

Transport for London

Environment  
Report 2005



## Contents

1. <u>Environmental performance summary</u>	2
2. <u>Introduction</u>	4
2.1 Transport for London	4
2.2 Purpose of this report	4
2.3 London's environment and the transport system	5
3. <u>Managing TfL's environmental performance</u>	11
4. <u>Environmental objectives and key performance indicators</u>	12
5. <u>Environmental performance</u>	19
5.1 Tier 1 Environmental objectives	19
5.1.1 Reduce pollutant emissions to air	19
5.2.1 Reduce energy consumption	23
5.3.1 Reduce noise and vibration	26
5.2 Tier 2 Environmental objectives	27
5.2.1 Reduce consumption of resources	27
5.2.2 Maintain, and where possible enhance, the quality of London's built environment	29
5.2.3 Reduce the impacts of waste generated from TfL and contractor activities	30
5.2.4 Promote the sustainable transport of waste	32
5.3 Tier 3 Environmental objectives	34
5.3.1 Maintain, and where possible enhance, the quality of London's natural environment	34
5.3.2 Reduce pollutant emissions to water and land	34
5.3.3 Reduce consumption of water resources	36
6. <u>Moving forward</u>	37
6.1 What next for TfL?	37
6.2 Feedback	37



## 1. Environmental performance summary

In 2004/05 more passengers travelled on public transport under the responsibility of Transport for London (TfL) than ever before. While providing more and better public transport and managing the strategic road network, TfL must also manage operations so as to minimise the impact on the environment. Table 1 summarises TfL's performance in 2004/05 against its 10 environmental objectives agreed and adopted in 2004<sup>1</sup>. In this period, TfL made significant progress on seven out of these 10 environmental objectives.



Table 1: TfL environmental performance summary in 2004/05

Environmental objective	Comments on progress
Reduce pollutant emissions to air	TfL has reduced emissions of fine particles by 28 per cent in comparison to 2003/04. This is primarily due to the fitting of particulate traps to buses
Reduce energy consumption, implement efficiency measures and increase the use of renewable energy to reduce greenhouse gas emissions	Renewable energy purchase by LU has increased by 3.7 per cent since 2003/04 to 17.9 per cent. TfL continues to invest in sustainable technologies such as solar power
Reduce noise and vibration by promoting the use of quieter travel modes and vehicles, reduce the noise generated by vehicle use and control the levels of transport noise on sensitive locations	Plans are in place to make progress on this objective
Reduce consumption of resources, implement efficiency measures and recognise where resources are consumed to reduce the adverse effect on the environment through environmentally preferable procurement and trading	TfL has increasingly moved towards e-documentation to reduce paper usage. Examples include the digitising of staff files and the launch of an online job application process. TfL is developing a green procurement programme, to be delivered during 2006/07
Maintain, and where possible enhance, the quality of London's built environment	TfL has published Streetscape Guidance to encourage good practice in this regard. Efforts to tackle envirocrime continue
Reduce the impacts of waste generated from TfL and contractor activities through minimising consumption and promoting re-use and recycling	Significant amounts of both commercial and industrial, and construction and demolition waste were recycled
Promote the sustainable transport of waste	A London Freight Plan is being developed and will be published in 2006. TfL's new Freight Unit, which has a dedicated waste freight co-ordinator, is promoting the sustainable transport of waste
Maintain, and where possible enhance, the quality of London's natural environment	Biodiversity surveys continue
Reduce pollutant emissions to land and water	There were no major incidents
Reduce consumption of water resources and implement efficiency measures	TfL has recorded an approximate six per cent reduction in water consumption (LU and head offices) in comparison to 2003/04.



## 2. Introduction

### 2.1 Transport for London

TfL was created in 2000 as the integrated body responsible for the Capital's transport system. This includes London Buses, London Underground (LU), Docklands Light Railway (DLR) and the regulation of Croydon Tramlink and London River Services. TfL also runs Victoria Coach Station and London's Transport Museum and is responsible for the 580km Transport for London Road Network (TLRN) and all of London's 6,000 traffic lights. In addition, TfL manages London's Congestion Charge and regulates the city's taxis and private hire trade. TfL's responsibilities also extend to the development of strategies to encourage walking and cycling as practical and sustainable modes of transport in London. Finally, TfL supports the London boroughs to deliver local transport improvements.

Accountable to the Mayor of London, TfL takes full advantage of its power to minimise environmental impacts while maximising sustainable transport and implementing the Mayor's environmental strategies. All policies within the Mayor's spatial development strategy, The London Plan<sup>2</sup>, are set within an overarching vision of sustainable development\*. The Mayor's Transport Strategy<sup>3</sup> sets out policies and proposals to improve transport in London, while the Mayor's five environmental strategies\*\* seek to safeguard the environment and enhance quality of life.

One of the main aims of TfL is to increase the use of public transport and other more sustainable modes of travel, while reducing reliance on private cars. TfL's activity to encourage more people to use public transport in London has seen year-on-year improvements.

#### Achievements to date include:

- A modal shift of four per cent from car usage to public transport since 2000<sup>4</sup>
- In 2004/05 there were 4.8 million bus journeys per day, an increase of almost 30 per cent from 3.9 million in 2000<sup>5</sup>. In total there were almost 1.8 billion bus passenger journeys in 2004/05 which was an increase of roughly five per cent compared to 2003/04
- Passenger numbers have risen on London's Tube network. In 2004/05 LU carried 976 million passenger journeys, the largest number ever to have used it in a single year<sup>5</sup>
- In 2004/05, average daily bicycle flows on London's major roads increased by 32 per cent compared with figures for 2000<sup>5</sup>.

TfL plays a key part in delivering the Mayor's vision of sustainable development. With regard to the environment, TfL is working to minimise its environmental impacts and protect the environment. TfL must do this in the context of forecast increases in population and employment<sup>2</sup>. TfL's performance is reported and measured by environmental objectives and associated Group key performance indicators (KPIs).

### 2.2 Purpose of this report

TfL has made substantial progress in working towards an improved environment for London. This report describes how TfL's activities affect the Capital's environment, outlines achievements during the 2004/05 financial year (since TfL's Environment Report 2004<sup>1</sup>) and presents future plans TfL is taking to improve its environmental performance still further. This report also quantifies KPIs to measure performance against each environmental objective.



### 2.3 London's environment and the transport system

London bears the daily pressure of 7.3 million residents, plus workers and tourists, creating waste, consuming energy and driving cars - all of which can have an impact on the environment. In terms of transport, on an average day, there were more than 27 million journeys in Greater London in 2005 (see Figure 1).

\* Sustainable development is the term used to describe the strategic balance between economic growth, social inclusion and environmental protection. Mobility, accessibility and transport provision are key elements of sustainable development.

\*\* Biodiversity; Air Quality; Municipal Waste Management; Ambient Noise; and Energy.

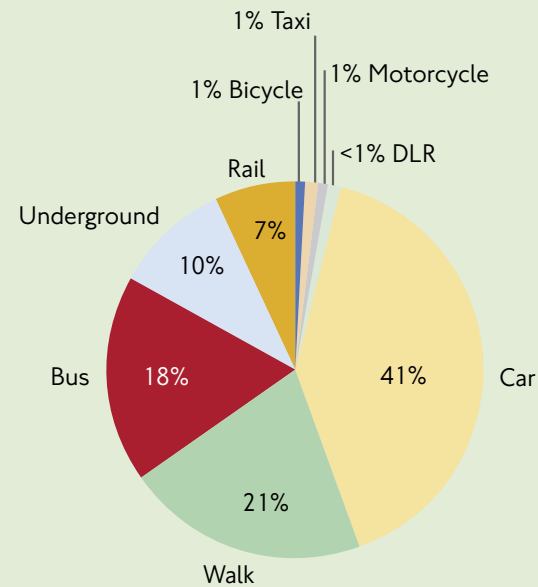


Figure 1: Modal shares of daily journeys in London (2004)

Source: Figures in Table 1.1.1 London Travel Report 2005<sup>5</sup>

As stated earlier, the Mayor has produced five environmental strategies which seek to protect the environment and improve quality of life. These are:

- Air Quality – Cleaning London’s Air<sup>6</sup>
- Ambient Noise – Sounder City<sup>7</sup>
- Biodiversity – Connecting with London’s nature<sup>8</sup>
- Energy – Green light to clean power<sup>9</sup>
- Municipal Waste Management – Rethinking Rubbish in London<sup>10</sup>.

Many of the key environmental problems arising from transport activity in London are set out in these strategies. These include the emission of pollutants which lead to poor air quality, carbon dioxide (CO<sub>2</sub>) emissions causing climate change, ambient noise, resource consumption, waste production and impacts upon the built and natural environments. TfL’s environmental objectives relate to the Mayoral strategies and directly to each of these issues.

**Air quality**

Air pollution can affect people’s health and quality of life. It particularly affects the most vulnerable in society such as, the very young, older people and those with pre-existing heart and lung conditions. In 2005, around 1,000 early deaths and the same number of hospital admissions in London were likely to be due to air pollution<sup>11</sup>.

