

## Proposal for a London Low Emission Zone

### Transport for London submission to London Assembly Environment Committee meeting: 17 January 2006

#### 1. INTRODUCTION

- 1.1. On behalf of the Mayor, Transport for London (TfL) is consulting on draft revisions to the Mayor's Transport and Air Quality Strategies. The proposed revisions seek to take forward the Mayor's proposal, made in his 2004 election manifesto, which, subject to consultation, was to designate the whole of Greater London a Low Emission Zone (LEZ).
- 1.2. The Mayor has a statutory duty to take steps towards achieving Government air quality objectives (and EU limit values) for seven locally managed pollutants in London. The objectives of the proposed LEZ are two-fold:
  - to move London closer to achieving the air quality objectives (and EU limit values) for 2010, in support of the Government's Air Quality Strategy (AQS) and the EU's Air Quality Framework and Daughter Directives; and
  - to improve the health and quality of life of people who live and work in London, through improving air quality.
- 1.3. The LEZ would seek to achieve this by deterring the most individually polluting diesel-engined vehicles from the Greater London area. From 2008 the LEZ would target Heavy Goods Vehicles (HGVs), buses and coaches based on their emission standards. The LEZ could be expanded to cover diesel-engined Light Goods Vehicles (LGVs) in 2010, subject to further analysis.
- 1.4. It is proposed that the LEZ would cover the whole of the Greater London area, to maximise the air quality and health benefits. The proposal would apply to the most individually polluting vehicles, which are diesel-engined HGVs, buses and coaches. LGVs, as a category of vehicle, are also highly polluting, and an option would be to include such vehicles in the proposed LEZ from 2010 onwards.
- 1.5. The emission standards for the LEZ should reasonably encourage the upgrade or replacement of diesel-engined heavy vehicles to Euro III for PM<sub>10</sub> by 2008 and to Euro IV for PM<sub>10</sub> by 2010. The standard of Euro IV for NO<sub>x</sub> from 2010 is a further option being considered subject to a suitable certification mechanism being established<sup>1</sup>.

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<sup>1</sup> NO<sub>x</sub> is the symbol for a generic group of chemicals called oxides of nitrogen, including both NO (nitric oxide) and NO<sub>2</sub> (nitrogen dioxide), though the emissions of NO<sub>2</sub> emitted in this direct way is small. NO<sub>x</sub> is produced by high temperature combustion processes. Tailpipe emissions include NO (nitric oxide) and NO<sub>2</sub>. NO<sub>2</sub> is also formed from NO reacting with ozone to form NO<sub>2</sub>, which is thought to be the main way that this pollutant concentrates in London.

PM<sub>10</sub> in the atmosphere consists of a wide variety of materials, including: primary particles arising from combustion sources (mainly road traffic); secondary particles, mainly sulphate and nitrate formed by chemical reactions in the atmosphere; and coarse particles, e.g.

- 1.6. The proposed LEZ would deter vehicles that do not meet these standards from entering Greater London by levying a daily charge for doing so. The charge would be set at a level to encourage all vehicles entering the zone, apart from those entering very infrequently, to be upgraded. Operators that do not pay the daily charge and whose vehicles are identified as not meeting the proposed emission standard would have to pay a penalty charge.
- 1.7. The details of the proposed London LEZ would be subject to the making of and consultation on a Scheme Order.
- 1.8. Prior to this, the Mayor's Transport and Air Quality Strategies need to be revised<sup>2</sup>. These revisions take into account the policies, proposals and objectives of the Mayor's other statutory and non-statutory strategies published since the original Transport and Air Quality Strategies were published in July 2001 and September 2002 respectively.
- 1.9. TfL has undertaken a formal period of consultation on the draft Strategy revisions with the London Assembly and GLA Functional Bodies (the London Fire and Emergency Planning Authority, the London Development Agency, and the Metropolitan Police Authority) as well as the London Sustainable Development Commission and the London Health Commission.
- 1.10. Formal public and stakeholder consultation on the draft Strategy revisions is expected to commence in mid-February 2006. If the Mayor decides to publish revisions to the Strategies, TfL would take forward implementation of the proposed LEZ and would draw up details of its operation and design in a Scheme Order, on which further public and stakeholder consultation would be carried out. Should it subsequently be decided to proceed, with or without modifications to the Scheme Order, the earliest possible date for implementation of the proposed LEZ would be early 2008.

