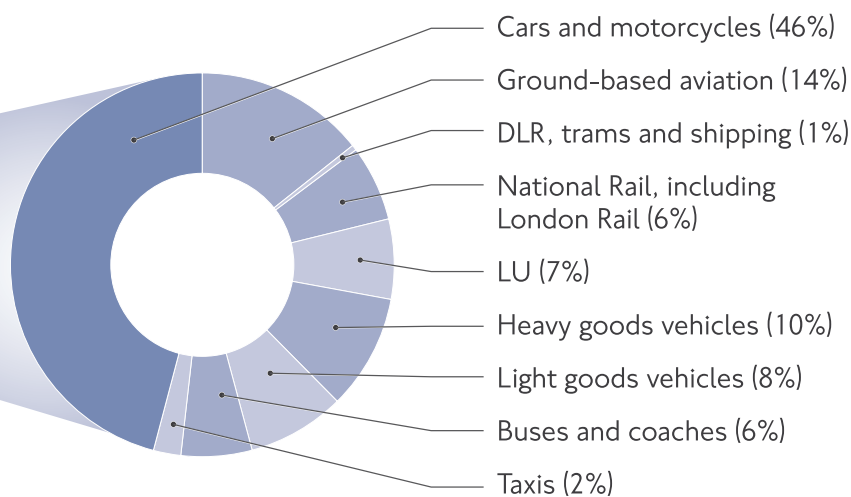
A major challenge facing TfL is how to reduce its total CO₂ emissions while delivering much needed increases in service capacity. Investment

Contribution to London's transport CO₂ emissions



Total emissions
44.7 million tonnes

Breakdown of CO₂ emissions from London's transport by source ⁱⁱⁱ



Ground-based transport
emissions 9.7 million tonnes

in London's public transport system will result in a 30 per cent capacity increase by 2017/18, which would be expected to require an increase in energy consumption.

However, thanks to the introduction of energy saving measures such as regenerative braking (the reuse of energy collected when trains slow down), total CO₂ emissions from TfL's operations are anticipated to remain broadly constant over this period.

TfL is also supporting the Mayor in helping London prepare for expected climate change. Work is under way to identify how its services and assets can most effectively adapt over the longer term.

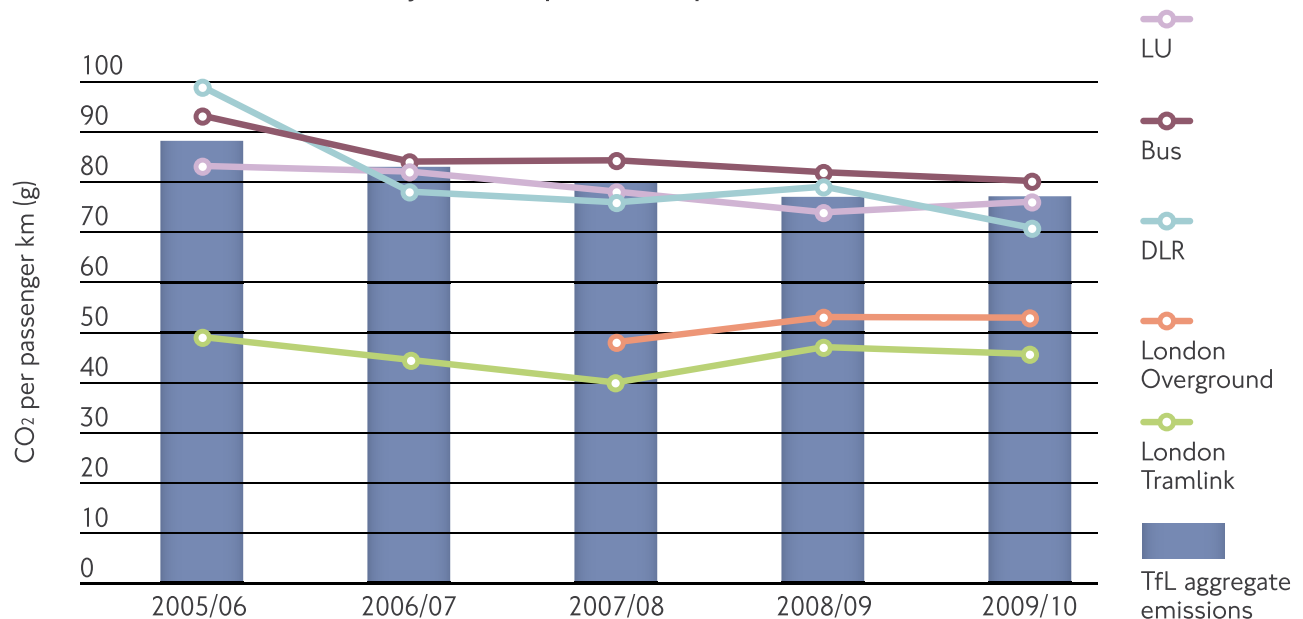
CO₂ emissions reduction

CO₂ is London's dominant greenhouse gas (GHG) from transport.

The main public transport services run by TfL are the Tube, buses, DLR, the Overground and London Tramlink. CO₂ emissions arising from these are influenced by distance travelled as well as by technology, fuels and how the vehicle is driven. Over the course of the year, TfL has continued to operate a growing number of services.

With investment in public transport set to continue, TfL's main focus is on improving the energy efficiency of its services. TfL has set a target of a 20 per cent reduction in CO₂ per passenger km (normalised emissions) by 2017/18,

Normalised emissions of CO₂ by mode of public transport



against 2005/06 levels. This year these services emitted, on average, 77g of CO₂ per passenger km, the same as in 2008/09. The current average level of CO₂ emissions from cars in London is approximately 170g per vehicle km.

Current emissions of CO₂ per passenger km for TfL's main public transport services are 12 per cent below the 2005/06 baseline total.

Due to the scale of their operations, the bus network and LU are the main contributors to TfL's normalised CO₂ emissions.

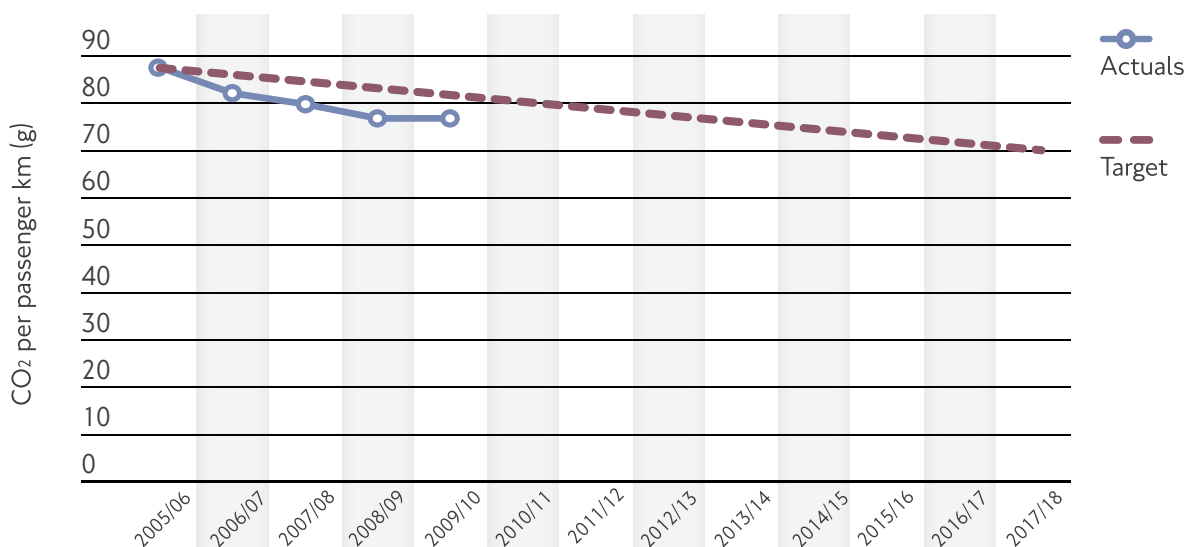
A two per cent reduction in normalised emissions has been achieved on the bus network despite growth in vehicle km – largely due to improved driver training and fuel monitoring by