In 1999, the European Union (EU) first introduced legally binding targets (air quality limit values) for national governments to reduce air pollution to levels at which no or minimal effect on human health are likely to occur<sup>12</sup>. In response to this, the Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published in January 2000<sup>13</sup>.

The Strategy sets National Air Quality Objectives for nine air pollutants to protect health. The Mayor has a statutory duty to achieve seven of the objectives in London<sup>6</sup> and the city is on target to meet these objectives except for nitrogen dioxide (NO<sub>2</sub>) and fine particles (PM<sub>10</sub>)\*. Reducing pollution from individual vehicles and reducing overall traffic levels is a key part of the Mayor’s Air Quality Strategy.

\* Particulate matter with an aerodynamic diameter of 10 microns (10µm) or less, small enough to penetrate the lungs<sup>6</sup>

**Energy**

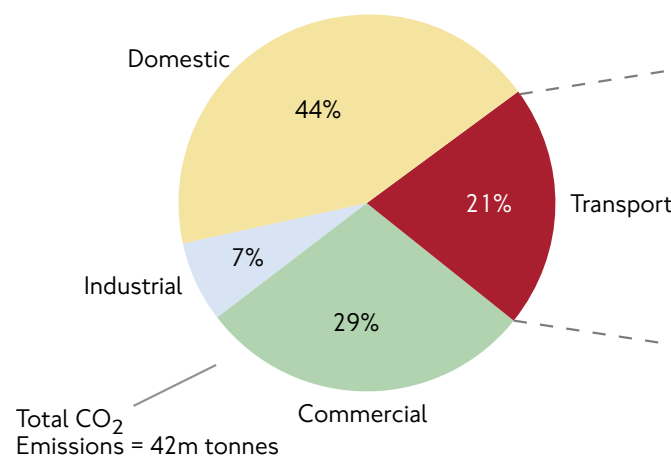
Energy use has environmental effects, a major one being climate change. There is a broad international consensus that the global climate is being affected by human-induced emissions, termed ‘greenhouse gases’, and that unless action is taken to reduce these emissions significantly, the effects of climate change on society worldwide could be extremely serious. There are six principal greenhouse gases, with CO<sub>2</sub> the most important by virtue of the huge quantities emitted. CO<sub>2</sub> is produced whenever carbon based fuels are burned<sup>9</sup>.

Transport is a significant consumer of energy in London. Figure 2 shows that transport is responsible for about 21 per cent of all CO<sub>2</sub> emissions in London of which road traffic accounts for around 80 per cent. The Mayor’s Transport Strategy seeks to reduce traffic in central London by 15 per cent by 2010. It also supports the London Plan in providing sustainable transport solutions as part of the wider city development. This will help reduce road transport’s emissions of CO<sub>2</sub>.

Climate change has potentially severe implications for London’s future. The risk of flooding, storm damage, overheating, subsidence and water shortages are likely to arise in London as climate change takes place. In addition, London’s financial services sector is likely to be impacted by both domestic and global instances of extreme climate change<sup>14</sup>. The UK, as a signatory to the Kyoto Protocol, has committed to reducing its greenhouse gas emissions. In February 2004, the Mayor published the Energy Strategy for London<sup>9</sup>, which set out aims to reduce energy consumption and to cut CO<sub>2</sub> emissions by 20 per cent on 1990 levels by 2010, in line with the UK Government’s Energy White Paper targets.

In 2005 the Mayor launched the London Climate Change Agency (LCCA) to encourage business and political leaders to tackle climate change by delivering low and zero-carbon projects and services. The LCCA will complement initiatives under the already established London Hydrogen

Carbon dioxide emissions from London



Contributions to transport emissions  
Based on energy usage

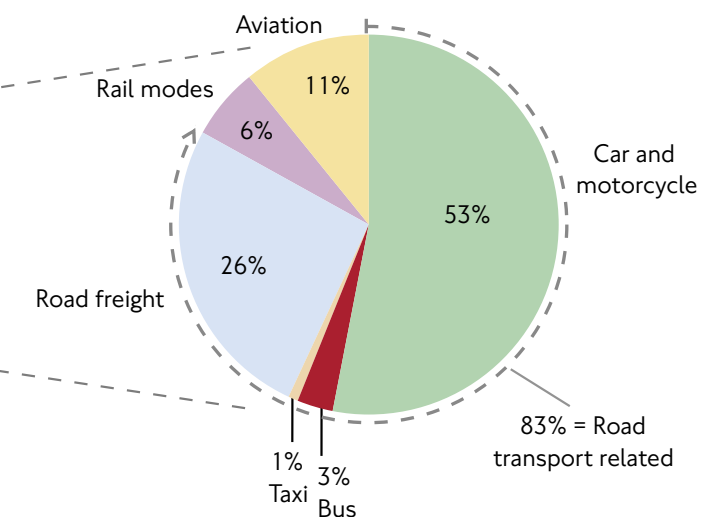


Figure 2: Carbon dioxide emissions and contributions to transport emissions, 1999 figures

Source: Greater London Authority (GLA)<sup>9</sup> and London Travel Report 2004<sup>5</sup>



Partnership and the London Energy Partnership, which facilitate work on climate change and air quality. TfL is working closely with the Mayor and these agencies to identify and pursue initiatives with the potential to reduce transport-related greenhouse gas emissions.

**Ambient noise**

Ambient noise is ongoing unwanted sound in the environment<sup>7</sup> and population exposure is often higher where transport and buildings are concentrated. Busy roads, major rail corridors and aircraft are the main sources of ambient noise in London<sup>7</sup>. Recognition of its importance is growing and noise is increasingly seen as a quality of life issue<sup>15</sup>.

**Resource consumption**

Unsustainable resource consumption is recognised as one of the biggest problems that the Capital faces<sup>16</sup>. An analysis of Greater London calculated that Londoners consumed 49 million tonnes of materials in 2000 – 6.7 tonnes per person. The study also identified that 27.8 million tonnes of materials were used by the construction sector, the single largest consumer, which includes major transport developments.

**Built environment**

The condition of London’s buildings and transport infrastructure significantly affects the public’s sense of well-being and security. Actual and perceived levels of environmental crime, such as litter and graffiti, are often used as measures of quality of life<sup>17</sup>.

**Waste**

London produces approximately 17 million tonnes of waste every year. The Mayor’s Municipal Waste Strategy focuses on municipal waste (4.4 million tonnes), which is collected by the London boroughs, primarily from households. Thirty-eight per cent of London’s waste is commercial and industrial, representing the largest proportion of the total waste generated (6.4 million tonnes)<sup>10</sup>. TfL’s waste is classified as commercial and industrial, it also produces construction and demolition waste which is the second largest type of waste produced in London (see Figure 3).

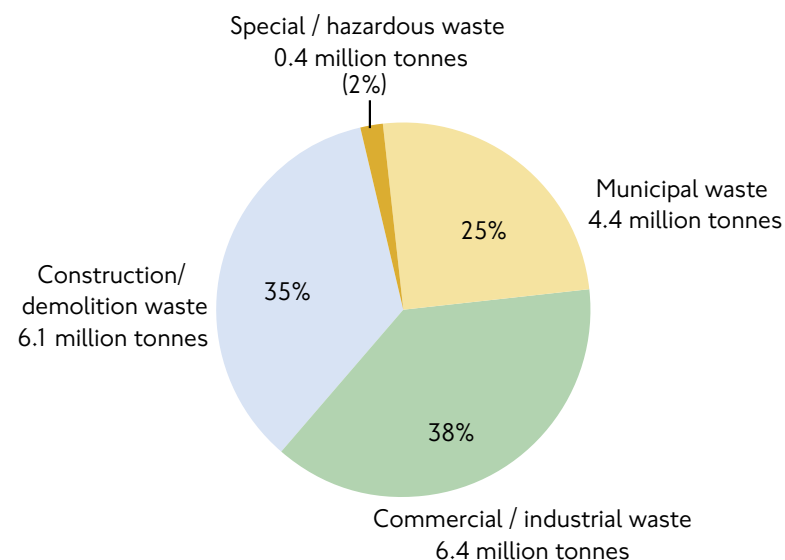


Figure 3: Waste in London by type (Source: Enviros, 2003)<sup>17</sup>



**Natural environment**

London contains a large proportion of open space with two thirds of the land area occupied by green spaces and water<sup>8</sup>. In addition to the areas of woodland, heath, wetlands, parks and city squares, it also contains important wildlife corridors along the waterway and railway networks.

**Water consumption**

The Capital has a high-quality, reliable water supply, much of which is sourced from outside the city. However, the concentration of people and services within London can lead to pressure on supplies during periods of prolonged hot weather when water usage increases. Almost half of the water consumed in London in 2000 was by households (432 billion litres). The total amount used by commercial and industrial users such as TfL (195 billion litres) is less than the volume lost through leakage (239 billion litres)<sup>16</sup>.