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suspended soils and dust and particles from construction work. Both short-term and long-term exposure to PM<sub>10</sub> are consistently associated with respiratory and cardiovascular illness as well as other ill health effects.

<sup>2</sup> Details of the proposed LEZ are set out in new Proposals 4G.27 to 4G.29 of the Transport Strategy and new Proposals 10 to 12 of the Air Quality Strategy, which include additional options for the proposed LEZ in 2010.

<http://tfl.gov.uk/tfl/low-emission-zone/strategies.asp>

## **2. LINES OF ENQUIRY**

2.1. Set out below are responses to the Environment Committee's agreed lines of enquiry:

### **3. Whether the timetable for implementation is achievable and the extent to which it will achieve required levels of reduction in nitrogen oxide levels and particles by 2010.**

3.1. The strategic review of feasibility options for implementing a LEZ<sup>3</sup> undertaken for TfL in February 2005 considered three implementation options:

- A TfL-sponsored Parliamentary Bill under Section 169 of the Greater London Authority Act 1999.
- A Traffic Regulation Order (TRO) executed by each individual borough or jointly by TfL or ALG.
- A Scheme Order confirmed by the Mayor under Section 295 and Schedule 23 of the GLA Act 1999.

3.2. In order to implement a LEZ under a single TRO, individual traffic authorities would have to enter into a 'joint arrangements' agreement under Section 101 of the Local Government Act 1972 to delegate their TRO making functions to a joint committee or a chosen traffic authority. This would involve co-ordinating the actions of up to 34 traffic authorities and would therefore be extremely complex and time consuming to implement. The Parliamentary Bill option would also be likely to result in a long implementation timetable, given the time needed to take a Bill through Parliament. There could be significant risk of delay to the implementation of the LEZ, which would lead to a delay in the introduction of the health and air quality benefits from the LEZ.

3.3. The Strategic Review concluded that of the three options, the Scheme Order route would provide the earliest likely delivery date with the least risk of programme slippage and ensure comprehensive consultation on both the strategy and detailed operation of the LEZ scheme.

3.4. The earliest a LEZ could be implemented under a Scheme Order is early 2008. This takes into account the time required to undertake the statutory consultations and to complete the legal processes required to make and confirm a Scheme Order, as well as the time to put in place the required business systems and processes and for vehicle operators to implement the necessary changes to their vehicle fleets.

3.5. The early 2008 start date assumes that:

- There are only two rounds of public consultation: one at the Transport and Air Quality Strategy revision stage and one at the Scheme Order stage;

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<sup>3</sup> "London Low Emission Zone – Strategic Review of Feasibility Options", Deloitte, February 2005.

- No public inquiry is needed and there is no intervention by the European Commission;
  - The full co-operation of key partners such as the DfT, DVLA, the Vehicle and Operator Services Agency (VOSA) and the Association of London Government (ALG) is achieved<sup>4</sup>;
  - The Mayor revises his Air Quality and Transport Strategies and confirms the Scheme Order, with or without modifications, following consultation.
- 3.6. The consultation process is currently progressing to plan with the public and stakeholder consultation programmed to start, subject to Mayoral approval, in mid-February 2006.

