LONDONASSEMBLY

Environment Committee

Every Breath You Take

An investigation into air quality in London

May 2009

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Terms of reference

- To set out why and how poor air quality affects Londoners.
- To determine what actions are available to the Mayor, the GLA group and other stakeholders to improve air quality in London and meet EU targets.
- To consider the impact of these actions in improving air quality to meet EU targets.

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Chair's Foreword

Air quality in London is amongst the worst in Europe. Air pollution today is made up of new pollutants, which can have different impacts on our health. Tiny, complex particles, and gases mainly from emissions from diesel vehicles can contribute to a range of health effects, from coughing and sneezing, to more serious illnesses requiring hospital admissions and even death. A recent report from the European Environment Agency indicates that air pollution contributed to 650 deaths per million people in the UK in 2005. This could indicate up to 3,000 deaths for London based on its population (see page 15 – 16 for more details). This is why it is so important that we quantify how many Londoners are affected by air pollution and put in place measures to prevent this ill health.

Action is required across the tiers of government and of course from individuals adapting their behaviour to cut polluting emissions. The focus of this report is what actions the Mayor can take to improve air quality and improve the health of Londoners. We have published this report to feed into the Mayor's air quality strategy, due for publication in summer 2009. Our findings draw on a broad base of submissions and examples of best practice that are already working in other European cities, to improve air quality. These are set out in chapter seven.

Understanding air pollution is a complex issue. The scientific process involved in collecting air quality data from local monitoring stations and using these figures to provide air pollution levels for London as a whole, requires technical expertise to fully understand. Therefore, the Committee found that providing Londoners with more information about air pollution levels in their local area, and how air quality can be improved would be beneficial. This could include setting up electronic information panels in public areas, which relay real time air pollution levels.

Vehicle emissions are the largest source of air pollution, so the focus must be on policies to target this. The Committee is recommending the use of a range of different technological solutions. These include,

for example, targeted local low emission zones and a big push to use biofuel in public transport.

Finally we welcome the Mayor's efforts to encourage a change in how people travel around London. We are looking for concerted action to make walking and cycling around the capital both easier and more attractive. This 'behaviour change' is already working with positive results in some parts of London and beyond.

The Committee is looking for the Mayor to set out in his Air Quality Strategy a realistic timetable for how he will tackle poor air quality in London. In 2012 the world will be celebrating sporting achievements: we do not want the quality of London's air to be an issue as was the case in the two most recent Olympic and Paralympic Games in Beijing and Athens.

I would like to thank all those who contributed to this investigation, both during the Committee meetings and in written submissions, as their input has been valuable in producing this report.

Darren Johnson AM

Chair, London Assembly Environment Committee

Executive Summary

Overview

London has the worst air quality in the UK and amongst the worst in Europe for airborne particles (particulate matter, PM_{10}) and nitrogen dioxide (NO_2), which affects health and quality of life. Government estimates suggest that air pollution[1] may have contributed to around 1,000 premature deaths in London each year, but experts at a recent Environment Committee meeting believe this is an underestimate, and recent figures show this could be closer to 3,000 deaths.[2] This absence of **accurate and timely information and data on the impacts on Londoners' health is unacceptable and must be provided to inform policy decisions**.

UK strategies to improve air quality have been developed since the 1990s. However, despite action at borough, regional and national level, eight areas of the UK, including London have failed to meet air quality targets. As a consequence, the European Union (EU) has launched infringement action against the UK government. **Bold and innovative action has to be taken by the government and the Mayor and implemented effectively and quickly, to improve public health and avoid substantial fines from the EU**.

The Mayor's Air Quality Strategy – points to include

Mayor Johnson's Air Quality Strategy is expected to focus on four policy areas: low emission vehicles, encouraging more walking and cycling, smoothing traffic flows and non-transport areas such as energy efficiency in buildings. In the absence of more detailed workings, the Committee recommends that **the Air Quality Strategy clearly demonstrates the impact these measures will have in the short, medium and long term, clarifying what reductions in PM_{10} and NO_2 are expected and when this will happen.**

Additional actions presented by the Environment Committee

The Committee held two meetings to discuss what bold actions could be implemented to improve air quality. At the local level this report calls for local **air quality data to be available in real time** so that Londoners can understand the levels in their own local environments. Where pollution runs at unacceptably high levels, **additional, smaller**

[1] From PM_{10}

[2] Government estimates suggest that air pollution contributes to around 1,000 premature deaths in London each year, but recent data from the European Environment Agency suggests that this could be closer to 3,000. However, both of these figures are estimations for London, based on calculations from UK figures, since the Committee is not aware of accurate, empirical data for London. See footnotes 31 to 34 on page 16 for more information.

Low Emission Zones should be introduced to target pollution hotspots from road transport. A similar scheme in Berlin resulted in a three per cent reduction of PM_{10} plus ten per cent reduction of NO_2 in its first year.[3] This should be accompanied by a vehicle retrofit scheme, with financial support from the Government to help people replace vehicles that would not be permitted into the zone.

The Mayor and TfL should take action against polluting public fleets by researching the use of **biofuel for all public transport in London**, including buses, trains, taxis and river transport. Existing examples that are used elsewhere include **Biogas**, from waste, which produces almost no health hazardous emissions and very little greenhouse gas emissions[4] and **biodiesel from used vegetable oil** which could result in up to 50 per cent reduction in PM emissions.[5] This research should be as comprehensive as possible to be effective. **The reduction of emissions from older public diesel vehicles** is vital, as some experts believe with hindsight that using diesel for public transport was 'a very big mistake'.[6] Diesel particles have a greater negative effect on both air quality and health than petrol. The bus retrofitting programme should be rolled out to fit the latest particulate filters on all public fleets, as filters can reduce PMs by up to 90 per cent and selective catalyst reduction for reducing NOx[7] by up to 85 per cent.[8]

[3] includes just the effects of the LEZ without weather and other measures (in German) http://www.berlin.de/landespressestelle/archiv/2009/04/15/125521/index.html
[4] Civitas report on Sustainable Urban transport
[5] if buses are equipped with particle catalysts. Without a catalyst, biodiesel and fossil diesel emit similar amounts of particles. Source: Civitas report on Sustainable Urban transport http://213.131.156.10/xpo/bilagor/20060118105941.pdf
[6] Evidence from Prof. Frank Kelly, King's College London, Environment Committee meeting, February 2009
[7] NOx includes both NO and NO_2 – please see glossary for more information
[8] http://www.airqualitypolicy.co.uk/sadler_files/pdf/Final%20Austrian%20article.pdf

1 – What is the issue?

The quality of the air in London is a fundamental environmental concern. Everyday activities such as driving our cars and heating our homes contribute to worsening air quality. This can in turn lead to serious health problems for some people. There is no one solution to achieving clean air and while all levels of government, from local to European must play a part, the Mayor's policies to target air pollution can have a notable impact on the air that we breathe.

London suffers from poor air quality and parts of London are amongst the worst in the UK and EU for particulate matter (PM_{10}) and nitrogen dioxide (NO_2). The UK was set air quality targets by the EU in 1999[9] that came into effect in 2005 and infringement action has been launched against the UK government for failing to meet these targets.[10] Effective action must now be taken to remedy this failure, to improve public health and avoid substantial EU fines, which would have to be met by the government.