### 3. Managing TfL's environmental performance

Monitoring the organisation's environmental impacts and improving environmental performance are recognised by TfL as very important. TfL demonstrates its active management of its operations to ensure that it is environmentally responsible and an effective user of resources. TfL takes a systematic approach to managing Health, Safety and Environment (HSE) and is establishing aligned approaches to HSE management across the organisation through the implementation of HSE Management Systems (HSE MSs). A group HSE MS has been developed that sets out the requirements for the directorates' HSE MSs. However, the extent of implementation of HSE MSs is not uniform across the directorates, and in general, incorporation of health and environment matters lag behind safety, due to safety being a higher priority for TfL. Where health and environment are not adequately addressed, plans to improve this are being developed.

Principal responsibility for delivery of environmental performance improvements lies with the individual directorates which identify issues, put in place plans to address them and execute the programmes. An Environmental Liaison Group (ELG), which consists of managers and others with environmental responsibilities within TfL, meets

regularly to review and improve TfL's environmental performance by sharing best practice within TfL and with other bodies, particularly the Greater London Authority (GLA) and the other Functional Bodies. The Safety, Health and Environment Committee (SHEC) of the TfL Board reviews the environment related elements of the Business Plan, the Sustainable Development submission to the GLA and performance reports.

TfL seeks not only to comply with environmental legislation, but to demonstrate best environmental practices. The Mayor's environmental strategies and the Transport Strategy require TfL to lead by example in adopting and promoting environmental best practice in the areas of air quality, ambient noise, biodiversity, energy and waste management. Here TfL reports on its performance and outlines plans to improve environmental performance in the future.

TfL is establishing a Group-level sustainability function. This small team within General Counsel will provide director-level support on sustainability matters across TfL, in a way similar to that currently employed in HSE. It will be responsible for co-ordination of key aspects of sustainability across TfL.





## 4. Environmental objectives and key performance indicators

TfL's Environment Report 2004 presented TfL's 10 environmental objectives and reported its performance against this framework. The objectives are based on the Mayor's five environmental strategies and TfL's potential influence and actual impact on the environment. The objectives are prioritised into three tiers that reflect their importance to TfL and the level of influence and control TfL has.

During 2004/05, TfL's ELG developed a set of environmental KPIs. Their development was driven by the need to have improved methods for reporting TfL's overall environmental performance in addition to tracking individual projects, which was undertaken in TfL's Environment Report 2004.

Ideally, the KPIs should be group ones so, for instance, different modes contribute. However, not all of the environmental objectives lend themselves to quantitative measurement and there are challenges in aligning and aggregating data from different modes. In some instances, for example the number of noise complaints for LU, mode specific indicators were included either instead of, or to support, a Group KPI. Where possible, to allow greater comparability over time, KPIs are normalised by an appropriate measure, typically passenger kilometres\*. This allows KPIs to be resilient to changes in operations, for example, an increase in kilometres operated, and allows for comparison between modes of transport where appropriate.

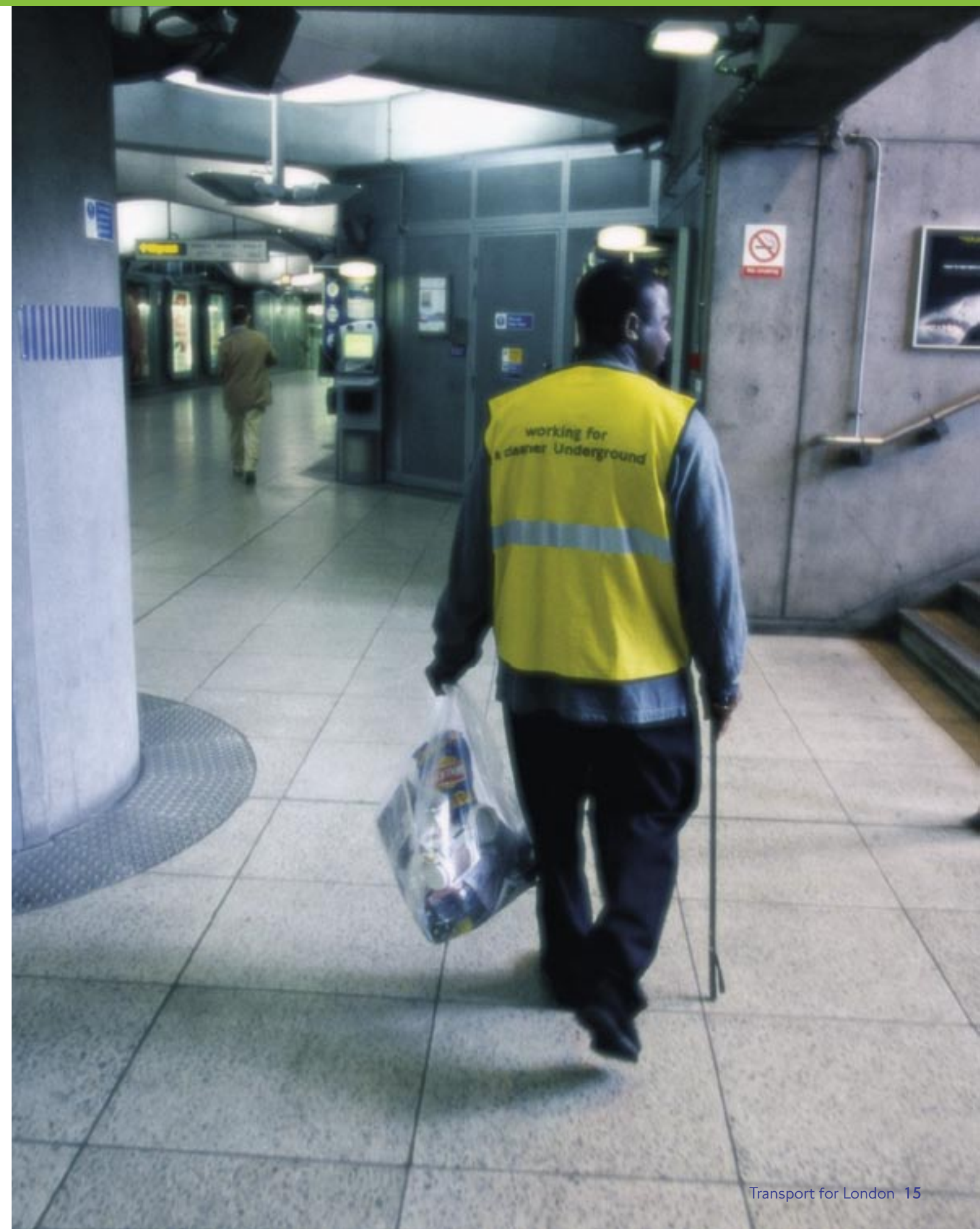
\* Passenger kilometre is a standard measure used in the transport industry and represents total distance in kilometres travelled by users of the given mode (over a specified time period, in this case per annum).

Table 2: TfL's environmental objectives and key performance indicators

Tier	Group environmental objective	Key performance indicator
1	Reduce pollutant emissions to air	<b>Group</b> <ul style="list-style-type: none"> <li>• NO<sub>x</sub> emissions: total tonnes and per modal passenger km</li> <li>• PM<sub>10</sub> emissions: total tonnes and per modal passenger km</li> <li>• SO<sub>2</sub> emissions: total tonnes (non-road transport)</li> </ul>
1	Reduce energy consumption, implement measures and increase the use of renewable energy to reduce greenhouse gas emissions	<b>Group</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> emissions: total tonnes and per modal passenger km</li> <li>• Percentage of renewable energy (of electricity portfolio)</li> </ul>
1	Reduce noise and vibration by promoting the use of quieter travel modes and vehicles, reduce the noise generated by vehicle use and control the levels of transport noise impact on sensitive locations	<b>Group</b> Investigating: <ul style="list-style-type: none"> <li>• Number / proportion of properties exposed to road traffic and rail noise levels within a given noise band</li> </ul> <b>Modal</b> <ul style="list-style-type: none"> <li>• Number of noise related complaints (LU)</li> <li>• Number of new buses entering the fleet at least 2dBA quieter than the legal requirement (Buses)</li> </ul> Investigating: <ul style="list-style-type: none"> <li>• Percentage of TLRN surfaced with SMA (stone mastic asphalt) (Streets)</li> </ul>
2	Reduce consumption of resources, implement efficiency measures and recognise where resources are consumed to reduce the adverse effect on the environment through environmentally preferable procurement and trading	<b>Group</b> <ul style="list-style-type: none"> <li>• Percentage recycled materials/products for 2004/05 top 10 suppliers, in terms of spend and volume</li> <li>• Percentage recycled materials/products for 2004/05 top 10 commodity groups, in terms of spend and volume</li> <li>• Total number of toner cartridges purchased, and recycled toner cartridges purchased, as percentage of total (normalised to office staff numbers)</li> <li>• Total tonnes of paper purchased, and recycled paper purchased, as percentage of total (normalised to office staff numbers)</li> </ul>