bus operators. The Government also increased the proportion of biofuel required by the Renewable Transport Fuel Obligation, from 2.5 per cent to 3.25 per cent, leading to a 1.46 per cent reduction in emissions compared to regular diesel. Also during the year, the operational and technical evaluation of 56 hybrid buses from four manufacturers continued and the design of the New Bus for London began. Emissions are expected to fall further as more low emission buses are brought into the fleet.

Fewer passengers used the Tube over the year, primarily due to the economic climate, and this caused normalised emissions to increase by three per cent. A number of engineering solutions are being put in place to help reduce the immediate and long-term demand for energy.

CO₂ target for a 20 per cent reduction in normalised emissions from TfL's public transport services

Includes emissions from LU, buses, DLR, Overground and Tramlink



Regenerative braking provides a 20 per cent saving in electricity and is currently in use on 15 per cent of the network.

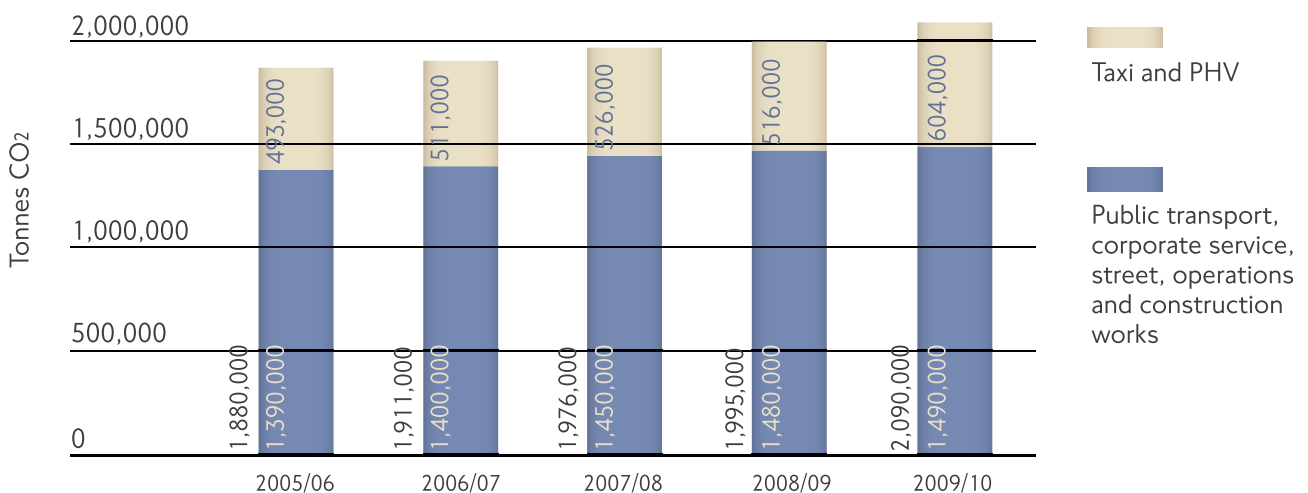
Normalised emissions fell by 11 per cent on the DLR due to a significant rise in passenger journeys. They remained the same for the Overground and Tramlink fell by three per cent, despite construction works taking place across both networks.

Total emissions from TfL's public transport operations, street operations, construction works and head offices accounted for 1.49 million tonnes of CO₂. This is only a marginal increase on the previous year, despite the expansion of TfL's services and the inclusion of new data associated with the construction of Crossrail.

The remaining emissions associated with TfL's activities come from taxis and PHVs. These increased in 2009/10 as a result of improved reporting and changes to the composition of the fleets. During the year, TfL undertook detailed analysis on the profile of the taxi and PHV fleets as part of its preparations for the draft Mayor's Air Quality Strategy. This work highlighted a number of important issues regarding data collection, all impacting on CO₂ and air emissions totals. The box opposite provides further information.

As a result of these new findings, 2009/10 figures for taxis and PHVs cannot be directly compared with previous years. To aid comparisons over time, total CO₂ emissions from taxis and PHVs have been separated from the rest of TfL's operations.

Total CO₂ emissions from TfL operations



In total, CO₂ emissions associated with all of TfL's activities rose in 2009/10 to 2.09 million tonnes.

During 2009/10, energy efficiency across head office buildings improved by one per cent. This was achieved by implementing energy efficiency measures such as lighting, draught proofing, insulation and building controls as part of the Mayor's RE:FIT programme. The programme uses a new kind of energy performance contract, where energy companies guarantee a set level of savings that help to finance the efficiency measures.

TfL's work to improve the environmental sustainability of its buildings was recognised when it was named client of the year at the annual Chartered Institute of Building Service Engineers Low Carbon Performance Awards. In addition, TfL's head offices and LU achieved the Carbon Trust Standard. This acknowledges that carbon emissions were measured, managed and cut, and recognises that the organisation is committed to making further reductions year on year. There are only 260 organisations in the UK that have received this award.

PHVs and taxis

There are a number of factors that influence the amount of emissions from PHVs in London.

Since 2006 when licensing was first introduced, the fleet has grown annually, with nearly half of the vehicles being replaced each year. This means that the make, model, Euro standard and fuel type has changed considerably.

In 2009/10, there was a noticeable shift to PHVs with larger engines, reflecting the increasing numbers of chauffeur-driven cars and people carriers in the fleet. In addition, in late 2008, larger specialist vehicles (such as those used to transport patients) came under PHV regulations and 4,500 have since joined the fleet. These have larger engines and therefore higher emissions. The average annual mileage driven by each vehicle rose

by 15 per cent compared with the previous year, resulting in an increase in fuel consumption and emissions.

Taxi emissions were previously estimated following the same model as that used for cars, but the way in which taxis operate in the Capital is very different. The Taxi and Private Hire Directorate at TfL has now created an emissions model specific to London taxis, resulting in an emissions estimate that is much more accurate. Also, over the course of 2009/10, the fleet's annual average mileage per vehicle increased by 10 per cent and the number of vehicles rose by two per cent, impacting on total CO₂ and air emissions.

At present, emissions from taxis and PHVs cannot be normalised with sufficient accuracy, and are not included in TfL's CO₂ target.

During 2009/10, there was an increased focus on reducing energy at Tube stations. For instance, switching off escalators during off-peak hours delivered savings of around 4,000 tonnes of CO₂ per year. Energy efficient LED lighting has also been installed at a number of stations across the Underground network, including in the new ticket hall at King's Cross. Energy consumption arising from electronic advertising has been reduced through the replacement of the old advertising units with new, far more energy efficient ones. Fitted with fewer long life bulbs, they achieve the same illumination quality and require less frequent scheduled replacements. Next year, TfL plans to undertake 70 energy efficiency projects at 22 office sites, saving around £500,000 per year and preventing 2,500 tonnes of CO₂ being emitted.