### ***Levels of reduction achievable***

- 3.7. Annex A sets out the latest projected reductions in NO<sub>x</sub> and PM<sub>10</sub> emissions in tonnes, and the changes in area (in km<sup>2</sup>) and in total population in areas exceeding NO<sub>2</sub> and PM<sub>10</sub> objectives<sup>5</sup> that are projected to arise under the proposed LEZ under various scenarios<sup>6</sup>.
- 3.8. The 2010 objectives are 23µg/m<sup>3</sup> for PM<sub>10</sub> and 40µg/m<sup>3</sup> for NO<sub>2</sub> as annual mean concentrations. Whilst the introduction of the LEZ is unlikely to enable these objectives to be met in all locations, modelling estimates predict that the LEZ basic scheme<sup>7</sup> would reduce the area of Greater London exceeding the NO<sub>2</sub> and PM<sub>10</sub> annual mean objectives in 2008 by 7.2% and 7.8% respectively, and in 2010 by 10.5% and 18.4% respectively.
- 3.9. In addition to the annual mean objectives, there is a UK objective for the number of days an area is allowed to exceed the daily mean limit value for PM<sub>10</sub>. This objective is 35 days, which some areas of London currently exceed. The LEZ basic scheme would reduce the area exceeding the 35 day limit for daily PM<sub>10</sub> exceedences by 17% in 2010 for the basic scheme.
- 3.10. It is projected that the population exposed to levels of NO<sub>2</sub> and PM<sub>10</sub> exceeding the annual mean objectives would decrease by 8.2% in 2008 and by 11.1% and 18.8% respectively in 2010.

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<sup>4</sup> It should be noted that TfL has received a positive response from the Secretary of State for Transport and DfT officials on the continuation of the RPC scheme to support the proposed LEZ and we are engaging with DVLA and VOSA to work through our detailed requirements and how these will be met.

<sup>5</sup> Air quality targets are set in respect of concentrations rather than emissions. This is an important point as while emission reductions might be significant, they do not necessarily translate directly into measured improvements in air quality concentrations.

<sup>6</sup> The figures were produced for TfL by AEA Technology in November 2005 and have been updated since those prepared in the September 2005 TfL Board Paper to reflect changes in the proposed scheme design, e.g. the scheme proposed to start in 2008 (rather than 2007) and the start for coaches and HGVs < 7.5 tonnes being deferred until mid 2008.

<sup>7</sup> The 'basic scheme' would require HGVs, buses and coaches to meet the Euro III standard for PM<sub>10</sub> in 2008 and Euro IV for PM<sub>10</sub> in 2010.

- 3.11. If Light Goods Vehicles were included in the LEZ from 2010 it is expected that there would be: a 21.4% reduction in the area of Greater London exceeding the PM<sub>10</sub> annual mean objective; a 20% reduction in the area exceeding the 35 day limit for daily PM<sub>10</sub> exceedence; and a 21.7% reduction in the population exposed to levels of PM<sub>10</sub> exceeding the annual mean objective.
- 3.12. A standard of Euro IV for NO<sub>x</sub> for HGVs, buses and coaches would be very useful in moving London towards meeting air quality objectives for NO<sub>2</sub>. Under this scenario, it is expected that in 2010 there would be: a 28% reduction in the area of Greater London exceeding the NO<sub>2</sub> annual mean objective; and a 30.4% reduction in the population exposed to levels of NO<sub>2</sub> exceeding the annual mean objective.
- 3.13. However, implementing an NO<sub>x</sub> standard for the LEZ would be dependent on the availability of certified retrofit NO<sub>x</sub> abatement equipment, which requires development of an appropriate certification mechanism, so that operators have an economic route to achieve this standard. The practicalities of this are uncertain because:
- As yet few registers of vehicles retro-fitted with NO<sub>x</sub> abatement equipment exist making it difficult to identify such vehicles.
  - There are as yet no effective in-use compliance mechanisms for enforcing NO<sub>x</sub> standards.
  - Retro-fit NO<sub>x</sub> abatement technology is still evolving and can be more complex than those used to control PM<sub>10</sub>. NO<sub>x</sub> abatement equipment requires sophisticated control systems to be built into the vehicle, including on-board sensors and diagnostic equipment which can be relatively difficult to fit.
  - There are as yet no universal standards for the specification of retro-fit NO<sub>x</sub> abatement technology.