Tier	Group environmental objective	Key performance indicator
2	Maintain, and where possible enhance, the quality of London's built environment	<b>Modal</b> <ul style="list-style-type: none"> <li>• Scores from mystery shopper surveys (LU) and customer satisfaction surveys (other modes)</li> </ul>
2	Reduce the impacts of waste generated from TfL and contractor activities, through minimising consumption and promoting re-use and recycling	<b>Group</b> <ul style="list-style-type: none"> <li>• Tonnes of commercial and industrial waste: total and per modal passenger km</li> <li>• Percentage of commercial and industrial waste recycled</li> <li>• Tonnes/litres of hazardous waste total and percentage recycled</li> </ul> <b>Modal</b> <ul style="list-style-type: none"> <li>• Tonnes of construction and demolition waste: total (from road maintenance/ major projects)</li> <li>• Percentage of construction and demolition waste recycled (from road maintenance/ major projects)</li> </ul>
2	Promote the sustainable transport of waste	Awaiting completion of Freight Plan for suitable indicator
3	Maintain, and where possible enhance, the quality of London's natural environment	<b>Group</b> <ul style="list-style-type: none"> <li>• Percentage of TfL open land holdings which have been habitat surveyed for biodiversity</li> </ul>
3	Reduce pollutant emissions to water and land	<b>Group</b> <ul style="list-style-type: none"> <li>• Number of environmental incidents to land or water</li> </ul> <b>Modal</b> <ul style="list-style-type: none"> <li>• Number of contaminated land sites remediated (LU)</li> </ul>
3	Reduce consumption of water resources and implement efficiency measures	<b>Group</b> <ul style="list-style-type: none"> <li>• M<sup>3</sup> of water consumed: total and per modal passenger km</li> </ul> <b>Group</b> <ul style="list-style-type: none"> <li>• M<sup>3</sup> of water consumed: per occupant (head offices)</li> </ul>





The rationale for adoption of these KPIs is given in turn below.

**Air quality**

TfL has established three Group KPIs to monitor key air pollutant emissions and so reflect TfL's contribution to air quality improvement in London and allow the effectiveness of investment to be evaluated. TfL is measuring its emissions of oxides of nitrogen (NO<sub>x</sub>) and PM<sub>10</sub> because the EU and UK air quality objectives will not be met within the required time frame for the pollutants NO<sub>2</sub> and PM<sub>10</sub> (the objective is actually for NO<sub>2</sub>, which is a component of NO<sub>x</sub>).

Sulphur dioxide (SO<sub>2</sub>) is another EU and UK legislated pollutant although London will meet the national objective set and beyond. Power stations are the main source of SO<sub>2</sub> and TfL's main source is Greenwich Power Station (a back up energy supply to the national grid), which it reports to the Environment Agency.

**Energy**

TfL has established two Group KPIs, the first one being total CO<sub>2</sub> emissions reflecting the impact of TfL's energy consumption on climate change, and the second is renewable electricity use to indicate conservation of non-renewable resources. TfL has chosen to report only on CO<sub>2</sub> emissions because emissions of other greenhouse gases are negligible.



**Ambient noise**

Developing a Group KPI for noise and vibration, so that TfL can efficiently monitor transport noise impacts and performance, is challenging in terms of aligning and aggregating data from different modes. TfL is investigating a number of measures, including use of the Department for Environment Farming and Rural Affairs (Defra) London Road Traffic Noise Map<sup>18</sup>. This is likely to be used in relation to the number, or proportion, of properties exposed to particular road traffic noise levels, per unit length of road. Road traffic noise is the main contributor to ambient noise in London, and is therefore the focus of TfL's efforts. However, TfL also plans to use rail noise maps when available (Defra has indicated that it will be commissioning such mapping, the results of which is required by the European Environmental Noise Directive 49/2002/EC, to report by mid 2007).

Interim modal KPIs are used as indicators of performance. At present one exists for LU:

- Number of noise complaints reported to LU.

In future years TfL aims to present the following indicators for Buses and Streets:

- The number of new buses in the fleet at least two decibels (dBA) quieter than the legal 'type approval' (this applies from 2006/07 when these buses will enter the fleet)
- The percentage of the TLRN surfaced with quieter noise surface materials such as stone mastic asphalt.

**Resource consumption**

TfL is a large organisation and as such, purchases a wide and varied range of resources. Two Group KPIs were identified, reflecting the recycled element of the materials/products provided by TfL's top 10 suppliers and the recycled element of the top 10 commodity groups, both in 2004/05. While TfL puts into place systems to report against the Group KPIs, two interim KPIs exist - recording paper and toner cartridge usage and the proportion of both bought as recycled products.

**Built environment**

Three distinct themes have been identified as potentially meaningful for producing a Group KPI:

- *Envirocrime*: Levels of litter and graffiti, and customer perceptions around this issue
- *Condition and maintenance of operating assets*: Including lighting, footways, stations, building condition, street furniture/clutter etc
- *Local culture, heritage and architectural quality*: Issues such as protection of listed buildings and architectural recognition for new buildings.

TfL has identified an interim measure under envirocrime for the short to medium term and is looking at whether there are appropriate indicators that adequately report TfL's contribution to the quality of the built environment.

The envirocrime data is derived from TfL's surveys on 'cleanliness' and 'condition' for stations, stops, piers, buses, trains, trams and river services and graffiti on LU. While buses and rolling stock are not strictly speaking a component of the built environment, TfL considers the condition of these assets to be a significant influence on how the public perceives TfL's contribution to London's living and working environment.

**Waste**

TfL produces three categories of waste:

- commercial and industrial (C&I)
- hazardous
- construction and demolition (C&D).

Two Group KPIs measure total C&I waste and the percentage recycled. Two Group KPIs measure total hazardous waste and the proportion recycled. C&D waste from transport schemes and highway maintenance fluctuates over time, therefore the total and percentage recycled is reported as modal KPIs.





### Natural environment

The Group KPI is a measure of the proportion of open land holdings that have been surveyed for biodiversity\* and reflects the Mayor's first target for biodiversity\*\*. Surveys completed and in progress enable wildlife sites to be identified on operational land (mainly LU, but some TLRN) consistently with those identified elsewhere in London. Management plans will be developed to maintain biodiversity interest, especially in these sites and for priority and protected species. It is intended the KPI will be developed to reflect the maintenance of biodiversity interest and it is intended that progress will be measured by the net change in wildlife sites.

### Emissions to water and land

With limited routine emissions to water and land, TfL has identified the reporting of the number of accidental releases of pollutants as the Group KPI under this objective. In addition, as an organisation with extensive land holdings, the potential for land assets to become contaminated due to historical activities exists. LU has an Assessment of Environmental Harm, under the PPP contract, of which contaminated land is a component. Therefore, a modal indicator of the number of LU contaminated sites remediated is also included.

### Water consumption

The Group KPI is total water consumption in cubic metres (m<sup>3</sup>).

\* Biodiversity is the diversity, or variety, of plants, animals and other living things in a particular area or region. It encompasses habitat diversity, species diversity and genetic diversity<sup>8</sup>.

\*\* There is no net loss of Sites of Importance for Nature Conservation. Proposal 70<sup>8</sup>.

## 5. Environmental performance

### 5.1 Tier 1 Environmental objectives

The priority environmental impacts over which TfL has the greatest level of influence and control are emissions to air, energy consumption and noise and vibration. These are considered as Tier 1 objectives.

#### 5.1.1 Reduce pollutant emissions to air

##### Tier 1 Group objective

##### Reduce pollutant emissions to air

The overview of performance against the Group KPIs for reducing pollutant emissions to air is presented in Table 3. While most of the major transport contributors are included in these figures, TfL aims to report on emissions from other sources in future years, for example, private hire vehicles.

TfL has calculated emissions using emission factors\* from the National Atmospheric Emissions Inventory (NAEI) except for buses where TfL has used its own emission factors to better reflect the vehicle mix in the London bus fleet and London driving conditions.

Total NO<sub>x</sub> and SO<sub>2</sub> emissions have not changed significantly over the past year. In contrast, however, the emissions of PM<sub>10</sub> have decreased by 28 per cent. Further details of NO<sub>x</sub> and PM<sub>10</sub> and an explanation of the PM<sub>10</sub> reduction are provided below (Table 4). It should be noted that some major sources have yet to be included in the emissions estimates, most notably private hire vehicles.

Table 3: Overview of performance against Group KPI for pollutant emissions to air

Group key performance indicators	2003/04	2004/05	% Change
NO <sub>x</sub> emissions (tonnes) <sup>19</sup>	6,949	6,980	0.004
PM <sub>10</sub> emissions (tonnes) <sup>20</sup>	201	145	-28
SO <sub>2</sub> emissions (tonnes) <sup>21</sup>	38	38	0

Table 4: Overview of performance against modal KPIs for pollutant emissions to air

Modal key performance indicators		NO <sub>x</sub>		PM <sub>10</sub>	
		2003/04	2004/05	2003/04	2004/05
Bus	tonnes	5,923	5,999	81	35
	grams per passenger km	0.92	0.88	0.013	0.005
Taxis	tonnes	911	884	118	108
Dial-a-Ride	tonnes	58	50	1.95	1.69
	tonnes per thousand journeys	0.043	0.039	<0.002	<0.002
Woolwich Ferry	tonnes	37.6	37.2	0.68	0.67
Greenwich power station	tonnes	20	10.5		

\* An emissions factor is a figure which can be used to calculate releases of air pollutants from a defined set of input criteria, e.g. for buses this includes fleet size, vehicle type, Euro standard engine, fuel type, known emissions controls and annual mileage.