Carbon Reduction Commitment (CRC) Energy Efficiency Scheme

Over the course of the year, TfL put a system in place to deliver compliance with the CRC, the Government's climate change and energy saving scheme. It is designed to raise awareness in large organisations and encourage changes in behaviour and infrastructure. It is mandatory for organisations using more than 6,000 megawatt hours per year of half-hourly metered electricity, and introduces financial incentives to reduce energy use by putting a price on carbon emissions.

Climate change adaptation

TfL made good progress during 2009/10 in developing its adaptation plans.

In July 2009, the Government published the United Kingdom Climate Change Projections providing modelled climate scenarios for the rest of the 21st century. During 2009/10, TfL, working with the GLA, used the projections to improve its understanding of how the changing climate could impact its operations and London as a whole.

TfL also worked with the GLA on the transport element of the Mayor's Climate Change Adaptation Strategy, currently under development.

In 2009/10, a new duty under the Climate Change Act 2008 was introduced requiring key public sector organisations to report on their risk assessments and plans for adapting their functions to the changing climate. The GLA must submit its report by 31 December 2010 and TfL will provide the detail covering the Mayor's transport duties.

Next steps

Plans to improve operational performance in 2010/11 include:

- TfL's head office buildings and 10 of the largest stations on the Tube network have joined the 10:10 campaign. Work continues to cut CO₂ emissions by 10 per cent in 2010/11
- Trialling low carbon measures at Golders Green and Leicester Square Tube stations
- Exploring a new energy sourcing strategy, plus opportunities for generating energy locally and from renewable sources, for LU
- Reviewing adaptation measures for priority areas to ensure the TfL network can cope with a changing climate

Crossrail's carbon footprint^{iv}

This provides a detailed prediction of net CO₂ emissions resulting from the construction and operation of the railway. Crossrail is seeking to minimise these emissions by designing and using energy efficient systems and materials during operational and construction stages. Measures include installing energy efficient escalators and lifts, using daylight and natural ventilation and introducing lighter trains capable of using regenerative braking. Crossrail's designs are also taking account of the need to adapt to climate change, considering flood risk and options for sub-surface station platform cooling.

Crossrail's contractors are mandated to implement several energy efficiency measures. These include installing electricity metering and using energy efficient equipment and commercial road vehicles that meet Euro 3 standards. The movement of materials to and from construction sites is critical to the successful delivery of the project. By limiting road traffic, for instance by using rail and water transport where practicable, further reductions in emissions from construction will be achieved.

Once operational, the project will contribute to wider goals to reduce carbon emissions as customers switch from cars and existing diesel rail services to Crossrail.

Climate Change Fund (CCF) update

TfL's three-year CCF finished in March 2010, having allocated £22m to 12 projects. The fund was created to support projects that reduce CO₂ above and beyond those already included in TfL's Business Plan. The aim was to help deliver the Mayor's 2025 target of a 60 per cent CO₂ emissions reduction in London, compared to 1990 levels.

The range of projects supported included:

- Delivering CO₂ reductions in the short to medium term for buildings, operations or vehicles (eg through improving fuel efficiency, the use of alternative fuels, or switching to modes with a lower carbon footprint in terms of emissions).

For example, the fund invested in TfL's demonstration of hybrid bus technology. At the end of the reporting year, there were 56 different vehicles being tested alongside standard diesel buses on a variety of routes across the network. Hybrid buses provide a smoother ride, are quieter and emit approximately 30 per cent less CO₂ than standard diesel buses. It is estimated that, with fleet-wide roll-out, emissions savings will be more than 20 per cent.

- Delivering significant CO₂ savings in the longer term, by using renewable energy 'flagship' technologies or promoting the development of new technologies (eg independent green energy generation or hydrogen engines).

TfL opened the first tri-generation fuel cell and combined heat and power system of its kind in the UK with help from the CCF. The system generates energy locally, potentially cutting CO₂ emissions by up to 30 per cent and saving £90,000 in energy costs a year.

- Raising awareness of climate change and wider behavioural change benefits (eg travel demand management opportunities, staff and business travel facilities, solar panels or wind turbines on flagship buildings or structures).

During the reporting year, TfL opened a 37-metre wind turbine at the new West Ham bus garage. The largest of its kind in Inner London, the turbine saves 41 tonnes of CO₂ a year and has set a number of planning precedents for inner city wind turbines.



TfL's approach to carbon footprinting

TfL recognises that its impact extends beyond its direct and licensed operations. The activities of companies working on behalf of the organisation, as well as the resources they consume, will also result in carbon emissions.

Parts of TfL have already developed their own footprint reports – namely LU, Crossrail and London Tramlink. TfL has reported on its main energy use for some time. During this reporting year, initial works were carried out to develop an appropriate carbon footprint for TfL drawing on the widely used GHG Reporting Protocol.

TfL accounts for the carbon emissions of the products and services it purchases by using a proxy measure for carbon emissions per

financial spend in different categories. The footprint also looks at the indirect emissions that arise from employee commuting and business travel, supplying water to the organisation and landfill waste.

Carbon Disclosure Project (CDP)

As part of a wider GLA Group initiative, five of TfL's key suppliers have been invited to report their carbon emissions and explain their organisational approach to carbon management through the international CDP.

Membership of the CDP is one of a number of initiatives that the GLA is keen to explore with the aim of delivering carbon savings in the supply chain.



Enhancing the quality of life for all Londoners

Targets

- A 40 per cent reduction in total NO_x emissions by 2017/18, against 2005/06 levels
- A 50 per cent reduction in total PM₁₀ emissions by 2017/18, against 2005/06 levels

KPIs

- Total NO_x emissions and NO_x emissions per bus passenger km, as a measure of air pollution
- Total PM₁₀ emissions, as a measure of air pollution
- For noise, the number of complaints received that relate to TfL's operations, the proportion of the Transport for London Road Network (TLRN) that is covered with lower noise surface materials; and the proportion of the bus fleet that is at least two decibels (dB(A)) quieter than the legal noise test limit
- Mystery shopper surveys and customer satisfaction surveys to monitor the quality of the built environment

Background

Transport has a fundamental impact on the quality of life for all Londoners. In many cases, this is very positive and enhances personal freedom, education, social and life opportunities. The Mayor's recent efforts to

encourage more walking and cycling are aimed at improving people's health and wellbeing.

However, certain impacts on London's environment from the wider transport system present significant challenges. Poor air quality, for example, can cause serious health problems, especially among vulnerable groups including children, older people and those with existing conditions such as asthma, heart or lung disease.

The new draft Mayor's Air Quality Strategy, due to be published later this year, will set out a package of proposed actions to improve London's air quality and reduce emissions from transport. TfL contributed to the development of the strategy over the past year and will continue to be instrumental in further reducing public transport emissions, as well as influencing those from private road transport.

The Mayor, through TfL, will continue to seek to reduce noise impacts from transport by promoting smoother driving and the use of quieter vehicles. He is also looking to help boroughs limit impacts by researching the effectiveness of alternative speed control measures to road humps. TfL also continues to work on reducing the noise impacts of its operations.

TfL continues to implement measures that help protect and enhance the built and natural environment, creating attractive streets and spaces that are a pleasure to use.



The draft Mayor's Air Quality Strategy

The Mayor is required to work towards the UK Government's air quality objectives, which are based on EU limit values. The draft strategy, due to be published this year, will set out the Mayor's proposed actions to improve the Capital's air quality by addressing emissions from a range of sources, including PM₁₀ and NO_x emissions from transport.