**4. Why LEZ costs have increased so dramatically, where the funding will come from, and how the increase is likely to impact on implementation.**

- 4.1. The 5 year TfL Investment Programme 2004/05 – 2009/10 published in October 2004 included £12.8 million capital costs for the introduction of a LEZ. In addition, some £20 million in operating costs were allowed for in the TfL Business Plan, giving a total of some £33 million. These figures were based upon the output of the joint GLA, ALG, TfL, Defra and DfT Phase II London LEZ Feasibility Study which reported in July 2003.
- 4.2. TfL carried out further detailed analysis of the costs of implementing and operating a proposed LEZ and reported updated estimated net costs of the LEZ to the TfL Board in September 2005. These costs are some £70m to £78m (operating and capital costs, minus revenues), which is some £37m to £45m more than previously allowed for. These additional costs were included in the revised business plan approved by the TfL Board in October 2005.

- 4.3. The updated estimates of scheme implementation and running costs were based on a bottom-up review of all cost components and referred back to the experience of implementing the Central London congestion charging scheme. This review concluded that the feasibility study figures were an underestimate because:
- The enforcement strategy assumed a heavy reliance on data captured by congestion charging cameras. In practice, many of the heavy vehicles operating in Greater London do not enter the congestion charging zone and hence additional enforcement infrastructure outside the congestion charging area would be required.
  - It made insufficient allowance for the project management, legal, public information and scheme monitoring costs and did not allow for a revision to the Air Quality and Transport Strategies or a Scheme Order and their associated consultations.
  - Based upon current procurement expectations; service provider costs for operating the scheme would be higher than allowed for in the Feasibility Study.
- 4.4. The projected annual costs to TfL for the proposed basic scheme are shown in Annex B. The costs to TfL of enhancing the standard for 2010 to Euro IV for PM<sub>10</sub> and NO<sub>x</sub> are not significantly different from the basic scheme as the same infrastructure for the basic scheme would be used. The cost to TfL of including LGVs is estimated at an additional £4m (NPV). These additional implementation options are still being assessed by TfL for feasibility and acceptability.
- 4.5. TfL continually reviews these estimated costs as part of its reporting and budget approval process. The next formal update of these costs would occur following the outcome of the public consultation on the Transport Strategy and Air Quality Strategy revisions. Estimates of scheme operating costs and revenues would be further updated as the scheme is refined. Data on likely operator responses to the proposed LEZ and associated compliance costs will be refined as more information is obtained from potentially affected parties.
- 4.6. A number of uncertainties around the proposed LEZ inevitably exist, primarily associated with operator behaviour and the scope and cost of services from DfT. These were built into the updated capital expenditure (CAPEX) estimates to cover legal costs in the case of a challenge, abatement certification costs if the DfT solution was not available, and any further research, public information and enforcement costs that may be required. No further optimism bias was added in the CAPEX estimates but an overall optimism bias of 30% was applied to OPEX.
- 4.7. There is no expectation that the proposed LEZ would generate sufficient revenue to offset its costs. Furthermore, air quality improvements would be maximised by high levels of operator compliance, rather than payment of the charge.

**5. What is being done to engage with London's businesses (particularly small businesses) and how effective that engagement is.**

5.1. TfL has been meeting with key LEZ stakeholders, including London business representatives, throughout the process of developing the LEZ proposals. The key business, industry and operator representative bodies who TfL has regularly met with are:

- Freight Transport Association
- Road Haulage Association
- Confederation of Passenger Transport
- Federation of Small Businesses
- Small Business Service (DTi)
- London First
- London Chamber of Commerce and Industry (LCCI)
- London CBI
- Society of Motor Manufacturers and Traders (SMMT)

5.2. In addition to individual meetings, the LEZ project team meets with these groups quarterly<sup>8</sup> to update them on the LEZ proposals and to provide them with an opportunity to comment and provide feedback. TfL has used this feedback in developing LEZ proposals that balance the costs to operators against the potential benefits of the LEZ. TfL has also provided briefings to a number of stakeholders on request, such as the London Chamber of Commerce Transport Committee, the Heathrow Consultative Committee and the Confederation of Passenger Transport Annual Conference. Further regular meetings are held with public sector stakeholders (e.g. the London boroughs, ALG, DfT, Defra) and there are ongoing discussions in relation to technical standards and feasibility of proposals held with abatement technology manufacturers and other relevant stakeholders.