Buses have contributed approximately 85 per cent of TfL's total NO<sub>x</sub> emissions for both years. The slight increase in total NO<sub>x</sub> emissions is partly due to the fact that the distance travelled by buses increased in 2004/05<sup>22</sup>, but also that the introduction of Euro III\* engines has not delivered the expected reduction in NO<sub>x</sub> emissions under London operating conditions. However, normalised NO<sub>x</sub> emissions (i.e. per passenger km) did show a decrease in 2004/05 compared to the previous year. This was due to an increase in distance travelled by passengers, from 6.4 billion km in 2003/04 to 6.8 billion km in 2004/05.

The change in PM<sub>10</sub> total emissions from buses is very positive, with a 57 per cent reduction between 2003/04 and 2004/05 and a similar reduction in normalised emissions. This decrease is due to the fleet replacement programme and, more significantly, because TfL has been fitting diesel particulate filters (DPFs) to the bus fleet since 1999. DPFs reduce emissions of particulate matter by 90 per cent, so fitting these filters to the bus fleet makes a considerable contribution to improving air quality in London.

The reductions in NO<sub>x</sub> and PM<sub>10</sub> emissions from taxis and Dial-a-Ride in 2004/05 are due to fleet turnover.

\* EU vehicle emissions standards are known as 'Euro Standard'. Each Euro Standard has limits to reduce different pollutants. These standards become increasingly strict over time and ensure that vehicle manufacturers produce less polluting vehicles

#### Achievements

- TfL is at the forefront of piloting new technology for buses and has been testing three 'zero emission' Hydrogen Fuel Cell buses on route RV1 since January 2004 as part of a European trial. Due to initial success this has been extended to the end of 2006
- TfL achieved its target for all buses to have a DPF by the end of 2005 and meet a minimum Euro II standard. As at March 2005, more than half the fleet (52 per cent) met the higher Euro III standard
- The Congestion Charge is estimated to have continued to maintain 12 per cent reductions in emissions of NO<sub>x</sub> and PM<sub>10</sub> from road traffic within the charging zone<sup>23</sup>
- TfL continues to offer a 100 per cent discount from the Congestion Charge for low emission vehicles and there was a 21 per cent increase in the number of such vehicles registered, compared to 2004<sup>24</sup>
- TfL awarded funding for a number of borough air quality initiatives, for example 'Clear Zones'\* traffic management in Camden and electric vehicle charging points in City of Westminster, as well as trials of pollution absorbing paving in Camden and the City of London
- TfL and the GLA produced the 2002 London Atmospheric Emissions Inventory<sup>25</sup>, a strategic data set for use by boroughs and others to assess air quality effects of proposals
- TfL is working to change people's travel behaviour through travel plans which encourage walking and cycling and the use of public transport over the private car. In 2004/05, TfL delivered a travel plan for the GLA and a best practice travel plan guide for the National Health Service (NHS) having completed a pilot study of 18 NHS sites. This guide will be used to develop travel plans for all 83 London NHS trusts.

#### Future plans

- In March 2005 the Mayor launched his Taxi Emissions Strategy<sup>26</sup>, under which all taxis are required to meet Euro III or better for NO<sub>x</sub> and PM<sub>10</sub> by July 1, 2008
- The proposed London-wide 'Low Emission Zone' (LEZ) scheme is being managed by TfL. The proposed LEZ, which will deter the most polluting heavy diesel-engine vehicles from being driven through Greater London, will require vehicles to meet Euro III standard for particulates by 2008 and Euro IV standard for particulates by 2010. Go-ahead will be subject to public consultation<sup>27</sup>
- NO<sub>x</sub> abatement technology has been trialled by TfL since January 2005. Fourteen buses have been testing Selective Catalytic Reduction (SCR) technology, and 10 buses Exhaust Gas Recirculation (EGR) technology. These technologies are anticipated to deliver NO<sub>x</sub> reductions of approximately 45 per cent and 65 per cent respectively. If either trial is successful, a bus retrofit programme will be developed and implemented from 2006/07
- TfL will pilot six hybrid diesel electric buses which have reduced air emissions
- TfL will pilot a freight operators' recognition scheme with the GLA and some boroughs in early 2006 and then target key freight operators throughout 2006/07. The aim is to reduce emissions (and noise) from operators' fleets while also realising economic efficiencies
- By increasing the proportion of journeys made by foot and bicycle there will be a reduction in motorised traffic, which will lead to an associated reduction of air pollutants.

\* Clear Zones can improve the quality of life in town centres through: reducing the impact of traffic while maintaining accessibility, viability and vitality; reducing emissions caused by public transport and goods distribution; looking at demand management and the provision of efficient interfaces and information between different types of transport.



- TfL's London Cycling Action Plan<sup>28</sup> contains measures to encourage the use of bicycles. These include disseminating best practice, raising awareness and promoting cycling, training for children and adults, providing more cycle parking and creating coherent and attractive cycle routes and other infrastructure improvements
- The Walking Plan for London<sup>29</sup> aims to ensure more people make walking their first choice for short journeys and combine walking and public transport for longer trips. The plan also sets targets for increasing the level of London's 'walkability', both in terms of people's perceptions and in the quality of the actual walking environment
- TfL will also expand its programme of 'soft' travel demand management measures; these are non-pricing measures that influence travel behaviour to reduce car use, such as school and workplace travel plans
- In 2005/06, a travel demand management team will be in place to deliver travel plans for 39 TfL head offices, the Metropolitan Police and the London Fire and Emergency Planning Authority (LFEPA). It will also deliver a travel plan for local authorities, including the results of three pilot schemes of teleworking in Barnet, Ealing and Lewisham. In 2006/07, the team will deliver travel plans covering 25,000 private sector employees.

### 5.1.2 Reduce energy consumption

#### Tier 1 Group objective

*Reduce energy consumption, implement energy efficiency measures and increase the use of renewable energy to reduce greenhouse gases.*

The Group KPI performance overview for the energy objective is presented in Table 5.

The total CO<sub>2</sub> emissions for most business units are supplied as modal indicators in Table 6. TfL hopes to report those that have not been included in the future. Looking forward, TfL also aims to provide the percentage of its electricity requirements supplied from renewable sources for each business unit. The CO<sub>2</sub> data was calculated using emissions factors provided in Defra's Guidelines for Company Reporting on Greenhouse Gas Emissions<sup>32</sup>.

Table 5: Overview of performance against Group KPIs for energy consumption

Group key performance indicators	2003/04	2004/05	% change
CO <sub>2</sub> emissions (tonnes) <sup>30</sup>	1,219,932	1,225,642*	0.005
Renewable energy (% of electricity portfolio) <sup>31</sup>	14.2	17.9	

\* Includes provisional figure for buses

Table 6: Overview of performance against modal KPI for energy consumption

Modal key performance indicators		CO <sub>2</sub>		
		2003/04	2004/05	% change
LU	tonnes	410,000	415,000	1
	grams per passenger km	56	55	-1.8
Bus	tonnes	533,000	538,000**	1
	grams per passenger km	83	80	-3.7
Taxis	tonnes	241,000	242,000	0.3
DLR	tonnes	15,000	15,000***	0
	grams per passenger km	66	64	-3.3
Croydon Tramlink	tonnes	5,600	5,600***	0
	grams per passenger km	54	49.5	-8.8
Dial-a-Ride	tonnes	2,954	2,445	-17
	tonnes per thousand journeys	2.23	1.94	-13
Woolwich Ferry	tonnes	561	556	-1
River Piers	tonnes	238	215	-10
Victoria Coach Station	tonnes	237	39	-84
East Thames Buses	tonnes	123	21	-82

\*\* Provisional figures \*\*\* To be verified





Overall, measured CO<sub>2</sub> emissions remained relatively constant between 2003/04 and 2004/05, however there was a slight increase in both bus and LU emissions. These are the largest contributors of CO<sub>2</sub> with 44 per cent and 34 per cent respectively each year.

The one per cent increase in tonnes of CO<sub>2</sub> from LU was due to a 2.7 per cent rise in train kilometres operated in 2004/05 compared to the previous year<sup>33</sup>. However, the respective increase in CO<sub>2</sub> emissions was only one per cent due to the offset from renewable energy sources. Due to increased passenger numbers the emissions per passenger kilometre fell by 1.8 per cent.

The small increase in CO<sub>2</sub> emissions from buses is also due to the increase in kilometres operated<sup>22</sup>. Emissions per passenger kilometre fell by 3.7 per cent due to an increase in passenger usage. The 84 per cent reduction in CO<sub>2</sub> emissions contributed by Victoria Coach Station was due to a large increase in its renewable electricity purchase.

TfL has increased its purchase of renewable electricity for LU from four per cent in 2000/01 to nearly 18 per cent in 2004/05 - a 3.7 per cent increase since 2003/04. This is significant as LU is the largest single consumer of bulk electricity supply in London (3.5 per cent of total consumption).