The aims of this report are to set out why and how poor air quality affects Londoners and determine what actions are available to the Mayor, the GLA group and other stakeholders to improve air quality in London and meet EU targets. Two Environment Committee meetings were held: the first in February 2009 with key academics, experts and interest groups to consider actions to improve air quality. The second meeting in March, with policy officials from national, regional and local government and Transport for London, discussed ways of implementing these actions.[11] This was supplemented by site visits to Marylebone Air Quality monitoring site and Uptown Oil Biodiesel manufacturers in Southwark. The Committee received many written submissions (available on our website) including the European Commission, King's College London, the Campaign for Clean Air in London, and from Londoners, by speaking to residents groups and through an online questionnaire.[12]

Conclusions from views gathered at Committee meetings show that action to tackle air quality needs to take place on a local, regional, national and from European level and it needs to be coordinated. Experts agreed that the solutions to improve air quality exist and are

[9] Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0030:EN:NOT
[10] for PM_{10} Written evidence from European Commission
[11] Please see http://www.london.gov.uk/assembly/envmtgs/index.jsp#78
[12] See Appendix 2 for results

working in other cities. Future policies need to focus on building a greater public understanding of the issues, promoting technological solutions and supporting behavioural change. Political will is needed to drive forward this change. The Mayor is due to update London's Air Quality Strategy in summer 2009. This is a vital moment to make changes that will improve the health and well being of people across London.

London is in a strong position: it has some of the most sophisticated air quality monitoring networks in the world and first-class academics to analyse this information, together with the governance structure of the GLA group. This gives it a robust basis to make policy changes to improve air quality, through transport measures, planning decisions, economic development and other environmental policies including waste management and climate change. It needs political leadership to bring these activities together.

This report will set out the extent of the air quality problem in London, current policies in place and further actions that can improve the situation that the Committee would wish to see included in the Mayor's forthcoming Air Quality Strategy.

2 – The current situation in London

How is air quality measured?

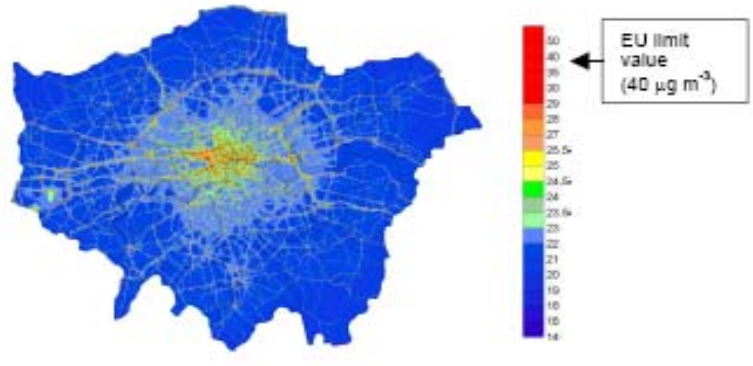
Concentrations of air pollution are measured on a regular basis at over a hundred sites across London. Measurements are taken by a complex array of monitors, which are then relayed to a control centre near Waterloo. King's College London oversees the monitoring and analysis of air quality data in London. Hourly and daily results are published on the London Air Quality Network website.[13]

London has the worst air quality in the UK and amongst the worst in Europe. It currently fails three EU limit values: nitrogen dioxide, particulate matter and ozone. Table A1 in Appendix 1 is taken from information submitted by King's College London and shows the EU limit values and where they are failed in London, the ability to control policies in London and future trends. London currently meets EU limits for carbon monoxide (CO) and sulphur dioxide (SO_2), but fails the World Health Organisation levels of SO_2 (see Appendix table A2).

Where in London is affected

King's College London has provided maps to show London's air quality in 2004. These will be updated in the Mayor's forthcoming Air Quality Strategy. The colour coding represents the concentration of air pollution, with yellow to red indicating the areas of worst air quality. Figure 1.2 shows that NO_2 is a widespread problem that affects large areas of central and inner London, parts of suburban London and all busy roads. Figure 1.1 shows that PM_{10} is more of a localised problem to the busiest roads in London.[14]

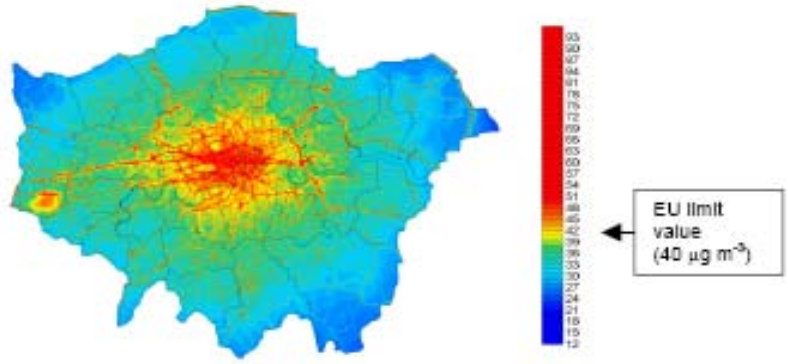
Figure 1.1 Annual mean PM_{10} concentrations in 2004



Source: King's College London

[13] http://www.londonair.org.uk/london/asp/publicstats.asp?region=0
[14] For more information, see Appendix Table A1

Figure 1.2 Annual mean NO_2 concentrations in 2004



Source: King's College London

Note: These maps show 2004 figures, which are the latest available at the time of publication, but will be updated with new figures and projections in the Mayor's forthcoming strategy. The latest projections are available in the London Atmospheric Emissions Inventory, published in December 2008. [15]

Source of air pollution

Figures 1.3 and 1.4 clearly show that road transport, and in particular older diesel vehicles, are the main cause of air pollution in London. The number of diesel cars in London is increasing: figures from Department for Transport (DfT) show 30 per cent of all cars registered in 2007 were diesel, compared with eight per cent in 1993.[16] Although newer diesels have lower emissions than the most polluting old vehicles and emit less CO_2, they still emit much higher levels of PM_{10} and NO_2 than petrol vehicles. There is some evidence to suggest that this is why PM_{10} levels have not been reducing in the last few years.