5.3. TfL undertook a survey of vehicle operators in Spring 2005, which indicated that the proposed LEZ would have no impact on approximately half of operators in London as their vehicles are already compliant with the proposed standards. For most non-compliant vehicles a one-off cost to fit pollution abatement equipment, plus lesser ongoing maintenance costs would be required.

5.4. Subject to Mayoral approval, a public and stakeholder consultation process will be undertaken between February and April 2006 on draft revisions to the Mayor's Air Quality and Transport strategies. This will provide stakeholder groups and individuals with the opportunity to provide formal feedback on the LEZ proposals. At the same time, an attitudinal survey of potentially affected businesses and the general public will be undertaken. The feedback from the consultation and the

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<sup>8</sup> The previous meeting was on 21 October 2005. The next meeting is scheduled for February/March 2006.

attitudinal survey will be reviewed and taken into account in the Mayor's decision whether to confirm the Strategy revisions, and in ongoing scheme design. Further consultation would be undertaken at the time of developing a Scheme Order.

5.5. The LEZ, particularly if extended to LGVs in 2010, could have a larger impact on small businesses as these frequently have a lower rate of vehicle turnover than large businesses, and any compliance costs are likely to represent a higher proportion of their total costs than would be the case for larger operators. The forthcoming public and stakeholder consultation, as well as an assessment of impacts on employment, will assist in quantifying the impacts on small businesses and in detailed development of the LEZ proposals.

5.6. Based on feedback from the coach industry on the long life of their vehicles (a coach may run for over twenty years whereas the average life of an HGV is around 12 years) the proposed LEZ standards were amended to enable these vehicles to continue to enter the LEZ with suitable modification, rather than having to be scrapped or sold outside London. Phased implementation of the scheme is also planned whereby vehicle types that may need a longer lead time to fit abatement equipment, i.e. HGVs under 7.5 tonnes, buses and coaches, would not need to meet the standards until part way through the first year of the LEZ.

## **6. Whether there are viable alternative methods that might effectively achieve the required levels of improvement in London's air quality**

6.1. A Feasibility Study<sup>9</sup> to examine methods of reducing traffic emissions in London via one or more Low Emission Zones was commissioned in July 2001. This study was undertaken on behalf of the GLA, TfL, the Association of London Government, the Department for Transport (DfT) and the Department for the Environment, Food and Rural Affairs (Defra). Phase I of that study concluded that a LEZ was the best approach to help achieve air quality objectives in London. Phase II, which reported in July 2003, looked at options for introducing a LEZ in more detail and concluded that a London wide LEZ was the most effective option.

6.2. Subsequently, in his 2004 election manifesto the Mayor proposed, subject to consultation, to designate the whole of the Greater London area a LEZ. In early 2005, TfL completed a review<sup>10</sup> of the findings of the Feasibility Study, and concluded that there were no alternatives to the LEZ likely to achieve the same level of benefits in the same or shorter timeframe. As such, in the absence of national initiatives, the proposed LEZ represents the most effective way to reduce the most harmful transport related emissions between 2008 and 2015.