The Mayor is committed to taking bold action to reduce air pollution from London's transport system. Measures that will directly

or indirectly reduce emissions of PM₁₀ and NO_x include promoting a shift to cleaner forms of transport, investing in walking and cycling, the LEZ, continuation of the central London Congestion Charging scheme, and freight delivery and service plans. The transport initiatives proposed by the draft strategy will help to further improve London's air quality.

Air emissions reduction

PM₁₀ and NO_x are the principal air pollutants from TfL operations and arise from vehicle combustion engines. TfL is committed to reducing these emissions, including from taxis and PHVs, by 50 and 40 per cent respectively by 2017/18, compared to a 2005/06 baseline.

NO_x

During 2009/10, TfL recorded 8,150 tonnes of NO_x emissions, with London's bus fleet accounting for three quarters of this. The fleet is one of the cleanest in the UK for its size and its NO_x emissions fell by two per cent because of continued investment. On average,

500 of the oldest buses in the fleet are replaced each year with the latest Euro standard vehicles available.

While the increase in total emissions last year is mainly due to improved reporting and changes to the taxi and PHV fleet, overall emissions are six per cent lower than 2005/06 levels.

TfL's standard bus replacement programme is expected to deliver further, more significant reductions over the coming years.

The Mayor's priority programme – cycling

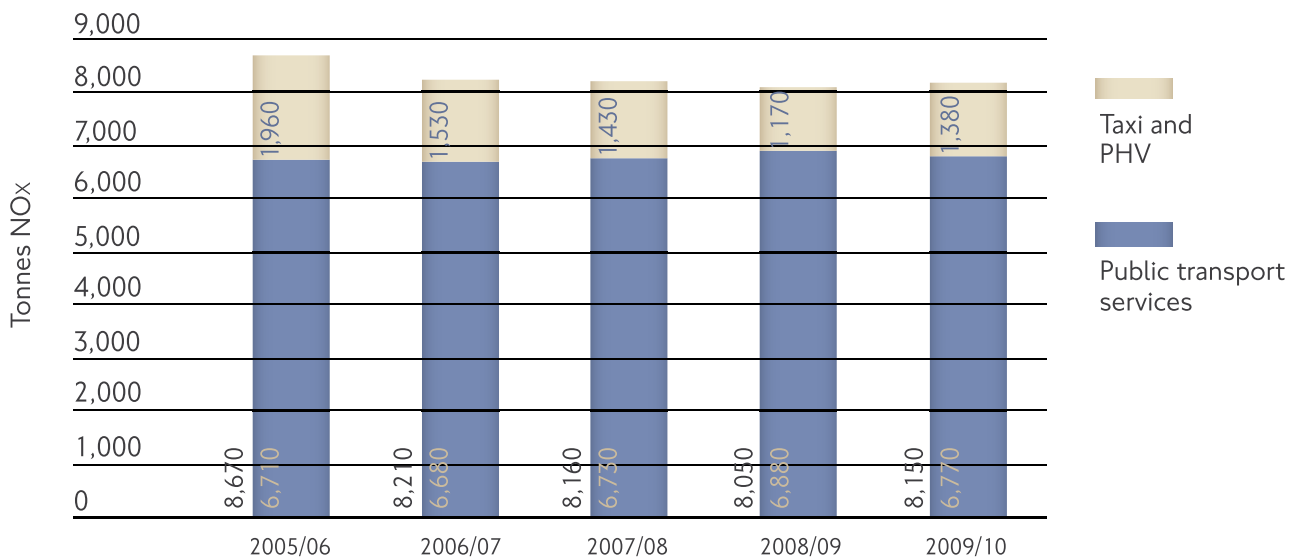
A host of initiatives took place during 2009/10 supporting the Mayor's pledge to create a cycling revolution in London. These include the preparation for two major schemes, Barclays Cycle Hire and Barclays Cycle Superhighways.

Barclays Cycle Hire

When fully rolled out, a total of 6,000 bicycles will be available for hire from across central London. The bikes offer a fast, easy and economic alternative to the bus, Tube and car, as well as being a greener and healthier way to travel.



Total NOx emissions from TfL operations



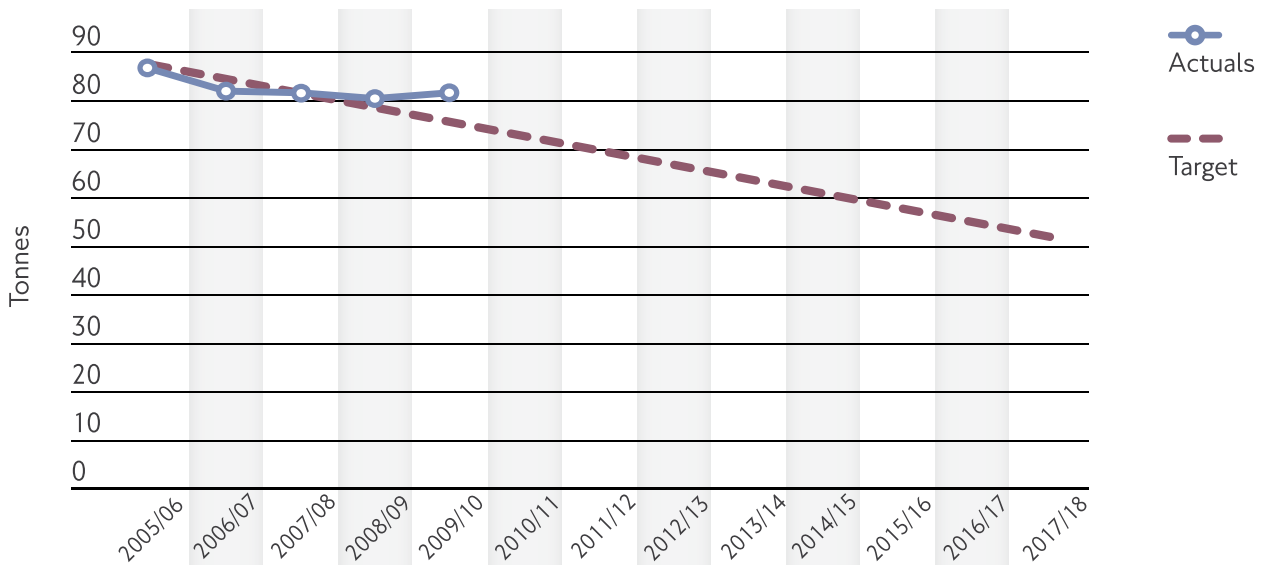
Barclays Cycle Superhighways

These are designed to improve conditions for existing cycling commuters and encourage more people to cycle to and from work. Twelve radial routes going from Outer London into the centre will provide safer, fast, direct and continuous access along recognised commuter roads. They will be identified by their blue road surfacing and distinct signage. Following the delivery of two pilots in summer 2010, a rolling programme of routes will be completed by 2015.



NO_x target of a 40 per cent reduction in total emissions from TfL's operations

Includes emissions from public transport services, taxis and PHVs



In 2012, the New Bus for London will be introduced, which will incorporate the latest hybrid technology and be 40 per cent more fuel efficient than conventional diesel buses. TfL's hybrid bus programme will also help cut air pollutant emissions and the draft MAQS contains a number of proposals aimed at reducing emissions from taxis and PHVs.