[15] *Note: the LAEI provide projections for 2010, based on 2004 figures on p208 and 210 at www.london.gov.uk/mayor/environment/air_quality/docs/laei-2004-full-report-dec08.pdf*
[16] Data provided by the DfT to show the number of licensed vehicles in the Greater London area as at 31.12.07

Figure 1.3 PM_{10} emissions sources in London, 2003[17]

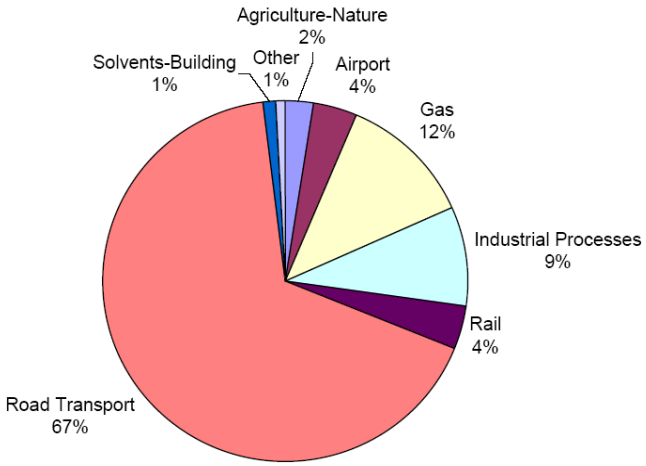
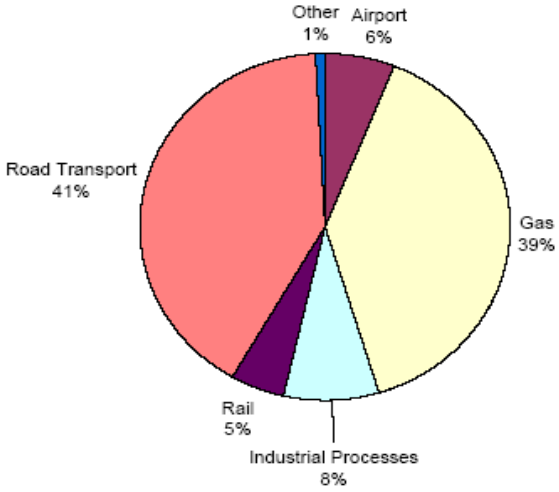


Figure 1.4 Nitrogen Oxide emissions sources in London, 2003[18]



Note: gas refers to gas combustion including domestic, industrial-commercial consumption and gas leakage

Source: King's College London

In addition, evidence from King's College London suggests that the PM_{10} emitted in London (mostly traffic) is responsible for the majority of damaging health effects. Action taken in London to reduce PM_{10} emissions and meet regulatory limits will therefore be one of the most effective ways to reduce the health burden from air pollution on London's population.

[17] *Source:* London Atmospheric Emissions Inventory 2003 (GLA)
[18] *Source:* London Atmospheric Emissions Inventory 2003 (GLA)

3 – The impacts of poor air quality

The World Health Organisation (WHO) states "clean air is considered to be a basic requirement of human health and wellbeing. However, air pollution continues to pose a significant threat to health worldwide. According to a WHO assessment […], more than two million premature deaths each year can be attributed to the effects of air […] pollution".[19]

Air quality is now a major concern for many in Europe. Since the early 1970s, the EU has been working to tackle air pollutants. However, despite a reduction in some harmful emissions, air quality continues to cause health problems. The European Commission states that 'air pollution is increasingly being cited as the main cause of lung conditions such as asthma - twice as many people suffer from asthma today compared to 20 years ago'.[20]

The aim of the Mayor of London's 2002 air quality strategy was '**to improve London's air quality to the point where pollution no longer poses a significant risk to human health' …** although it is recognised that '**this will be a very challenging task**'.[21] The Committee would welcome a confirmation of this aim in the current Mayor's forthcoming air quality strategy, as well as a statement of what progress has been made towards this goal since 2002.

Table 1.5 The main air pollutants, sources of these pollutants and potential health effects[22]

Pollutant	Sources	Health Effect
Nitrogen dioxide	Road transport, domestic boilers, power stations and industry	Causes irritation to airways. High concentrations can increase asthma symptoms
Fine particulates (PM_{10} and $_{2.5}$)	Road transport (mainly diesel vehicles), power stations, domestic boilers	Can cause heart and lung diseases and lead to premature death in those already ill
Ozone (ground level)	Produced when sunlight reacts with pollutants from vehicle and industrial emissions.	Causes irritation to eyes, nose and throat. Can cause damage to lungs and airways

[19] http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf
[20] http://ec.europa.eu/environment/air/index_en.htm
[21] The Mayor's Air Quality Strategy highlights, September 2002
[22] Taken from http://www.cityoflondon.gov.uk/Corporation/LGNL_Services/Environment_and_planning/Pollution/air+quality.htm#defra (Original source, Defra)

Professor Frank Kelly, Director of the Environmental Research Group at King's College London states that the elderly and young are the most vulnerable to air pollution. Scientific studies have shown those who live on busy roads, or children who go to school close to busy roads have increased respiratory illnesses[23]. King's College London is currently researching the long term impacts of poor air quality on health, by undertaking a study with school children in east London. Studies from the United States suggested children's lungs are smaller and do not develop to full capacity if they live on or go to school close to busy roads,[24] although further research is needed in the UK.[25]

Professor Kelly states that air pollution does not kill directly. Instead, it works alongside other entities (such as viruses, bacteria and allergens) to accelerate and exacerbate health problems, which can lead to hospitalisation, and even death in the more severe cases.[26] This has a severe and costly impact on the National Health Service.

The link between poor air quality and long term health impacts has been quantified for the UK. Department for Food and Rural Affairs (Defra) states **that poor air quality from particulate matter reduces life expectancy in the UK by an average of seven to eight months, with equivalent health costs estimated to be up to £20 billion a year**.[27] **There is a real need for accurate and timely information and data on the impacts on Londoners' health, as has been calculated for the UK, to inform policy decisions.** In London, current levels of air pollution are estimated to contribute to **just over 1,000 premature deaths and a similar number of extra hospital admissions due to respiratory problems each year in London**.[28] However, this London figure is an estimation based on the proportion of London's population of the UK total. Professor Kelly states that in his opinion, given the nature of the problem in London (for example, the likelihood that proportionally many more people are exposed to high diesel concentrations) this is likely to be an underestimate and the figure for premature deaths is

[23] Evidence from Prof. Frank Kelly, King's College London
[24] Oral and written evidence from Prof. Frank Kelly, King's College London, February 2009, for more details, see http://www.thelancet.com/journals/lancet/article/PIIS0140673607600373/abstract?iseop=true
[25] which is being undertaken by King's College London
[26] Written evidence from Prof. Frank Kelly, King's College London
[27] Defra's Local Air Quality Management, Policy Guidance (PG09), February 2009
[28] Environment Agency overview of air quality in London http://www.environment-agency.gov.uk/research/library/publications/40987.aspx

'probably many thousands'.[29] A recent study from the European Environment Agency, which provides UK figures,[30] suggests that **PM_{10} could have contributed to around 3,000 premature deaths in 2005 in London**.[31]

Through its investigation, the Committee received information about the harmful effects of $PM_{2.5}$ and Ozone. The EU states that fine particulates present a health risk which is of increasing concern. Europe has set a new limit value for $PM_{2.5}$ as the European Commission consider this is among the most dangerous pollutants for human health.[32] The Committee received written information about the harmful effects of $PM_{2.5}$ through incineration of waste. It welcomes the statement by the London Waste and Recycling Board that it will not be investing in incineration projects, but focusing on new energy from waste technologies,[33] which have a lower impact on air quality and CO_2 emissions.[34] The EU also notes that summer smog, originating in potentially harmful ground-level ozone, regularly exceeds safe limits. A recent study from the University of California has found that long-term exposure to ground-level ozone is associated with an increased risk of death from respiratory ailments.[35] **The forthcoming air quality strategy should address how London policies will contribute to the reduction of all air pollutants, including $PM_{2.5}$ and Ozone.**