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<sup>9</sup> <http://tfl.gov.uk/tfl/downloads/pdf/lez/phase-2-feasibility-summary.pdf>

<sup>10</sup> <http://tfl.gov.uk/tfl/downloads/pdf/lez/3-LEZ-strategic-Review-Report-250205.pdf>

6.3. The alternatives considered by TfL were:

- **Relying on the natural vehicle replacement cycle and tighter Euro standards to produce the same air quality improvements as the proposed LEZ.** Work undertaken by TfL estimates that the introduction of a London LEZ would bring forward by some 4 to 5 years reductions in PM<sub>10</sub> emissions in 2010 than would otherwise be achieved under the natural vehicle replacement cycle.
- **Higher levels of Vehicle Excise Duty (VED) for more polluting vehicles.** Government has indicated it has no plans to support the introduction of differential VED rates depending on PM<sub>10</sub> and NO<sub>x</sub> emission levels.
- **The introduction of national road user charging with higher charges for more polluting vehicles.** Planning for a national road user charging scheme is in its infancy. There is no firm target date for its introduction and much debate on its form and development is still to be had.
- **Grants for retro-fitting emissions reducing equipment to vehicles.** Government grant programmes are very unlikely to provide sufficient funding to clean up the HGV fleet to the level that would be achieved by a Low Emission Zone. Also, European Union rules limit any environment-related grant to 30 per cent of the capital cost of the equipment. Funding grants for operators to this level is unlikely to be cost-effective, and unlikely to provide adequate incentives to operators to clean up their vehicles.
- **Scrapping of older vehicles.** The issues relating to the provision of incentives for scrapping older vehicles are similar to those relating to grants. There would also be a number of problems in targeting financial assistance to the large number of UK vehicles that operate in London but are registered outside.
- **Roadside emission testing of vehicles.** Roadside emissions tests are only able to identify the most polluting vehicles (i.e. those that would fail an MoT test) as the tests are fairly insensitive and cannot distinguish between Euro standards. Roadside testing also requires the involvement of VOSA or the police to stop vehicles, and it would not be practical to stop HGVs using many London roads. As an approach for dealing with the emissions of Heavy Goods Vehicles, buses and coaches, roadside emissions testing would achieve small reductions in emissions compared to those from the proposed LEZ<sup>11</sup>.

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<sup>11</sup> A London-wide Vehicle Emissions Testing (VET) Programme was trialled between July 2003 and March 2004. Only 3 diesel vehicles were presented with a penalty notice for excessive emissions over this period and the cost of the scheme was approximately £900K. It was deemed that the emissions achieved by the programme did not justify the cost.

6.4. It should be noted that the LEZ would be just one of a number of initiatives aimed at reducing road transport related emissions in London and within the Mayor's Air Quality Strategy there are a number of initiatives that are being pursued to deliver reductions in emissions. These other measures include:

- Within the Transport and Air Quality Strategies there are initiatives which encourage a modal shift away from private vehicles and on to public transport, as well as encouraging people to cycle and walk.
- All London buses under contract to TfL met a minimum of Euro II emission standards for all pollutants by the end of 2005. Through the fitting of particulate traps on all Euro II and Euro III buses, the fleet also met a minimum of Euro IV emission standards for PM<sub>10</sub> by December 2005. In addition, over 1,000 buses will be fitted with NO<sub>x</sub> abatement equipment by March 2010, subject to the successful outcome of current trials.
- The Mayor's Taxi Emissions Strategy will require all London licensed taxis to meet Euro III emission standards for PM<sub>10</sub> and NO<sub>x</sub> by mid 2008.
- The London Fire and Emergency Planning Authority (LFEPA) replaced half of their original fire engines by the end of 2005, and all their vehicles should meet Euro III emission standards for PM<sub>10</sub> by mid 2008.
- The Mayor requires boroughs to improve air quality at a local level, including pollution hotspots, through the Local Air Quality Management system. The Mayor is also working with the boroughs to address emissions arising from local traffic, new developments, and construction activities. The Mayor is encouraging boroughs to assess and improve the emissions of their own vehicles, including refuse collection and waste vehicles.
- TfL has introduced a 100% discount on the Congestion Charge for the cleanest alternative fuel vehicles.