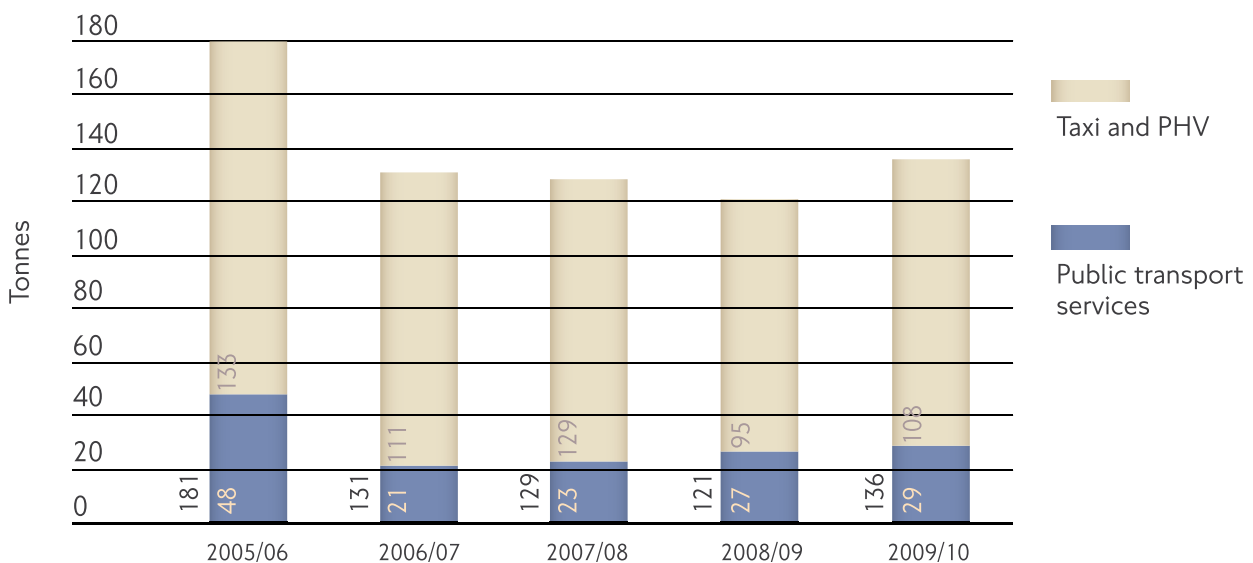
of PM₁₀ exhaust emissions from its operations, with taxis and PHVs accounting for around 80 per cent. This year's improved data collection and fleet expansion has caused their emissions to increase.

PM₁₀

Over the reporting year, TfL recorded 136 tonnes

As performance from the fleets cannot be directly compared with previous years, figures for taxis and PHVs have been separated from those associated with TfL's other operations.

Total PM₁₀ emissions from TfL operations



Buses are responsible for a relatively small proportion of TfL's total PM₁₀ emissions (around 10 per cent), due to improvements introduced by the organisation over the past decade. All Euro II and III buses were fitted with particulate filters which cut PM₁₀ emissions by around 90 per cent. However, more recently, emissions of PM₁₀ from buses have seen a slight rise as a result of increased mileage across the network, and greater numbers of Euro IV buses coming into the fleet. Manufacturers have been asked by TfL to reduce their PM₁₀ emissions below that of the European limit.

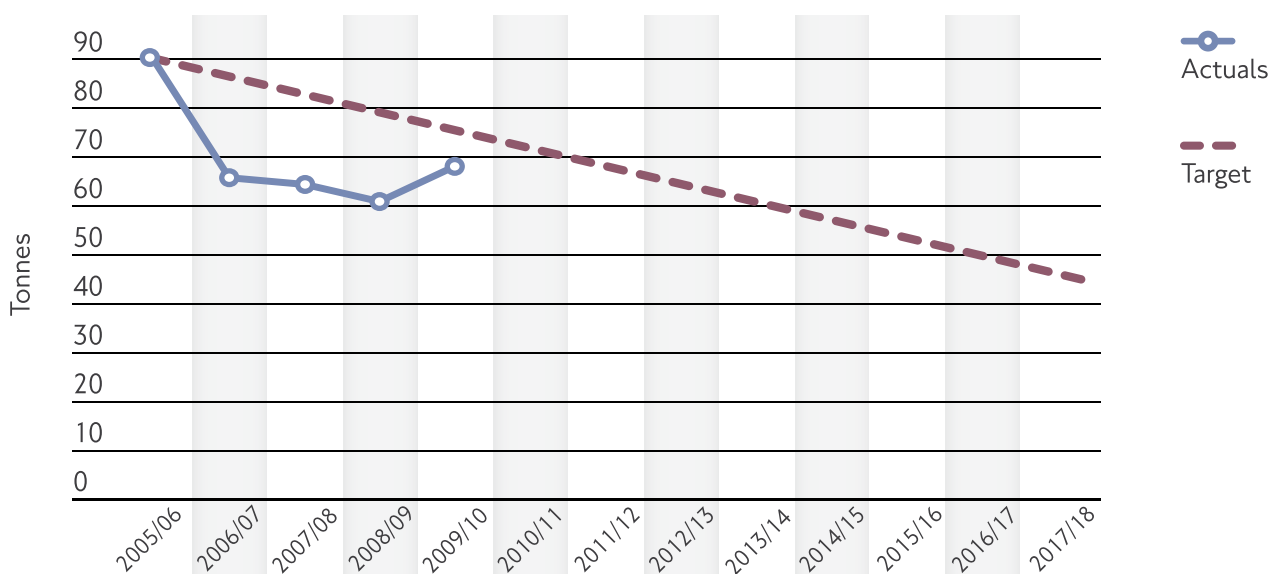
The remaining emissions are principally associated with scheduled passenger services on the Thames, including the Woolwich Ferry.

These have remained relatively constant despite an increase in services. The use of ultra-low sulphur fuel, which significantly reduces sulphur dioxide and PM₁₀ emissions compared to the more polluting standard marine diesel, was introduced last year.

While the increase in total PM₁₀ emissions from TfL operations compared with last year is mainly due to improved reporting plus taxi and PHV fleet changes, overall emissions still remain 26 per cent lower than in 2005/06. Going forward, emissions are expected to reduce further in line with the target.

PM₁₀ target of a 50 per cent reduction in total emissions from TfL's operations

Includes emissions from Overground, taxis and PHVs, river services and buses





Noise

TfL supports the delivery of the Mayor's Ambient Noise Strategy for London. It is reducing traffic noise from the road network by using lower noise road surface materials on the TLRN (around 74 per cent of the network is now covered with these materials) and quieter engines in the bus fleet.

Many of TfL's efforts to introduce low carbon and lower air pollutant vehicles, such as hybrid buses and EVs, will also reduce noise.

TfL monitors the number of noise complaints it receives. Largely because of the increase in LU's activities following the integration of Metronet into TfL in May 2008, noise complaints rose (643 in 2009/10 compared to 411 the previous year).

TfL seeks to address and resolve these issues in an effective and timely manner. It also undertakes measures, where feasible, to limit noise and vibration levels associated with construction activities.

LU is developing a map of noise sensitive locations so that, at the start of maintenance and project works, it can ensure action is taken to minimise the impact of its activities.

Quality of the built environment

London's public transport network forms a key feature of the urban realm and ongoing maintenance by TfL helps enhance it. This includes preserving historic TfL buildings and infrastructure, cleaning up litter and graffiti, and addressing vandalism on the network. When developing new transport infrastructure, TfL aims to ensure that all projects are delivered to high standards to provide an enjoyable passenger experience.