[29] Evidence from Professor Frank Kelly, King's College London
[30] 650 premature deaths per 1 million people in the UK in 2005 caused by PM_{10} http://www.eea.europa.eu/publications/spatial-assessment-of-pm10-and-ozone-concentrations-in-europe-2005-1 yet Professor Kelly states the approach used to produce these new figures differs from that used by the UK Government in 2001 as it captures all pollution-related categories of death not just those whose death has been triggered by an air pollution episode i.e. it takes into account the impact of exposure over several decades of life. Note: there is debate amongst experts as to which is the best approach to use.
[31] based on the proportion of 4,469,400 million people over 30 in Greater London in 2007 this would equate to 2,905 deaths from PM_{10}
[32] Directive 2008/50/EC on ambient air quality http://www.europa-eu-un.org/articles/en/article_7826_en.htm
[33] Oral evidence from Paul de Rivaz, Chief Operating Officer, LWaRB, Environment Committee meeting, March 2009
[34] The Committee will be examining this subject in more detail in Autumn 2009
[35] The study followed nearly 450,000 people for two decades across the US, analysed the risk of death for both ozone and fine particulate matter: 48,884 of the people in the study died from cardiovascular causes such as heart disease and strokes, and 9,891 died from respiratory causes. http://content.nejm.org/cgi/content/abstract/360/11/1085

4 – Responsibilities of each level of government

UK strategies to improve air quality have been developed since the 1990s. Despite action at borough, regional and national level, London is still failing to meet air quality targets. This section looks at why this is the case. Timing is now more critical, not least because the EU has launched infringement action against the UK government for failing to meet air quality targets.[36]

The objective of the air quality policies of the EU is to achieve levels of air quality that do not give rise to unacceptable impacts on, and risks to, human health and the environment. To enforce this, the EU sets limits of air pollution for the main pollutants and non-compliance can lead to fines. The Secretary of State for the Environment has the obligation to achieve the EU directive limit values throughout the UK. The first National Air Quality Strategy was produced in 1997 and was most recently updated in July 2007[37]. It sets national air quality objectives for reducing the levels of individual air pollutants and the measures that will be used to meet these objectives.

The Mayor has a statutory obligation under the Greater London Authority Act to produce an Air Quality Strategy[38]. The Mayor is currently updating this document, which is due for initial consultation in summer 2009. London boroughs have statutory duties for local air quality management (LAQM). They are required to regularly assess air quality in their area against national standards and objectives. Where standards are unlikely to be met, boroughs must create air quality management areas (AQMAs), submitted to the GLA in London (and Defra in the rest of England) and take remedial action to tackle the problem. All boroughs in London now have AQMAs, however it is worth noting that they do not necessarily apply to all areas within boroughs. The role of the Greater London Authority is to provide guidance and best practice to the boroughs in order to avoid duplication of work.

Legal Framework

The EU sets limits for amounts of pollutants in the air across the European Union, but also now allows for time extensions for member states not able to meet the deadlines, with the provision that plans are

[36] for PM_{10} Written evidence from European Commission
[37] http://www.defra.gov.uk/environment/airquality/strategy/pdf/air-qualitystrategy-vol1.pdf
[38] http://www.london.gov.uk/mayor/strategies/air_quality/air_quality_strategy.jsp

in place to show how they will meet the targets. Table 1.6 below sets out key dates relating to air quality.

Table 1.6 Timeline of key dates relating to air quality

Date	Item of note
1997	First UK Air Quality Strategy
1998	
1999	EU directive including PM_{10}, NO_2 limit values for all Member States
2000	
2001	
2002	First Mayoral Air Quality Strategy published
2003	Congestion Charge introduced
2004	
2005	**PM_{10} EU limit value comes into effect**
2006	
2007	Western Extension Zone (WEZ) of congestion charge introduced
2008	Low Emission Zone (LEZ) introduced
	Plans to increase Congestion Charge for most polluting vehicles cancelled
	Defra seeking extension for PM_{10} EU limit until 2011
2009	Plans put in place to cancel WEZ
	Intention to suspend LEZ phase III
	Heathrow expansion agreed
2010	**NO_2 EU limit value comes into effect** - Defra likely to seek extension until 2015
	$PM_{2.5}$ into national legislation
2011	**PM_{10} extension ends**
2012	
2013	
2014	
2015	**NO_2 extension ends**
2016	
2017	
2018	
2019	
2020	**$PM_{2.5}$ EU limit value comes into effect**

The new European air quality directive[39], amalgamating previous directives[40], came into force in June 2008, and must be transposed into national legislation by June 2010[41]. The new directive allows for the possibility for time extensions of three years for PM_{10} (to 2011) or up to five years for NO_2 (to 2015) for complying with limit values, based on conditions and the assessment by the European Commission. It also provides a new regulatory framework for $PM_{2.5}$ (fine particles).

The EU has requested a detailed plan of how the UK will comply with EU air quality limits and Defra has submitted its response (although it missed the original deadline). The European Commission has begun to pursue infringement action against the UK for exceeding PM_{10} limit values in London and seven other areas in the UK. It will also consider taking enforcement action in respect of any exceedence of NO_2 limit values when they enter into force in 2010.[42] Defra states that the extension would enable current and planned measures to take effect to reduce PM_{10} levels to within the EU limits by the extended deadline of 2011.[43] These projections will need to be revised to reflect the Mayor's review of existing air quality policies and introduction of new measures (please see following section for more detail) as well as the government's recent approval for the expansion of Heathrow Airport.

Ideas for improvement - integration

The panel of experts at the Committee meetings found that the different levels of government are not effectively coordinating their responses to air quality. This is not a new idea: a background paper for the assessment of European air pollution policies in 2004 states that 'greater dialogue between different levels of governance will assist in achieving compliance with the EU limit values, informing policy makers at each level of the activities and problems with which each are faced. Cities also need to talk together to share best practice and raise these matters with their national authorities.'[44]

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[39] Directive 2008/50/EC on ambient air quality and cleaner air for Europe
[40] This new Directive merged most of the existing air quality legislation into a single directive (except for the fourth daughter directive) including daily and annual limit values for PM_{10} which are already applicable, and annual limit values for NO_2 which will apply from 2010.
[41] http://ec.europa.eu/environment/air/quality/legislation/existing_leg.htm
[42] Written evidence from European Commission
[43] http://www.defra.gov.uk/news/2009/090127a.htm
[44] http://www.airqualitypolicy.co.uk/sadler_files/pdf/London-Berlin-Paris%20situation.pdf

The Committee heard that as long as government responsibility for air quality is in a separate department from transport and health policy – essentially the cause and effect of poor air quality – 'we cannot expect to see substantial improvement in air quality'.[45] Coordination between government departments needs to take place. At the regional level, under the forthcoming GLA organisational restructure, it is planned that the transport and environment policy departments will merge. However, it is important to ensure that strategies and workplans are also coordinated. The Committee welcomes the fact that the forthcoming Air Quality and Transport strategies are being coordinated by the respective teams, as stated at the March Committee meeting, although we note that the Mayor's Environment Director is not part of the core Transport Strategy team.[46]

Defra's recent guidance stated that improved air quality has significant health benefits, and local authorities are best placed to improve air quality at localised hotspots and deliver both health benefits and improved quality of life.[47] This is true for localised breaches of EU limit values but additional city and national action is needed to tackle the widespread breaches in London. For example, the City of London[48] has very high levels of NO_2. Annual average roadside concentrations of NO_2 in the City of London can be as high as 130-µg m^{-3}. Background concentrations are around 55-µg m^{-3}. The City of London state that it will be impossible to meet the limit value of 40-µg m^{-3} by 2015 without major national and regional intervention.[49]

The Committee will expect close working between Defra and the Mayor to achieve the EU limit values for PM_{10} and NO_2 and also O_3 and $PM_{2.5}$ in the future.