6.5. The option of investing further in the TfL contracted bus fleet will continue to be reviewed in light of the current trials and the final emissions standards adopted for the LEZ and developments in NO<sub>x</sub> abatement equipment<sup>12</sup>.

## **7. How effective trialled additional measures have been and what is the extent of their impact in reducing harmful emissions.**

7.1. TfL has not conducted any specific trialling of additional pollution reduction measures relating to the introduction of the proposed LEZ as the standards would encourage operators to replace older vehicles with newer ones, or to fit diesel particulate filters. TfL has tested the performance of particulate filters and NO<sub>x</sub> abatement equipment and other 'cleaner' technologies with regard to improving the emissions of the London bus fleet.

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<sup>12</sup> NO<sub>x</sub> abatement equipment is currently being trialled by London Buses.

### ***Diesel Particulate Filters (DPFs)***

- 7.2. Particulate filters (or traps) fitted to diesel engined vehicles typically reduce emissions of particulates, hydrocarbons and carbon monoxide by approximately 90%. These devices are tried and tested and well developed in the market place. Recent evidence shows that there is a possible link between the fitting of some types of particulate filter and an increase in the proportion of NO<sub>x</sub> emitted as NO<sub>2</sub>. TfL has been conducting further research into this issue and will be discussing the implications of the findings with Defra.

### ***NO<sub>x</sub> abatement equipment***

- 7.3. TfL has been conducting trials of selective catalytic reduction (SCR) and exhaust gas recirculation (EGR) NO<sub>x</sub> abatement equipment on London buses for the last six months, with a view to fitting over 1000 buses in the London bus fleet with this equipment by 2010. Because of the relative technical complexity of NO<sub>x</sub> abatement equipment versus particulate filters it has not to date been possible to develop a common certification scheme for the retro-fitting of the equipment. This would be required before a LEZ standard for NO<sub>x</sub> could be set requiring all older HGVs, buses and coaches to be fitted with NO<sub>x</sub> abatement equipment.

### ***Fuel cell bus trials***

- 7.4. The Mayor is keen to build London's hydrogen economy as soon as possible and TfL is currently trialling three hydrogen buses. Hydrogen-powered fuel cell buses are very beneficial in terms of air pollution as they emit no CO<sub>2</sub>, NO<sub>2</sub> or PM<sub>10</sub> but they are currently costly to purchase and run. An alternative to fuel cell buses is hydrogen internal combustion engine vehicles which although they are cheaper than fuel cell buses still emit some pollutants (although far less than diesel engined vehicles). TfL is looking at how it can work with the London Hydrogen Partnership to deliver its Action Plan and is already looking to procure 10 hydrogen or fuel cell vehicles for delivery between 2008 and 2009.

## **8. Other information**

- 8.1. TfL is aware that representatives from London First are attending the Committee hearing. London First has raised a number of issues with TfL in advance of this hearing. The information provided to London First in response to their queries will be copied to the Committee.