Customer satisfaction with aspects of the built environment managed by TfL, for instance station cleanliness, shows a steady improvement over the past few years. This is because of a concerted effort by TfL to ensure better standards of cleanliness and maintenance across all services.

All pedestrian guardrails on the TLRN have now been assessed, enabling TfL to meet its overall target to take away 60km of redundant guardrail by 2010. This will achieve a better balance between the needs of vehicles and other road users and improve the look, feel and quality of the Capital's streets.

Over the course of the year TfL undertook a number of other urban realm improvements including a £6m facelift of Woolwich town centre, making it safer and more attractive for



pedestrians, cyclists and road users. The work was carried out in partnership with Greenwich Council and has delivered benefits such as wider pavements and more space to reduce crowding at bus stops.

The intersection of Regent Street and Oxford Street is one of the busiest urban zones in Europe and its layout has been dramatically improved by the opening of the new Oxford Circus diagonal crossing in November 2009. People can now cross diagonally and this, along with widened footways and pedestrian crossings, is helping to reduce overcrowding and improve pedestrian flow across the junction. With 200,000 pedestrian movements each day at Oxford Circus, the scheme will play an important part in improving pedestrian conditions and helping the West End to maintain its popularity as a leading shopping district.

The natural environment

London's rail and road network provides essential habitats for wildlife across the city. The Mayor is committed to protecting and conserving the Capital's open spaces and TfL is working hard to enhance the natural environment where possible. The Mayor has committed to planting 10,000 trees by 2012 in areas where few currently exist and that would benefit the most. Over the year, TfL also planted 600 trees on the TLRN.

These new trees will help to improve the look and feel of the Capital's natural environment.

LU and the Royal Society for the Protection of Birds (RSPB) ran a photography competition in 2009 to encourage Londoners to discover the Capital's wide variety of birds, highlighting how easy it is to explore the city's green spaces and wildlife using the Tube.

TfL continues to improve wildlife and habitat management before, during and after projects and maintenance works. One example is the inclusion of LU ecology survey data in a geographical information system that helps to ensure existing habitats and wildlife populations are protected.

TfL is also building wildlife habitats on its land. A large living roof has been installed at LU's Grade II listed headquarters at 55 Broadway, demonstrating that modern technologies can be retro-fitted to improve the efficiency of historic buildings. Vegetation provides a natural habitat so encourages biodiversity in the area, while solar panels generate carbon-free electricity for the building. The roof also provides enhanced insulation for the building, improves flood resistance and controls temperatures to reduce running costs.

A living roof has also been installed at a new bus driver facility in the terminus at Dagenham Dock, which was formerly a vacant brownfield site. It is planted with sedum – a hardy alternative to grass – which is evergreen, drought-resistant and capable of withstanding extreme weather conditions. TfL received an award from the Royal Institute of British Architects acknowledging the considerate design of the facility.

In December 2009, the Mayor launched a £150,000 fund to help Londoners grow their own food in under-used areas of the Capital. TfL, as one of the signatories, committed to providing a brownfield site above Southwark Tube station which will be leased to local people so they can grow a range of fruit and vegetables. Also in support of the campaign, LU announced that a new 'fruit and vegetables' category will be created in its annual staff gardening competition, Underground in Bloom, starting in 2010/11.

Next steps

Initiatives to further improve TfL's operational performance in 2010/11 include:

- Publication of a revised LU Biodiversity Management Action Plan
- The opening of TfL's energy efficient West Ham bus garage, which includes a living green roof
- Introducing a small fleet of zero-emission hydrogen buses on to London's streets

Crossrail's Wallasea Island project

Crossrail intends to use material excavated during construction works to create a large wildlife reserve at Wallasea Island, eight miles north of Southend-on-Sea in Essex.

Clay, chalk, sand and gravel will be transferred by ship to the island. The RSPB will then use it to create 1,500 acres – nearly 2.5 square miles

– of tidal wildlife habitat. It will form one of the largest new wetland nature reserves in Europe for some 50 years and is expected to support a wide range of waterfowl, saltwater fish and plant species.

Development of Wallasea Island, expected to start in 2011, will be the most important coastal habitat creation scheme in the UK.



Making better use of resources

Targets

- Recycle 70 per cent of C&I waste by 2017/18
- Reuse or recycle at least 90 per cent of C&D waste over the period to 2017/18, and to achieve 95 per cent in 2017/18

KPIs

- Status against the Mayor's Green Procurement Code
- Amount of office paper consumed across the TfL Group
- Amount of C&I waste produced and the proportion recycled
- Amount of C&D waste produced and the proportion recycled

Background

Reducing fossil fuel use, improving water efficiency, cutting waste and increasing reuse and recycling can all help to save money, preserve natural resources and tackle climate change.

The Mayor is developing a Municipal Waste Strategy (for household and business waste collected by local authorities) and a Business Waste Strategy (for C&I and C&D waste).

The vision is for London to move to a culture of waste minimisation and reuse, high quality recycling and low carbon energy generation from waste. It is proposed to have a target for 80 per

cent of all the Capital's waste to be recycled or composted by 2031. The Mayor set up the London Waste and Recycling Board to support initiatives that help the delivery of his goals.

TfL has taken great strides in this area in recent years. More and more materials get recycled, and there has been an increasing focus on reducing and reusing waste at source.

Fuel and electricity are the main resources used by TfL and the organisation's performance on energy consumption is detailed earlier in this report. It also seeks to minimise water used for operational purposes and across head offices. Through its Responsible Procurement Policy, and in line with the Mayor's Green Procurement Code, TfL also monitors suppliers' management of waste and wider use of resources.

Waste management

Station, depot and office waste (or C&I waste)

This year TfL collected more waste from stations, depots and offices than ever before, resulting in a five per cent rise in waste being reported by the organisation. As with previous years, litter left by passengers in stations and on TfL services, notably newspapers, accounts for the majority of waste collected.

The proportion of waste being recycled has increased from 38 per cent to 46 per cent. In particular, significant progress has been made on the Underground, which also recycled 46 per cent of waste collected. This has been achieved through ongoing measures including

a separate collection of newspapers while trains are being cleaned.

While the Overground accounts for only seven per cent of TfL's C&I waste, the proportion it recycles has dramatically increased and now stands at 49 per cent, compared to six per cent the previous year. This is due to a variety of initiatives including introducing recycling facilities for newspapers and plastics at almost all stations, ongoing recycling efforts during train and station cleaning, and projects at the depots and operator's head office.

TfL is also focused on increasing the amount of waste it recycles from bus stations and offices. There are now 33 stations and area offices that recycle waste, and facilities are in place at all six Dial-a-Ride depots.

TfL's head office buildings recycled 62 per cent of office waste – the remainder was sent to an energy recovery facility, ensuring nothing went to landfill. This achievement was largely due to a new programme to improve recycling facilities across the estate, including the introduction of more recycling bins. There is also a long-term target of providing food recycling facilities in all



office kitchen areas. In addition, communications about recycling improved with a dedicated section on the TfL intranet and performance reported in building recycling leagues.

C&D waste

This type of waste typically comes from TfL’s construction projects, track repair and maintenance, the demolition of buildings and structures and road maintenance. The amount will vary according to the plan of activities scheduled for the year. For instance, less waste is typically produced as a project reaches completion.