[45] Environment Committee February meeting: Dr Iarla Kilbane-Dawe, AEA Consultants
[46] Oral evidence from Isabel Dedring, Mayor's Director of Environment, March 2009 "As none of us [GLA and TfL officers present at March Committee meeting] are on the core Transport Strategy team, I do not know what exactly they are planning on including in the April [strategy] document."
[47] Introduction of Defra's Local Air Quality Management, Policy Guidance (PG09), Feb 2009
[48] Corporation
[49] Written evidence from the City of London

5 – Existing air quality policies in London

Road transport is the major source of air pollution and therefore must remain the focus of policies to improve air quality. The first GLA air quality strategy was published in 2002[50]. Key policies are set out below.

The London **Congestion Charge** was introduced in central London in February 2003.[51] It aims to reduce traffic congestion and improve journey times by encouraging people to choose other forms of transport if possible. Vehicles which drive within the zone in central London between 7am and 6pm, Monday to Friday, have to pay an £8 daily Congestion Charge. TfL states that since the congestion charge scheme began, there are 70,000 fewer cars a day within the zone, with a six per cent increase in bus passengers during charging hours.[52] In February 2007, the original central London congestion-charging zone was extended westwards. TfL states that traffic entering the Western Extension had fallen by 14 per cent (30,000 fewer cars a day) with a 12 per cent increase in cycle journeys into the Western Extension Zone.[53] However, TfL has reported that decreasing levels of road space in both the original and western zones has caused congestion to return to levels experienced before the charge was introduced,[54] which could be attributable to poor traffic flow and roadworks. Chapter six outlines the current Mayor's policies in relation to congestion.

The London **Low Emission Zone** (LEZ) was introduced on 4 February 2008. The aim of the LEZ is to improve air quality in London by deterring the most polluting vehicles from being driven in the area.[55] A recent GLA analysis of the potential impacts of the scheme[56] found the LEZ is expected to reduce total road traffic related emissions of PM_{10} by up to 5.6 per cent in 2012, with beneficial effects on other pollutants such as NOx. It will also reduce the area of Greater London with levels of PM_{10} that exceed the annual mean air quality objective by 4.8 per cent in 2008 and by 14 per cent by 2012. Over a ten-year period, projections suggest that people who would otherwise die prematurely as a result of poor air quality will gain cumulatively an

[50] http://www.london.gov.uk/mayor/strategies/air_quality/air_quality_strategy.jsp
[51] www.cclondon.com
[52] http://www.tfl.gov.uk/roadusers/congestioncharging/6723.aspx
[53] http://www.tfl.gov.uk/roadusers/congestioncharging/6723.aspx
[54] http://www.tfl.gov.uk/corporate/media/newscentre/archive/8948.aspx
[55] specifically for PM_{10}. For further details see:
http://www.tfl.gov.uk/roadusers/lez/default.aspx
[56] Evidence provided by the Mayor of London to the UK government to inform their work to meet the air quality limit values
http://www.london.gov.uk/mayor/environment/air_quality/docs/evidence-28Nov08.pdf

additional life expectancy totalling 5,000 years. Over the same period, lower levels of illness would mean a reduction of about 250,000 'restricted activity days' and more than 300,000 cases where respiratory symptoms are reduced in severity. Table 1.7 shows the estimated predicted benefits of the LEZ provided by the Mayor to the UK government in January 2009. **The Committee would like to see a similar table in the Mayor's air quality strategy, showing actual results.**

Table 1.7 Estimated predicted benefits of the LEZ

BENEFITS:	Annual NO_x Emissions, tonnes (% reduction compared to without LEZ in same year)	Population in area exceeding annual mean NO_2 above 40 g/m^3 (000's) (% reduction compared to without LEZ in same year)	Annual PM Emissions, tonnes (% reduction compared to without LEZ in same year)	Population in area exceeding annual mean PM_{10} above 23 $\mu g/m^3$ (000's)[1]
Base (Jan 08)	33851	1317	2453	476
Phases 1& 2 (Dec 2008)	30375 (3.3%)	946 (5.9%)	2276 (2.1%)	306 (5.3%)
Phase 1,2 & 3 (Dec 2010)	25950 (4.1%)	607 (9.3%)	2101 (3.7%)	135 (10%)
Phase 1,2,3 & 4 (Dec 2012)	21420 (10.2%)	390 (21.5%)	1968 (5.6%)	70 (15.3%)

Source: Evidence provided by the Mayor of London to the UK government to inform their work to meet the air quality limit values[57]

Please note that all figures and expected benefits are estimates, and at time of publication of this report, no actual data has been published on the effect of the LEZ on air quality, although the Committee understands TfL and King's College London are carrying out analysis. However, TfL states that results thus far are proving very positive and 96 per cent of the heaviest lorries driving in the zone now meet the necessary standard compared to 70 per cent during 2007. Compliance rates for vehicles affected from July 2008 are 94 per cent.[58]

The **Taxi emission strategy**[59] in 2005 required all licensed taxis to meet a minimum of Euro III emissions for NOx and PM by July 2008. Its aim was to reduce emissions from London's taxis by up to 37 per cent by July 2008. TfL's Environment Report 2008 states that taxis which account for around a third of PM emissions, recorded a 30 per

[57] http://www.london.gov.uk/mayor/environment/air_quality/docs/evidence-28Nov08.pdf
[58] Written evidence from TfL
[59] http://www.london.gov.uk/mayor/environment/air_quality/mayor/taxi_emissions.jsp

cent reduction compared to the previous year. This was a result of older vehicles being replaced, or retrofitted with abatement technologies such as filters, to meet higher European emission standards.[60]

Bus emission programmes[61] included fitting **particulate filters** to all Euro II and Euro III buses (93 per cent of the fleet), which the GLA states has achieved an average reduction of 90 per cent of tailpipe PM emissions and the **Vehicle replacement programme**, which on average, replaced 500 of the oldest buses in the fleet each year with the latest euro standard vehicles available.