#### Achievements

TfL has continued to improve its energy efficiency, invest in solar power and trial 'no carbon emission' buses.

- In 2004, 40 per cent of the LU train fleet and all trams on Tramlink used regenerative braking which recovers energy as the train's brakes are applied<sup>34</sup>. All new Underground trains will have regenerative braking

- The BTEC bus driver training programme encourages smoother driving practices and therefore lowers fuel consumption and reduces CO<sub>2</sub> emissions. By March 2005, 10,320 had obtained their BTEC qualification, compared to 3,700 in 2003/04
- TfL Group Property & Facilities is accredited by the Energy Efficiency Accreditation Scheme (EEAS) for its 49 head office buildings. This prestigious scheme is cited by the Mayor's Energy Strategy as a method of demonstrating good practice in terms of energy efficiency, thus demonstrating Group Facilities' commitment to energy efficiency
- Since 2003, LU has operated an 'Energy Challenge' which encourages stations, station groups and lines to save energy. In 2004/05, a record 24 per cent energy saving was achieved across all stations exceeding the target of 20 per cent against a baseline year
- To date, 315 bus shelters and two per cent of the 11,500 bus stops have been upgraded to solar power. A trial of three solar powered bus ticket machines was completed. A solar lighting trial for taxi rank posts and shelters started in early 2005
- Solar panel technology was incorporated into two new buildings: Vauxhall Cross Interchange, which opened in December 2004 and Walworth bus garage, which opened in February 2005. Solar power provides a proportion of the energy requirements of both buildings which consequently results in reduced emissions of CO<sub>2</sub>
- The Hydrogen Fuel Cell buses on trial (as described under the air quality objective) emit no CO<sub>2</sub>
- TfL awarded funding to the South East London Transportation Partnership for a pilot project to collect used cooking oil and convert it to a transport fuel - biodiesel, for use in borough vehicles. The initiative is called BISTRO (Biodiesel Initiative for Sustainable Transport from Recycled Oil).



#### Future plans

- LU's energy consumption will increase through running more trains per hour and additional features on new trains which add to the weight. TfL's energy strategy seeks to mitigate this increase in energy use through greater energy efficiency in other areas and by investigating the expansion of the renewable energy market
- The expansion of London's public transport capacity, continued improvements to the quality of public transport, continued operation of the Congestion Charging Scheme and the pursuit of a variety of travel demand management strategies (including the promotion of walking and cycling, development of work and school travel plans), will continue to encourage modal shift away from private vehicles, reducing CO<sub>2</sub> emissions
- The diesel-electric hybrid buses which will go on trial (as described under the air quality objective)

are expected to produce at least 30 per cent less CO<sub>2</sub> emissions compared to conventional buses

- By the summer of 2006, London will have Europe's largest network of bus and taxi infrastructure illuminated by solar power. The target is 7,000 solar powered bus stops by 2010 at a rate of 1,400 per year. A roll-out of 11 taxi rank posts will be completed by summer 2006. Ten taxi shelters have been identified for upgrading
- From early 2006, TfL Group Property & Facilities will have two qualified in-house BREEAM<sup>35</sup> assessors to ensure that refurbishments and new building acquisitions achieve the highest possible energy efficiency ratings and a new round of assessments is planned for the current building portfolio
- TfL will continue to play an active role in the London Hydrogen Partnership and the London Climate Change Partnership.



### 5.1.3 Reduce noise and vibration

#### Tier 1 Group objective

*Reduce noise and vibration by promoting the use of quieter travel modes and vehicles, reduce the noise generated by vehicle use and control the levels of transport noise impact on sensitive locations.*

The modal KPI for noise and vibration is presented in Table 7.

The number of noise related complaints received by LU has risen due to noise generated from the increased construction and maintenance activity associated with the PPP improvement works. LU and its infrastructure companies Tube Lines and Metronet Rail are striving to minimise noise at source and will also review noise complaint procedures to improve management processes in order to act upon the complaints effectively.

Table 7: Overview of performance against modal KPI for noise and vibration

Modal key performance indicator	2003/04	2004/05	% change
Noise related complaints (LU)	280	488	75

#### Achievements

- TfL has investigated technologies that produce lower noise, e.g. the hydrogen fuel cell buses currently on trial
- In 2004/05 TfL introduced new noise standards for all buses coming into service in London from 2006/07. In the future, buses must achieve noise levels that are at least 2dBA quieter than standard 'type approval' limits. In addition, they will be required to meet limits set in TfL's own noise test, which is more representative of driving conditions in the Capital. The BTEC bus driver training programme contributes to smoother driving practices, and therefore lower noise
- LU, Tube Lines and Metronet Rail have taken action to mitigate the effects of noise created by the contact between wheels and rails by installing measures such as track lubricators, as well as introducing vibration blankets in the underground tunnels
- Tube Lines and Metronet Rail are using noise risk assessments and noise prediction modelling to estimate the number of properties potentially affected by station works in order to reduce the noise impact
- TfL continues to contribute to research into noise mapping and vibration and 2004/05 saw the completion of the European research project, coordinated by TfL and entitled 'Control of Noise and Vibrations from Underground Rail Traffic' (CONVURT). This study focused on improvements to the level of ground-borne noise generated by underground systems
- TfL investigated the use of road surfacing materials that have noise reducing properties and concluded that the surface materials used by TfL contribute to traffic noise reduction on the TLRN. In addition, road maintenance reduces noise incidents by removing potholes and loose ironwork
- TfL awarded funding to boroughs for initiatives to reduce noise including a noise barrier study in Brent, a pilot to test materials with noise reducing properties in the City and noise monitoring stations in various boroughs.



#### Future plans

- TfL is developing a Traffic Noise Action Programme for the TLRN to target the problem areas identified by noise mapping
- The freight operators recognition scheme in 2006/07 should help to reduce noise produced by operators' activities
- TfL will pilot 12 hybrid diesel-electric buses which, using smaller engines combined with a battery, produce less noise than conventional buses.

### 5.2 Tier 2 Environmental objectives

As Tier 2 objectives, TfL has been striving to achieve reductions in resource consumption; maintain and where possible enhance London's

built environment; reduce impacts of waste generated from TfL and contractor activities; and promote the sustainable transport of waste.

#### 5.2.1 Reduce consumption of resources

##### Tier 2 Group objective

*Reduce consumption of resources, implement efficiency measures and recognise where resources are consumed, to reduce the adverse effect on the environment through environmentally preferable procurement and trading.*

The two interim Group KPIs are presented in Table 8. Data is available for 2003/04 and is included as a baseline for future comparison.



Table 8: Overview of performance against Group KPIs for consumption of resources

Group key performance indicators	2003/04	2004/05
Total paper purchased (tonnes)	281	
Recycled paper purchased (% of total)	14	
Total toner cartridges purchased (number)	14,761	
Recycled toner cartridges purchased (% of total)	6	

**Achievements**

- TfL is a signatory to the Mayor's Green Procurement Code<sup>36</sup>. A Green Procurement Policy has been drafted and is currently undergoing business review
- The introduction of the Oyster smart card pre-pay system has reduced paper ticket usage in 2004/05 by more than 32 million tickets
- TfL has increasingly moved towards e-documentation to reduce paper usage.

Examples include the digitising of staff files and the launch of an online job application process.

**Future plans**

- TfL is developing a green procurement programme, to be delivered during 2006/07
- It is estimated that paper ticket usage will be reduced by a further 90 million in 2005/06 as more passengers use Oyster.

**5.2.2 Maintain, and where possible enhance, the quality of London's built environment**

**Tier 2 Group objective**

*Maintain, and where possible enhance, the quality of London's built environment.*

The interim KPIs for maintaining and enhancing London's built environment are presented in Table 9. The data is derived from TfL customer satisfaction surveys (CSS) and mystery shopping surveys (MSS).

The envirocrime scores suggest that, in total, there has been a slight improvement over the past year in the condition and cleanliness of the built environment for which TfL is responsible. The LU graffiti scores suggest that, while there has been a slight increase in the amount of graffiti observed on the Underground station network, the level of graffiti on trains has decreased since 2003/04.

Table 9: Overview of performance against modal KPIs for London's built environment

Modal key performance indicator*	2003/04	2004/05	
Envirocrime cleanliness and condition	Buses (CSS)	75.6	76.4
	Croydon Trams (CSS)	83.5	82.5
	London River Services (CSS) <sup>37</sup>	90	91
	LU (MSS)	62	66.5
	Victoria Coach Station (CSS)	72	73
Envirocrime graffiti	LU trains (MSS)	58	69
	LU stations (MSS)	80	78

\* The higher the score, the less litter/graffiti has been observed (MSS) or perceived (CSS)

**Achievements**

- TfL awarded £6.5 million funding to boroughs in 2004/05 for town centre improvements, an increase of roughly 25 per cent compared to 2003/04
- As a landowner, TfL is responsible for a variety of buildings across the Capital. In addition to maintaining and enhancing the appearance and quality of 45 English Heritage Grade II listed Underground stations, TfL also strives to enhance the quality of London's built environment. It does this through high quality design and management of public areas within its remit, and by working in partnership with stakeholders such as the London boroughs

- In 2005 TfL published the Streetscape Guidance document for the TLRN. The objective is to create excellent streetscapes through specific design principles and the use of preferred materials and products. It will also act as a 'gateway' to other local, regional and national good practice
- TfL's Vauxhall Cross Interchange opened in December 2004 and received the Street Design Award 2005 in the Highways Design category.