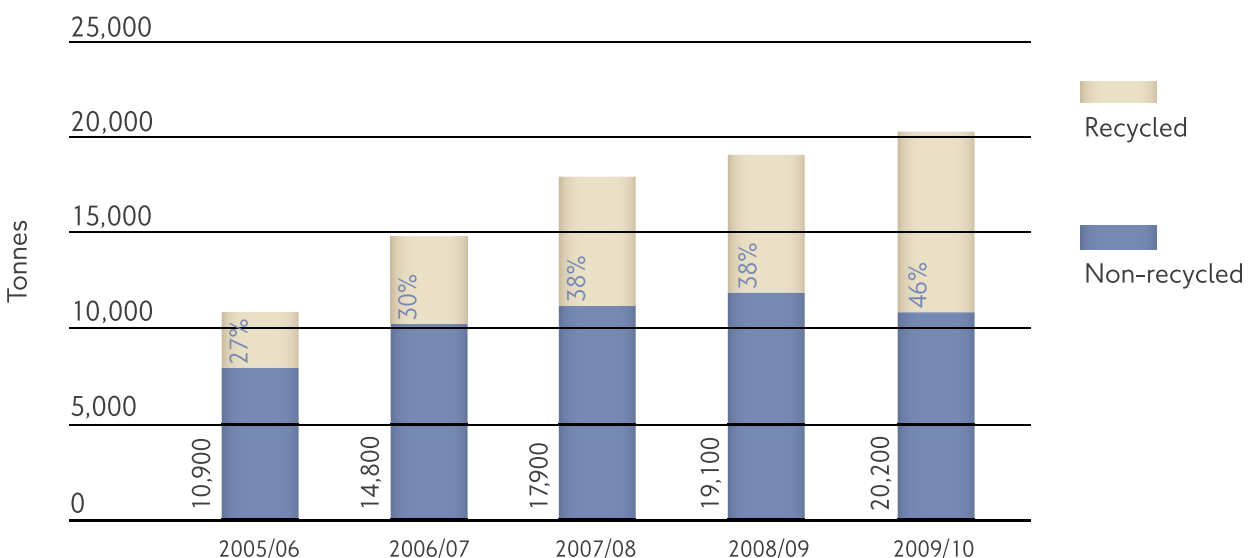
As with last year, waste associated with maintaining the TLRN, upgrading and maintaining the Tube and major construction work on the

East London line accounted for the majority reported. The total volume of waste fell by nine per cent to 570,000 tonnes.

This reporting year saw the start of waste arising from the early stages of Crossrail construction. This currently accounts for four per cent of TfL’s reported total waste but this will rise as major construction increases over the next few years.

The suitability of materials for reuse and recycling will depend on the type of waste generated, and as such the amount that can be recycled may vary year on year. The proportion of construction waste recycled fell slightly compared to last year, but the totals remain high at 82 per cent. Examples of how this was achieved include:

Total annual station, depot and office waste from TfL operations

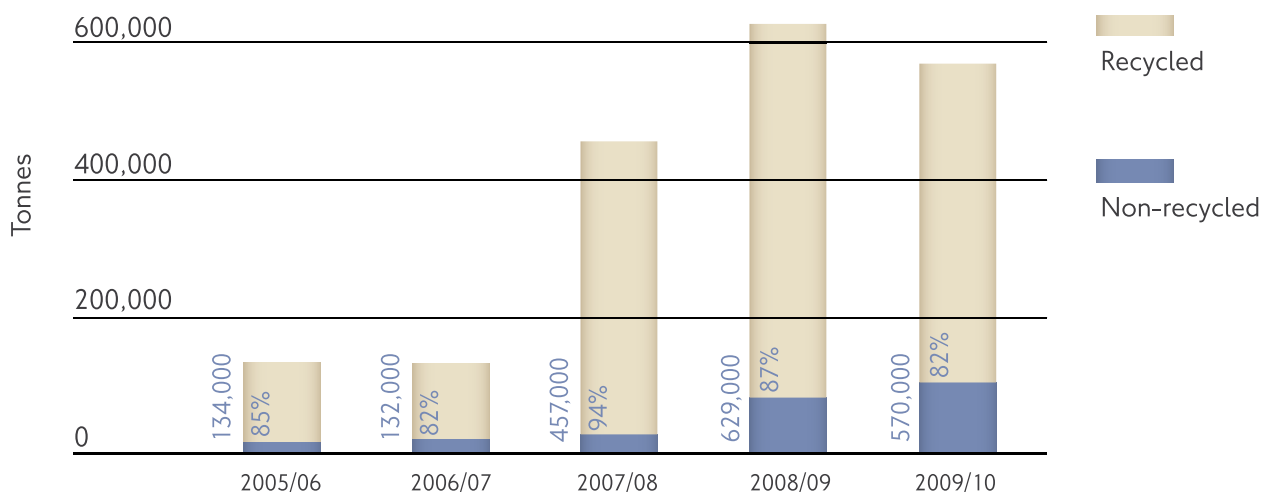


- Reusing 3,000 tonnes of demolition waste on-site as permanent backfill material^v for the works to extend the East London line
- Sending in excess of 6,800 tonnes of clay from LU's Green Park step-free access project to Hoo Island in the Medway estuary to help build a haven for wild birds
- More than 60,000 tonnes of C&D waste being recycled or reused by London Streets highways maintenance and works contractors

Hazardous waste

This accounts for six per cent of TfL's total reported waste, an increase on the previous year because hazardous material generated during the East London line construction was disposed of during the reporting year. TfL ensures its construction contractors have processes in place to deal with contaminated material according to good practice and the necessary regulatory requirements.

Total annual construction waste from TfL operations



Water consumption

Water consumption has risen by four per cent, largely because of more accurate data being collected across the organisation.

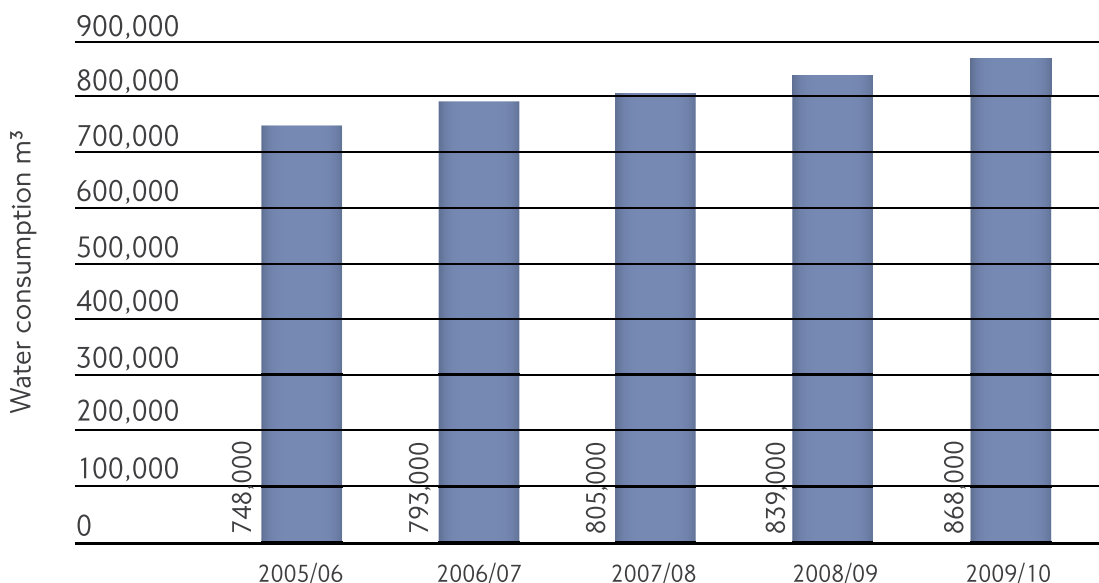
Water needed for operational purposes, for example in train washes and at depots and stations, accounts for the majority of TfL's total use. The organisation aims to minimise its consumption by choosing appliances that use less water and by recycling water for train and vehicle washing where possible. For example, LU's Cockfosters depot has a rain water harvester which recycles water that falls on to the depot shed. The recycled water is then used to clean the Piccadilly line fleet, saving around 700m³ of mains water annually.