The GLA also published **London Best Practice Guidance: the control of dust and emissions from construction and demolition**.[62]

Additional policies include **encouraging behaviour change** for which ***Smarter Travel Sutton*** is a good example. This is a three-year pilot programme, which encourages people to choose new ways to travel. It is a partnership between the London Borough of Sutton, TfL, local stakeholders and businesses and has just published its second annual report[63], showing successful results. Importantly results are not constrained by infrastructure, new vehicle procurement or fleet turnover times and it is already happening in London, so could be replicated in other boroughs. Successes of the scheme include:

- growth of bus patronage of 7.2 per cent in year two
- significant increase in cycling over the two years, with levels 50 per cent higher in April – October 2008 than they were for the same period in 2007
- reduction of 19 per cent in the number of pupils making car or car share trips to school (13 per cent in Outer London as a whole).

[60] http://www.tfl.gov.uk/assets/downloads/corporate/environment-report-2008.pdf
[61] Evidence provided by the Mayor of London to the UK government to inform their work to meet the air quality limit values
http://www.london.gov.uk/mayor/environment/air_quality/docs/evidence-28Nov08.pdf
[62] For further details see:
http://www.london.gov.uk/mayor/environment/air_quality/construction-dust.jsp
[63]http://www.smartertravelsutton.org.uk/_uploads/documents/STS_secondANNUALREPORT2009_FIN.pdf

6 – Policies since May 2008

The current Mayor has introduced a different approach to tackling poor air quality and this is reflected in his recent policy announcements. Written submissions from the GLA and TfL show the Mayor is focusing on four areas to tackle air pollution, three of which target road transport, which are detailed below. Questions from experts and academics were raised during the investigation regarding the extent to which these measures will improve London's air quality and if they will be sufficient to meet the EU targets. In addition, since May 2008, the Mayor has planned to reverse or cancel existing air quality policies, including putting in place plans to remove the Western Extension Zone of the congestion charge;[64] ending proposals to charge £25 for the largest fuel consuming vehicles (bands F and G) entering the Congestion Charging zone;[65] and his intention to suspend the third phase of the Low Emission Zone, due to be implemented in 2010, which would have affected smaller vehicles, including vans and minibuses.[66] Defra states that, 'should the Mayor decide to suspend Phase 3 of the LEZ, we would expect him to put in place other measures that would deliver equal, if not greater, improvements to air quality'.[67]

The four areas the Mayor is focusing on to tackle air pollution are:

1. Lower emission vehicles

The Mayor is proposing a number of measures to promote the use of lower emission vehicles including **hybrid buses**. However, these measures are likely to have a low to medium impact on air quality in London in the short term and will not be introduced in time to help to meet EU targets. The introduction of hybrid buses will make up just four per cent of the total bus fleet by 2011 (356 out of over 8,000) and therefore have little impact on total emissions (impact modelling states just 0.07 per cent emissions reduction is expected).[68] In addition, the time lag to introduce these new buses in part due to manufacturers not being able to meet demand from London will limit

[64] On 27 November 2008, the Mayor announced that, based on the results of the public consultation, he will begin the legal process required to remove the Western Extension of the Congestion Charging zone. http://www.london.gov.uk/mayor/congest/western-extension.jsp

[65] http://www.london.gov.uk/view_press_release.jsp?releaseid=17757

[66] Mayoral press release: Reprieve for small businesses Mayor suspends phase three of LEZ, 2 Feb 2009

[67] page 87 http://www.defra.gov.uk/environment/airquality/eu-int/eu-directives/airqual-directives/documents/090423-pm10-tech-doc.pdf

[68] Annex B - Technical report to accompany UK PM10 Time Extensions Notification forms, Jan 2009, Defra, page 81 http://www.defra.gov.uk/corporate/consult/air-quality/annexb-technicaldocument.pdf

their impact.[69] In addition, it is worth noting that hybrid buses require a substantially higher initial investment than other low emission vehicles.[70] **However, there would be a much larger impact on air quality if there were a greater number of hybrid buses introduced in the short to medium term.**

The Mayor is championing electric vehicles, which have zero emissions from exhausts. This will lead to a significant reduction in emissions at point of use, although there will still be PM_{10} emissions generated from the wear of brakes and tyres. Additional research needs to be undertaken to quantify these types of emissions.[71] The Committee would also like to clarify how the electricity to power these vehicles will be generated (ideally from local, renewable energy). **More information needs to be provided to show the overall impact electric vehicles will have on air quality**.

TfL is looking to trial low carbon technology in London's taxi fleet. The Committee notes that this policy might have a low impact on air quality if other emissions are not targeted. Some policies to reduce CO_2 can increase air pollution, resulting in a low or even negative effect on overall air quality. London's taxi fleet was estimated to be responsible for 12 per cent of NOx and 24 per cent of PM_{10} from road transport emissions in central London.[72] **TfL's trial should include all low emissions, as policies to reduce taxi emissions would have a significant impact on overall air quality.**

Therefore, **the Mayor's strategy needs to set out in detail the costs, timings and impact of lower emission vehicles.**

2. Behaviour change

This includes modal shift to cycling and walking and eco driving[73], which can have positive effects on air quality. The Energy Saving Trust estimate that eco driving can result in reductions of 15 per cent

[69] Evidence from Isabel Dedring, Mayor's Director of Environment policy, March 2009
[70] Civitas – City-to-city exchange, Clean buses factsheet www.civitas.eu
[71] Data from the London Atmospheric Emissions Inventory 2004 suggests this could be up to 40 per cent, although "non-exhaust road traffic emission are very uncertain" http://www.london.gov.uk/mayor/environment/air_quality/research/emissions-inventory.jsp
[72] Evidence base for summary sheets for Impact Assessment of extending the compliance deadline for meeting PM_{10} limit values in ambient air from 2005 to 2011, Defra
[73] For more information, see http://www.energysavingtrust.org.uk/Travel

less CO_2[74] although training needs to be ongoing to ensure compliance. Further evidence is required regarding the impact on PM_{10} or NO_2. Providing people with incentives to replace old diesel vehicles will also improve air quality. The Committee notes the proposal of a vehicle scrappage scheme to encourage the 'replacement of the oldest, most polluting vehicles with newer, cleaner ones'[75] and would welcome some additional information about this scheme. A vehicle retrofit subsidy scheme, funded by government support, would also be particularly useful in London.

London can learn from past examples including Defra's *Citizen's Jury* on behavioural change analysis and the DfT's *Smarter Choice* measures[76]. This latter study shows that provided they are implemented within a supportive policy context, smarter measures can bring about a reduction in car use. The high intensity scenario would be a reduction in peak urban traffic of about 21 per cent, which falls to 5 per cent in low intensity scenario.[77] **The Mayor's strategy must clarify what reduction in PM_{10} and NO_2 is expected and when this will happen** as widespread impact on air quality resulting from behaviour change is not likely to happen in the short term, to help meet EU targets.