**Future plans**

- The Urban Environment Team is formalising policy on the strategic importance of urban design within TfL. This will identify design standards for new stations and infrastructure
- TfL is sponsoring Urban Design London to deliver and promote the design agenda in the Capital
- LU will continue to tackle envirocrime by engaging with stakeholders and working with the British Transport Police.

**5.2.3 Reduce the impacts of waste generated from TfL and contractor activities**

**Tier 2 Group objective**

*Reduce the impacts of waste generated from TfL and contractor activities through minimising consumption and promoting re-use and recycling.*

The KPIs for reducing the impacts of C&I waste generated from LU are summarised in Table 10. In future years, TfL aims to present totals from all relevant parts of the business. However, some data are available from East Thames Buses and Dial-a-Ride<sup>38</sup>. The modal KPI for C&D waste is reported for LU for 2004/05 only as figures are only available for this year.

**Table 10: Overview of performance against Group KPIs and modal KPIs for waste**

Group key performance indicator <sup>39</sup>	2003/04	2004/05	% change
C&I waste (tonnes)	9,200	10,100	10
C&I waste (grams per modal passenger km)	1.25	1.33	6
% C&I waste recycled	12	20	
Hazardous solid waste (tonnes)*	115	247	114
Hazardous liquid waste (litres)	283,000	232,000	-18
Modal key performance indicator <sup>39</sup>	2003/04	2004/05	% change
C&D waste (tonnes)		64,300	
% C&D waste recycled		87	

\* Hazardous waste is waste with one or more properties that are hazardous to health or to the environment

There has been a slight increase in the amount of the C&I waste produced by LU in 2004/05. This is largely due to the rise in infrastructure upgrades and renewals associated with the increased investment and PPP works. However, the increase in the percentage of C&I waste that is recycled (eight per cent) means that the environmental impact from the disposal of waste is being reduced.

LU continues to make efforts to reduce the production of hazardous wastes. In 2004/05 there was a significant reduction in the production of hazardous liquid wastes. However, the amount of hazardous solid waste doubled due to the increased track replacement programme under the PPP investment programme. This figure is likely to rise further in 2005/06 due to the increase in works being carried out.

In 2004/05 LU achieved an 87 per cent recycling rate for C&D waste associated with its track replacement programme. This rate is well above C&D industry practice and LU intends to maintain it.

**Achievements**

- Tube Lines continued to implement a paper and newspaper recycling scheme at all seven of the termini stations it maintains, with roughly 70 per cent of the waste at these stations being recycled. LU worked with Tube Lines in 2004/05 to expand the scheme; there are now a total of 46 stations with newspaper recycling schemes on the Jubilee, Piccadilly and Northern lines.

**Future plans**

- TfL has committed to using recycled and secondary aggregates for the construction of future major projects, where economical and practicable. Over the next four years a significant level of modernisation and renewal work is scheduled to occur as part of TfL's £10 billion 5-Year Investment Programme
- The paper and newspaper recycling scheme will be expanded to be network-wide in the near future
- LU aims to recycle 25 per cent of its C&I waste in 2006/07.





### 5.2.4 Promote the sustainable transport of waste

#### Tier 2 Group objective

##### *Promote the sustainable transport of waste*

The objective for promoting the sustainable transport of waste is awaiting the completion of the London Freight Plan, which is scheduled for delivery in 2006, to inform the development of an appropriate environmental KPI.

TfL is working to promote a progressive shift of freight, including transport of waste, from road to more sustainable modes such as rail and water (where practical and economically viable).

Below are key actions taken by TfL to promote the sustainable transport of waste:

#### Achievements

- A Freight Unit has been established which will produce the London Freight Plan. The unit has a dedicated waste co-ordinator
- TfL has assisted in the development of Freight Quality Partnerships (FQPs) with the London boroughs, the Metropolitan Police and freight operators. The purpose of FQPs is to bring greater efficiency and environmental benefits to the distribution of goods. These will be rolled out across London to raise awareness of good practice in relation to supply chains, servicing visits and waste collection.

#### Future plans

- TfL will continue to use more sustainable modes of transport than road to remove waste generated by LU track renewal projects
- In addition to setting up a freight operators' recognition scheme, TfL will target the main players in various freight sectors, including waste, through the formation of industry action groups over the coming year
- The Freight Unit will trial the use of waterways for transporting waste in west London and Park Royal
- TfL will publish a freight data report as a key appendix to the London Freight Plan. This will encompass all of the main freight sectors, including waste, and will allow TfL to measure performance and determine KPIs for sustainable distribution
- As part of TfL's commitment to improve the capability and practicality of utilising alternative modes of transport, a multi-modal refuse collection vehicle (MMRCV) is being designed and a prototype will be built and trialed in Hackney during 2006. MMRCV technology involves the use of collection vehicles that have interchangeable bodies designed so they can be transferred to different modes of transport including canal and railway.





### 5.3 Tier 3 Environmental objectives

Identified as Tier 3 objectives, TfL has been working to maintain and where possible enhance London's natural environment; reduce pollution emissions to water and land and to reduce water consumption and implement efficiency measures.

#### 5.3.1 Maintain, and where possible enhance, the quality of London's natural environment

##### Tier 3 Group objective

*Maintain and where possible enhance the quality of London's natural environment*

The KPI is a measure of the proportion of open land holdings that have been surveyed for biodiversity. Much of TfL's open landholding has ecological importance to the Capital. The business areas with open land holdings that are included in the KPI are LU, Streets (the TLRN) and Tramlink. More than half of LU's network is above ground providing over 220 kilometres of trackside as a possible wildlife corridor or refuge. The TLRN and Tramlink networks also offer wildlife habitat.

All of the surveys planned for 2004/05 were completed.

##### Achievements

- All major TfL projects are subject to environmental assessment and include an evaluation of impacts on the natural environment. TfL's Major Projects business unit leads their development, working with TfL businesses and stakeholders to plan for strategic transport development. TfL seeks

\* GIGL is an open space and biodiversity records centre that collects, manages and makes available detailed information about London's plants, animals, wildlife habitats, statutory and non-statutory wildlife sites and open spaces.

to maximise opportunities for landscape and biodiversity enhancement to be considered in appropriate projects

- LU transferred all of its 1999 survey data to the Greenspace Information for Greater London (GIGL)\* database
- TfL continues to work with Tube Lines, Metronet Rail, the London Biodiversity Partnership and GIGL to implement a Biodiversity Action Plan compatible with LU operations
- Metronet Rail completed its planned biodiversity resurvey work on the above ground network, for which they are responsible
- As part of the East London Line extension, a nature conservation group has been established to maintain a wildlife corridor along the route
- Streets have developed an environmental datastore which includes the locations of biodiversity interest on the TLRN
- TfL awarded funding in 2004/05 to boroughs for the planting of trees and shrubs as part of transport schemes.

##### Future plans

- Metronet will complete the biodiversity resurvey work on the LU network, for which they are responsible during 2005/06.

### 5.3.2 Reduce pollutant emissions to water and land

##### Tier 3 Group objective

*Reduce pollutant emissions to water and land*

The KPIs for reducing pollutant emissions to water and land are summarised in Table 11.

Table 11: Overview of performance against Group KPIs and modal KPI for pollutant emissions to water and land

Group key performance indicator	2003/04	2004/05
Major environmental incidents to water and land	0	0
Modal key performance indicator	2003/04	2004/05
LU contaminated land sites remediated	0	1

In 2004/05 there were no reported significant environmental incidents affecting either water or land.

##### Achievements

- Via the PPP arrangements, LU has completed surveys of land contamination across its holdings. Of the sites examined only one, West Ruislip, required remediation work, which was completed in 2004
- Tube Lines undertook a drainage study, which identified the drainage discharge points across the assets that they manage and determined whether they drain to sewer or controlled waters.

##### Future plans

- Metronet Rail will be undertaking assessment of potential environmental harm from historical contamination as part of the PPP requirements due to be delivered in 2006
- Tube Lines is currently working with the Environment Agency to agree consents for discharges across the network.





### 5.3.3 Reduce consumption of water resources

#### Tier 3 Group objective

#### Reduce consumption of water resources and implement efficiency measures

Water consumption is reported for LU and head office buildings (Table 12). In future years, TfL aims to report water consumption for the other areas of the business.

For the areas reported, TfL has reduced total water consumption in 2004/05 by almost six per cent compared to 2003/04 levels. The reduction in water consumed at TfL's head office buildings is largely due to the disposal of a large building. TfL has also acquired some catering facilities which are large users of water.