Consumption per occupant at TfL's head office buildings is 6.1m³, better than Defra's best practice standard. This is an improvement on previous years thanks to the continued roll-out of water-saving devices such as dual flush toilets and trials of different types of taps that help cut waste. In addition, innovative schemes such as rain water harvesting at Palestra, TfL's office in Southwark, continue to generate significant water and financial savings.

Paper consumption

TfL purchased 511 tonnes of paper in 2009/10 for head office buildings, with nearly all of it coming from recycled sources. This figure has increased because of improvements in data collection and the inclusion of Crossrail for the first time.

Annual water consumption from TfL operations



The Mayor's Green Procurement Code

The code helps organisations reduce their environmental impact through responsible purchasing. Those that sign up^{vi} commit to achieving progressive targets and are awarded bronze, silver or gold status as a mark of their success.

For the second year running, TfL achieved gold status for its activities. This is the highest level an organisation can achieve and is a clear demonstration of TfL's commitment to responsible procurement. TfL is one of 16 organisations to have reached this standard.

TfL is also one of the first UK organisations independently assessed as being at the highest level of the Flexible Framework for Sustainable Procurement. The framework, developed by the Government's Sustainable Procurement Task Force, enables organisations to benchmark themselves against best practice.

Next steps

Plans to enhance performance further in 2010/11 include:

- Allowing a wider range of LU station, depot and office waste to be recycled
- A new catering contract at TfL's head offices and depots to introduce environmental improvement measures. These include the use of fresh, locally sourced produce; energy efficiency programmes; reduced packaging; and fewer transport emissions through consolidated deliveries
- Delivering responsible procurement training to all staff working in this area

TfL's new Greenwich Peninsula office

TfL has introduced a programme of improvements to reduce energy and water consumption at all head offices.

The programme combines traditional efficiency measures, such as lighting improvements and the installation of electricity and gas meters that can be read automatically, with more innovative technologies. These include solar photovoltaic and thermal energy sources plus various biodiversity schemes.

In July 2009, 1,800 staff moved to TfL's new premises at 14 Pier Walk, the first new building to be completed at the Greenwich Peninsula development next to the O2 arena. The building has received an 'excellent' rating

for its energy efficiency plus water and waste management under the internationally recognised Building Research Establishment Environmental Assessment Method (BREEAM)^{vii} standard.

A living roof has been installed at the building to help boost local ecology, improve insulation and limit the flood impact from rainfall. Inside, kitchen work surfaces are made from recycled glass that started life as windows on the 1967 Victoria line Tube carriages.

The move is a key part of TfL's property strategy to improve the overall quality and productivity of its workspace, while achieving significant efficiencies.



Summary of TfL Group environmental objectives and KPIs

Objective	KPI	Data				
		2005/06	2006/07	2007/08	2008/09	2009/10
Reduce GHG emissions	Total CO ₂ emissions from TfL operations (tonnes)	1,880,000	1,911,000	1,976,000	1,995,000	2,090,000
	CO ₂ emissions from the main public transport modes (g per passenger km):					
	TfL's operations	88	83	80	77	77
	LU	83	82	78	74	76
	Buses	93	84	84	82	80
	DLR	99	78	76	79	71
	London Tramlink	49	44	40	47	46
	London Overground			48	53	53
Reduce pollutant emissions to air	Energy consumption at head office buildings (kWh/m ²)	413	357	317	314	311
	Total PM ₁₀ emissions from TfL operations (tonnes)	181	131	129	121	136
	Total NO _x emissions from TfL operations (tonnes)	8,670	8,210	8,160	8,050	8,150
	NO _x emissions from buses (g per passenger km)	0.94	0.84	0.82	0.80	0.77
Reduce transport-related noise and vibration	Noise complaints received	479	458	529	411	643
	Percentage of TLRN with lower noise surface material	70	70	70	70	74
	Percentage of buses in fleet at least 2dB(A) quieter than the required legal limit	0	4	8	14	28
Maintain and, where possible, enhance the quality of London's built environment	No Group KPI. See detailed data tables in the appendix to this report for modal KPIs.					

Objective	KPI	Data				
		2005/06	2006/07	2007/08	2008/09	2009/10
Maintain and, where possible, enhance the quality of London's natural environment	No Group KPI					
Reduce resource consumption and improve green procurement	Status against the Mayor's Green Procurement Code	-	-	-	Gold	Gold
	Amount of office paper consumed across TfL Group (tonnes)	312	393	343	226	511
	Proportion of office paper supplied from recycled sources (%)	19	13	99	100	94
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	20,200
	Proportion of C&I waste recycled (%)	27	30	38	38	46
	Total C&D waste (tonnes)	134,000	132,000	457,000	629,000	570,000
	Proportion of C&D waste recycled (%)	85	82	94	87	82
	Proportion of total waste classified as hazardous (%)	2	9	1	2	6
Reduce water consumption	Amount of water consumed (total m ³)	748,000	793,000	805,000	839,000	868,000
	Water consumed per occupant in head office buildings (m ³ per person)	11.3	9.4	7.7	6.5	6.1

Further information

- The MTS:
www.london.gov.uk/mayors-transport-strategy
- Guidelines to Defra's GHGs conversion factors for company reporting:
www.defra.gov.uk/conversion-factors.htm
- The draft replacement London Plan:
www.london.gov.uk/london-plan
- TfL's Travel in London Report: tfl.gov.uk/til
- Draft Climate Change Mitigation and Energy Strategy:
www.london.gov.uk/climate-change-mitigation-strategy
- Draft Climate Change Adaptation Strategy:
www.london.gov.uk/climate-change-adaptation
- Draft Air Quality Strategy:
www.london.gov.uk/air-quality
- 'Sunder City', the Mayor's Ambient Noise Strategy: www.london.gov.uk/noise
- Biodiversity Strategy:
www.london.gov.uk/biodiversity
- Responsible Procurement Policy:
www.london.gov.uk/rp
- Green Procurement Code and recycling in London: www.londonremade.com
- Draft Waste Strategy:
www.london.gov.uk/waste
- Environment section on the TfL website, which outlines the organisation's overall approach and contains further details on air quality, noise plus wildlife and habitats:
tfl.gov.uk/environment

Endnotes

- i Emissions were calculated using the September 2009 Government guidance. All purchased energy (irrespective of the source of electricity) is now calculated using the Grid Rolling Average factor
- ii All figures in this report have been rounded to a maximum of three significant figures
- iii Source: The London Energy and Greenhouse Gas Inventory, 2008
- iv www.crossrail.co.uk/carbon-footprint
- v Backfill material can be used to fill excavations or voids. This may subsequently be built upon
- vi More than 800 organisations have signed up to the Mayor of London's Green Procurement Code
- vii The leading and most widely used environmental assessment method for buildings

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

Please send your comments to:

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