3. Smoother traffic flow

Policies to ease congestion and smooth traffic flow would improve air quality, and experts at the Environment Committee meeting generally agreed that vehicle emissions are reduced when traffic flow is smoother, when travelling at stable, moderate speeds. However, policies should ensure that suppressed demand does not simply fill the extra traffic space and result in more traffic on London's roads.[78] TfL is investigating this point[79] and evidence on the positive impacts of this policy will need robust investigation. In addition, research needs to be undertaken to demonstrate that smoothing road traffic flow will not impact negatively on walking or cycling around the capital.[80]

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[74] Evidence from EST, Environment Committee meeting, March 2009
[75] Written evidence from GLA and TfL to Environment Committee, March 2009
[76] includes workplace and school travel plans, personalised travel planning, public transport information and marketing, travel awareness campaigns, car sharing, car clubs, teleworking and teleconferencing, cycling and walking
http://www.dft.gov.uk/pgr/sustainable/smarterchoices
[77] DfT, Smarter choices, Changing the way we travel summary
[78] See Transport Committee's response to Way to Go! Mayoral Transport direction of travel document http://www.london.gov.uk/assembly/reports/transport/way-to-go-response.pdf
[79] Evidence from Charles Buckingham, TfL, Environment Committee meeting, March 2009
[80] Point raised by Mike LeRoy, Westminster, Environment Committee meeting, March 2009

4. Non-road transport initiatives

The Mayor has also included non-road transport initiatives in his plan to tackle air quality. These include **improving energy efficiency in buildings and homes** – the Committee received evidence that boilers and home insulation have a large impact on NO_2 in London, although are generally emitted at height.[81] Moves to decarbonise energy generation and use (including renewables) and energy efficiency (leading to less demand for energy) would reduce emissions. For example, in the City of London, 40 per cent of the total PM_{10} is emitted by gas boilers and 75 per cent of NOx are from commercial and domestic heating.[82] Therefore, energy efficiency gains could have a high impact on improving NO_2 emissions.

Written information from the GLA states that the Mayor continues to oppose **Heathrow expansion**, 'as it will increase emissions both from air travel and road congestion'.[83] However, Heathrow is already a strong NO_2 hotspot highlighted by the European Commission in its written response to the Committee (clearly shown in Figure 1.2 on page 12). Reducing these emissions will require significant improvements to local and national public transport infrastructure around the airport. Plans should be included in the Mayor's air quality strategy and further work is also required by the Government.

Finally, regarding **construction**, the Mayor's forthcoming strategy should ensure that *London Best Practice Guidance: the control of dust and emissions* from construction and demolition is implemented in full in all parts of London, including the Olympic site.

[81] Evidence from Sean Beevers, King's College London, Environment Committee meeting, February 2009
[82] Written evidence from the City of London, March 2009
[83] Written evidence from the GLA and TfL, March 2009

7 – Actions put forward by the Environment Committee for consideration

Despite ongoing work to reduce air pollution, the quality of air in London is not improving[84]. The Committee recommends a bold step change in the pace and depth of policies taken to reduce air pollution. Concerted, sustained action needs to be taken if we are to ensure Londoners are not subject to dangerous levels of air pollution and their life expectancy shortened by the air that they breathe. The Committee has investigated what more can be done, using examples that are working in other cities.

Expert views provided to the Committee show that **there is no one policy that will solve the air quality problem** – it is vital to use a range of options, not to over-rely on technological solutions (as technology gains can be cancelled out by changes in behaviour[85]) and crucially, there should be an ongoing appraisal of existing air quality policies to ensure that they are as efficient and effective as possible.

The aim of these actions put forward by the Committee, as identified in meetings and written evidence, is not to force a choice between the economy, the environment and public health. The Committee has been mindful to put forward workable suggestions during a time of economic downturn.

The following actions are split between those that should be implemented immediately and those in the medium term. The Committee has also allocated a **crude weighting** to each measure, to show the potential impact on improving air quality, in consultation with experts, plus an **indication of which pollutant will be targeted**.

Measures that should be implemented immediately or in the short term:

1. Introduce additional, smaller LEZs to target pollution hotspots from road transport. They should be supported by the Mayor to ensure consistency and avoid confusion. Standards set should not only address PM_{10} but should also reduce NO_2 to meet the EU limit values. An estimate from TfL, using existing infrastructure – focusing on PM and using congestion charge cameras - would cost less than £10m to introduce in the current congestion charging area.[86]

[84] Written evidence from King's College London to Environment Committee
[85] Evidence from Prof. John Whitelegg, Environment Committee meeting, March 2009
[86] Evidence from Nick Fairholme, TfL, Environment Committee meeting, March 2009

Case study: Berlin
Central LEZs were introduced on 1 January 2008. This is a simple scheme, that includes banning the most polluting vehicles (7 per cent of the total 1.2 million) [87] and is part of the 40 LEZs that have been set up in Germany.[88] The official evaluation of the first stage by the Berlin Senate has shown good results including a three per cent reduction of PM_{10} plus four fewer days of PM_{10} accidences of EU limit value concentrations as well as a 10 per cent reduction of NO_2 (estimated to become a 20 per cent reduction in NO_2 in 2010).[89]

2. Introduce a vehicle retrofit subsidy scheme in London, with funding support from central government. Defra states that retrofitting is the most effective potential option on the basis of monetary cost, technical feasibility and practicability.[90] There are around 90,000 light goods vehicles and minibuses in London, many of which are operated by small businesses and voluntary organisations, which may find it difficult to afford the costs of retrofitting at around £2,000, or the cost of replacing their vehicle (estimated at around £15,000) without assistance. This scheme should be introduced in parallel with the introduction of targeted Low Emission Zones, to help people retrofit or replace vehicles that would not be permitted into the zone.

3. Undertake research into using biofuel for all public transport in London, including buses, trains, taxis and river transport. Existing examples that are used elsewhere include **Biogas**,[91] which is the cleanest vehicle fuel that is commercially available. There are almost no health hazardous emissions and very little greenhouse gas emissions. Biogas is produced naturally when

[87] www.berlin.de/sen/umwelt/luftqualitaet/de/luftreinhalteplan/download/Umweltzone_Broschuere_en.pdf
[88] http://www.lowemissionzones.eu/
[89] includes just the effects of the LEZ without weather and other measures http://www.berlin.de/landespressestelle/archiv/2009/04/15/125521/index.html (in German)
[90] Consultation on the draft UK notification to the European Commission to secure additional time to meet the limit values for particulate matter for certain zones/agglomerations in accordance with the Council Directive 2008/50/EC on Ambient Air Quality and Cleaner Air for Europe http://www.defra.gov.uk/corporate/consult/air-quality/annexc-consultation-impactassessment.pdf
[91] Civitas report on Sustainable Urban transport http://213.131.156.10/xpo/bilagor/20060118105941.pdf

organic waste ferments and all types of organic material can be used such as restaurant waste and surplus wood. Before being used as a fuel, biogas must be purified. This requires an initial investment, but case studies from France and Sweden have shown that buses operating on biogas cost no more than operating diesel buses in the medium term.[92] The Mayor and TfL should also **carry out research into using biodiesel from used vegetable oil**, which could result in up to 50 per cent reduction in PM emissions if buses are equipped with particle catalysts.[93] **However, research needs to be undertaken to ensure there is no substantial increase of NOx as a result.**

The Committee welcomes the Mayor's intention to look into the potential for used cooking oil as part of the forthcoming municipal waste strategy.[94] The Committee went on a site visit to Uptown Oil, which produces between 6,000 - 10,000 litres of biodiesel per week. Changes resulting from the DfT's Renewable Transport Fuel Obligation from April 2010 will mean that fuel companies will be required to sell diesel with a biodiesel mix at five per cent. This means that the 100 per cent biodiesel will no longer benefit from the tax derogation, currently worth nine pence per litre, making biodiesel cheaper than diesel at the moment. Uptown Oil believed that a British Standard should be introduced, which if met by manufacturers could be used as a tax incentive.