Table 12: Overview of performance against Group KPI for consumption of water resources

Group key performance indicator		2003/04	2004/05	% change
LU	Water consumption (m <sup>3</sup> )	658,180	634,851	-3.5
	m <sup>3</sup> per million passenger km	86.5	83.5	-3.5
Group Property & Facilities*	Water consumption (m <sup>3</sup> )	106,000	84,000	-21
	Water m <sup>3</sup> /person	14	16	17

\* 28 out of 47 head office buildings (2004/05)

#### Achievements

- Group Property & Facilities reported a 21 per cent reduction in total water consumption between 2003/04 and 2004/05.

#### Future plans

TfL uses large quantities of water in its offices, station's workshops, bus cleaning and train washing depots. TfL aims to reduce the consumption of its water resources and implement efficiency measures by:

- Looking at the feasibility of using low water usage systems and grey water\*\* at tram depots to further reduce water consumption across the business
- Setting targets for office water use of 9m<sup>3</sup> of water per head office employee per year.

\*\* Grey water is the term given to rain water or domestic waste water that can be recycled and used in circumstances where water quality is not of major concern.

## 6. Moving forward

### 6.1 What next for TfL?

TfL continues to improve the breadth and depth of its environmental reporting including addressing the wide variety of activities and initiatives it has undertaken and those that are being planned for the future.

TfL continues to deliver enhancements to the public transport system and encourage cycling and walking as sustainable means of transport, offering realistic alternatives so the public can move away from using private motor vehicles. In this respect key deliverables of TfL's £10 billion 5-Year Investment Programme<sup>40</sup> include:

- Underground improvements that will enable an extra three million kilometres to be run each year by 2009/10. Examples are longer trains on the Jubilee line in 2006 and other improvements to the line by 2009 to increase passenger carrying capacity by 45 per cent
- Rail extension and capacity increases, for example, the East London Line extension, the DLR link to London City Airport (opened December 2005) and its extension to Woolwich Arsenal by 2008, and three-car DLR trains on the Bank to Lewisham branch by 2009
- New transit schemes, for example the bus-based rapid East London Transit (completion 2008) and Greenwich Waterfront Transit (completion 2009)
- Extension of congestion charging into further parts of Westminster and Kensington and Chelsea is scheduled to be introduced in February 2007
- Local environmental improvements to town centres, interchanges and residential streets
- Walking and cycling improvements to TfL and borough roads, totalling £166 million.

Performance against the environmental objectives and environmental KPIs is positive overall, but there are areas that can be improved on. TfL will continue to monitor and seek improvements to its

own operational impacts on the environment and information collected in the last few years will help push TfL to achieve more in the future.

TfL is proud to be supporting the Mayor's vision of a sustainable London and will continue to develop plans and activities to help deliver its responsibilities towards that vision.

Key to TfL's future environmental performance is:

- The potential introduction of a London-wide LEZ in 2008 to improve air quality
- Continued trials in zero and low-emission buses so that TfL's fleet continues to be one of the cleanest in the world
- Greater energy efficiency, increasing use of solar power and investigating the expansion of the renewable energy market contributing to reduced CO<sub>2</sub> emissions.

### 6.2 Feedback

TfL encourages feedback about its interaction with London's environment and is happy to receive your feedback relating to all its operations including London Buses, River Services, Street Management, Taxi and Private Hire, Victoria Coach Station, Docklands Light Railway, Croydon Tramlink and London Underground. TfL would also like to have your feedback on sustainable transport issues such as cycling and walking.

In an effort to reduce the consumption of paper, TfL encourages the completion of the online feedback form available from:

[www.tfl.gov.uk/feedback](http://www.tfl.gov.uk/feedback)

If you require assistance with this, or are unable to use this format, please contact customer services on 020 7222 5600 or write to:

Central Customer Services  
23rd Floor Empress State Building  
Empress Approach  
London, SW6 1TR



## Endnotes

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15. London Household Survey 2002, 13 per cent rated noise from road traffic where they lived a 'serious problem', compared with aircraft 6 per cent, road works/construction/demolition 4 per cent, noisy neighbours 4 per cent, trains/Tubes 2 per cent, industrial commercial premises 2 per cent and pubs/clubs/entertainment 2 per cent. Larger percentages experienced some level of problem.
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18. See [www.noisemapping.org](http://www.noisemapping.org)
19. Figure only includes NO<sub>x</sub> emissions from buses, taxis, Dial-a-Ride, Greenwich power station and Woolwich Ferry.
20. Figure only includes PM<sub>10</sub> emissions from buses, taxis, Dial-a-Ride and Woolwich Ferry.
21. Figure includes SO<sub>2</sub> emissions from Greenwich power station and Woolwich Ferry.
22. Bus kilometres operated: 437 million (2003/04) and 450 million (2004/05). Source: London Travel Report 2005. Transport for London (2005)  
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30. Figure comprises LU, buses, Victoria Coach Station (VCS), trams, Woolwich Ferry, DLR, river piers, taxis, Dial-a-Ride, and East Thames Buses building.
31. Renewable energy figure is for LU only. All Property & Facilities, Streets, VCS, and bus stops and shelters energy requirements are supplied from 100 per cent renewable sources.
32. See <http://www.defra.gov.uk/environment/envrp/gas/>. This document uses the CO<sub>2</sub> emissions factors from the National Atmospheric Emissions Inventory.
33. Underground train kilometres operated: 67.7 million (2003/04) and 69.5 million (2004/05). Source: London Travel Report 2005. Transport for London (2005)  
<http://www.tfl.gov.uk/tfl/pdfdocs/ltr/london-travel-report-2005.pdf>
34. The recovered energy from regenerative braking can save 20-25 per cent of an Underground line's electricity consumption and contributes to powering other trains. Total energy savings from regenerative braking will be offset by an increase in passenger mileage and energy demand from air conditioning being introduced on some lines.
35. BREEAM (Building Research Establishment Environmental Assessment Method) assesses a building's impact on the local environment and its occupants, as well as the management procedures in place. Areas assessed include energy management and energy efficiency, green procurement and materials, waste and recycling, daylighting and air quality for occupants, green travel including cycling and public transport. To date 21 of TfL's buildings have been assessed, 20 achieved a rating of 'very good', four of these being only a couple of points from achieving 'excellent' status.
36. TfL is a B1 signatory. Organisations commit themselves to being environmentally progressive, moving towards measurable change. By signing up to level B1, organisations commit to reaching the final level of membership, Level B2. Level B2 is about agreeing purchase or recycling contracts, setting realistic targets and measuring progress towards those targets.  
See <http://www.londonremade.com/mgpc2.asp> for more details.
37. This figure includes Woolwich Ferry.
38. 30 tonnes of commercial and industrial waste, three tonnes of hazardous waste and 16,593 litres of hazardous liquid waste.
39. Figures are for LU only.
40. Transport for London 5-Year Investment Programme 2005/06-09/10  
<http://5ip.tfl.hodes.co.uk/default.asp>



## Acronyms

BISTRO	Biodiesel Initiative for Sustainable Transport from Recycled Oil
BREEAM	Building Research Establishment Environmental Assessment Method
C&D	Construction and demolition
C&I	Commercial and industrial
CO <sub>2</sub>	Carbon dioxide
CONVURT	Control of Noise and Vibrations from Underground Rail Traffic
CSS	Customer Satisfaction Survey
Defra	Department for Environment, Farming and Rural Affairs
DLR	Docklands Light Railway
DPF	Diesel Particular Filter
EEAS	Energy Efficiency Accreditation Scheme
EGR	Exhaust Gas Recirculation
ELG	Environmental Liaison Group
EU	European Union
FQP	Freight Quality Partnership
GIGL	Greenspace Information for Greater London
GLA	Greater London Authority
HSE	Health Safety and Environment
KPI	Key performance indicators
LCCA	London Climate Change Agency
LEZ	Low Emission Zone
LFEPA	London Fire and Emergency Planning Authority
LU	London Underground
MMRCV	Multi-modal refuse collection vehicle
MS	Management System
MSS	Mystery Shopping Survey
NAEI	National Atmospheric Emissions Inventory
NHS	National Health Service
NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Oxides of nitrogen
PM <sub>10</sub>	Particulate matter less than 10 microns (10µm) in diameter
PPP	Public Private Partnership
SCR	Selective Catalytic Reduction
SHEC	Safety, Health and Environment Committee
SMA	Stone mastic asphalt
SO <sub>2</sub>	Sulphur dioxide
TfL	Transport for London
TLRN	Transport for London Road Network
UK	United Kingdom

## Image references

Page 2	Bus passing a London park
Page 5	London Eye, South Bank
Page 9	Underground
Page 10	Congestion charging
Page 12	London streetscape
Page 15	Keeping the Underground clean, Westminster
Page 16	Cyclist on Albert bridge
Page 18	Croydon Tram
Page 20	Hydrogen fuel cell bus
Page 22	Walking in Trafalgar Square
Page 25	Left: Sign displaying electricity generated by solar panels at Vauxhall Cross interchange Right: Canopy with solar panels at Vauxhall Cross interchange
Page 27	Grinder working on Underground tracks
Page 28	Oyster card user on DLR
Page 30	Southwark station
Page 33	River freight on the Thames
Page 35	Tube train on the Metropolitan line

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