## ANNEX A: Summary of projected LEZ impacts on emissions, exceedances and population exposure\*

Scenario	NO <sub>x</sub>							PM <sub>10</sub> - annual						PM <sub>10</sub> - daily					
	Emissions of NO <sub>x</sub>		Area exceeding annual mean NO <sub>2</sub> objective for 2010 (40ug/m <sup>3</sup> )		Population in area exceeding objective			Emissions of PM <sub>10</sub>		Area exceeding annual mean PM <sub>10</sub> objective for 2010 (23ug/m <sup>3</sup> )		Population in area exceeding annual mean PM <sub>10</sub> objective			Area with >35 (pre-2010) and >10 (2010) exceedances p/a of daily PM <sub>10</sub> objective (50ug/m <sup>3</sup> )		Population in area exceeding objective		
	Tonnes emitted	% reduction	Area (km <sup>2</sup> )	% reduction	Population exposed	Reduction in population exposure	% reduction	Tonnes emitted	% reduction	Area (km <sup>2</sup> )	% reduction	Population exposed	Reduction in population exposure	% reduction	Area (km <sup>2</sup> )	% reduction	Population exposed	Reduction in population exposure	% reduction
<b>Base Case 2008</b>	<b>34700</b>		<b>80</b>		<b>626800</b>			<b>2400</b>		<b>100</b>		<b>717400</b>			<b>5</b>		<b>24300</b>		
Basic Scheme (HGVs, coaches and buses) Euro III for PM <sub>10</sub>	33600	3.2%	75	7.2%	575600	51200	8.2%	2300	4.3%	90	7.8%	658500	58900	8.2%	4	11.7%	21700	2700	10.9%
<b>Base Case 2010 ( No LEZ in 2008)</b>	<b>27600</b>		<b>30</b>		<b>193700</b>			<b>2150</b>		<b>37</b>		<b>253500</b>			<b>33</b>		<b>216400</b>		
Basic Scheme Euro IV for PM <sub>10</sub>	26400	4.1%	26	10.5%	172100	21600	11.1%	1950	7.9%	30	18.4%	205800	47700	18.8%	27	17.0%	178600	37800	17.5%
<b>Options</b>																			
Euro IV for PM <sub>10</sub> and NO <sub>x</sub>	24300	11.9%	21	28.0%	134800	58900	30.4%	1950	8.2%	30	19.4%	203000	50500	19.9%	27	17.9%	176000	40400	18.7%
Euro IV for PM <sub>10</sub> + LGVs	26200	5.0%	25	13.0%	165800	27900	14.4%	1950	9.2%	29	21.4%	198400	55100	21.7%	26	20.0%	171800	44600	20.6%

\* Absolute figures have been rounded.

## ANNEX B: LEZ Estimated Costs and Revenues

Table 1 - CAPEX and OPEX Costs to TfL

Estimated costs (2005 constant prices £(m)) <sup>13</sup>									
	FY 05/06	FY 06/07	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12 to 15/16	Total FY 05/06 to 15/16	NPV
CAPEX	6.7	16.8	15.5	3.8	6.8	2.0	0	51.6	46.7
OPEX	0.9	1.0	9.2-13.3	12.1	12.6- 13.4	10.7- 10.8	55.5	102.0- 107.0	80.9- 85.4
Totals	7.6	17.8	24.7- 28.8	15.9	19.4- 20.2	12.7- 12.8	55.5	153.6- 158.6	127.6- 132.1

<sup>13</sup> Costs and revenues have been estimated at 2005 constant prices. Present values have been discounted at 3.5%.

**Table 2 - Estimated Revenues**

Estimated revenues (2005 constant prices £(m))									
	FY 05/06	FY 06/07	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12 to FY15/16	Total FY 05/06 to FY15/16	NPV
Charges	0	0	0.3-0.2	1.1-0.7	1.3-0.9	3.4-2.4	16.5-13.2	22.6-17.4	17.3-13.3
Penalties	0	0	1.4-5.6	2.8-10.2	0.4-0.6	4.0-14.8	4.1-11.1	12.7-42.3	10.3-35.1
Total Revenue	0	0	1.7-5.8	3.9-10.9	1.7-1.5	7.4-17.2	20.6-24.3	35.3-59.7	27.6-48.4

**Table 3 - Overall Funding Implications to TfL**

Net Costs (2005 constant prices £(m))									
	FY 05/06	FY 06/07	FY 07/08	FY 08/09	FY 09/10	FY 10/11	FY 11/12 to FY15/16	Total FY 05/06 to FY15/16	NPV
Costs	7.6	17.8	24.7-28.8	15.9	19.4-20.2	12.7-12.8	55.5	153.6- 158.6	127.6- 132.1
Revenue	0	0	1.7-5.8	3.9-10.9	1.7-1.5	7.4-17.2	20.6-24.3	35.3-59.7	27.6-48.4
Net Costs	7.6	17.8	23.0	12.0-5.0	17.7-18.7	5.3-(4.4)	34.9-31.2	118.3- 98.9	100.0- 83.7