[92] taken from a Civitas report on Sustainable Urban transport http://213.131.156.10/xpo/bilagor/20060118105941.pdf
[93] Without any catalyst, biodiesel and fossil diesel emit similar amounts of particles. Source: Civitas report on Sustainable Urban transport http://213.131.156.10/xpo/bilagor/20060118105941.pdf
[94] MQT answers 25 March 2009, question 587 and 751/2009

Case study: Graz, Austria [95]

Graz has a long experience of using 100 per cent biodiesel in public fleets. The production of biodiesel from used cooking oil from restaurants and from private households has developed and expanded in the last ten years. Today a fleet of 135 buses and around 60 taxis operate on biodiesel. 100 per cent biodiesel is used in buses all year round. The conversion of used cooking oil and rapeseed oil into biodiesel reduces the emissions of fossil CO_2 and helps solve the disposal problem.

The switch to biodiesel was done by ensuring that new buses were compatible and by converting existing buses. There was a small additional cost for biodiesel buses but actual savings in operating costs.

4. Launch a widespread information campaign to make air quality information more accessible to Londoners. Air quality matters to Londoners: a survey by Westminster Council shows that air quality is the top environmental issue that affects their constituents.[96] Providing more information to show the cause and impacts of poor air quality and the link between behaviour and effects on our health would be very useful. The campaign should be properly and appropriately costed to ensure that it provides value for money.

Air quality is monitored automatically at over a hundred sites in London and monitoring stations collect data continually. This information should be made available to the public, for example in **public areas and streets on display boards** – as **real time information** has more impact. Discussions with air quality data collectors, King's College London, show this would be possible. In addition, **information from the London Atmospheric Emissions Inventory should be made available more regularly: as at the time of writing (April 2009) the most current data available is from 2004.**

Information about all emissions, not just CO_2 should be more readily available to Londoners. For example, information on all emissions from cars and different types of fuels for heating and

[95] Civitas - http://www.trendsetter-europe.org/index.php?ID=2546
[96] Written evidence from Mike LeRoy, Westminster, March 2009

generating energy – so people can understand better the impact their behaviour is having on air quality. One suggestion is that PM_{10} and NO_2 emissions information should be given at point of sale for cars and other vehicles, as it currently is for CO_2.

Case study: Care4air initiatives

Lessons could also be learnt from Sheffield's *Care4air* initiatives where the council looked for innovative ways to get the message about air quality in the media, radio, television and newspapers[97]. It also encouraged individuals to get involved by supplying low cost air quality monitors, so people could assess the quality of the air around them.[98] This might in turn influence behaviour change.

Measures that should be implemented in the medium term:

5. The reduction of emissions in the older public diesel vehicle fleet is vital, as some experts believe with hindsight, that using diesel for the bus fleet was '**a very big mistake**'.[99] Diesel emissions have a greater effect on both air quality and health than petrol. The Mayor and TfL should consider measures in tandem with central government to ensure all buses and taxis meet the minimum of Euro IV standard and offer incentives to upgrade private vehicles to Euro IV standards, as older vehicles are the most polluting.[100] Research into emissions from existing vehicles shows that the most promising filters are diesel particulate filters for reducing PMs by up to 90 per cent and selective catalyst reduction for reducing NOx by up to 85 per cent.[101] Research needs to continue to ensure that retrofitting diesel vehicles does not increase levels in NO_2.

Typical cost of retrofitting

As part of its assessment of the LEZ, TfL worked closely with the pollution abatement equipment industry to assess the costs of retrofitting vehicles. Based on this analysis, TfL estimated on average

[97] http://www.care4air.org/
[98] information provided by King's College London during site visit
[99] Evidence from Prof. Frank Kelly, King's College London, Environment Committee meeting, February 2009
[100] Written evidence from Bremen transport management, Civitas. It is worth noting that Euro 5 standard and EEV (Enhanced Environmental Vehicle) produce 40 per cent less NOx than Euro 4 and are just 1–2 per cent more expensive.
[101] http://www.airqualitypolicy.co.uk/sadler_files/pdf/Final%20Austrian%20article.pdf

the costs of retrofitting a Euro I vehicle so that it meets the minimum Euro IV standard are in the range of £2,500 to £4,500. Fitting pollution abatement equipment to a Euro II vehicle so that it reaches the minimum Euro III standard for PM would be less expensive.[102]

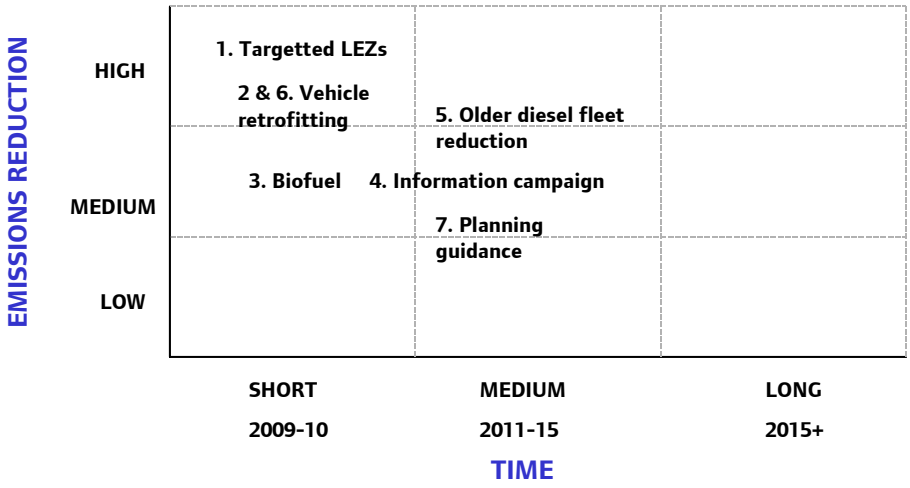
6. Planning guidance can be used through existing legislation if there are air quality implications for planning decisions.[103] A written response from the City of London states that **air quality emission reduction targets should be incorporated into the revised London Plan to reduce emissions from all new developments relative to their current use.** This would be a very effective way to initiate a long-term downward trend in pollutants, particularly NO_2. The London Borough of Croydon is developing a toolkit to assist with this process.[104]

[102] http://www.tfl.gov.uk/assets/downloads/roadusers/lez/LEZ-Mayors-Report-Chapter-6.pdf
[103] Defra LAQM policy guidance PG09, February 2009
[104] Written evidence from the City of London, March 2009

Conclusion

This investigation has shown that the pollution in London's air may contribute to thousands of premature deaths and has an adverse effect on the health of many more. The Mayor's forthcoming strategy needs to clearly set out **current levels** of air quality in London, quantify the **reductions necessary to achieve at least EU limit values** and the policy interventions to show **how and when this will be achieved**. A published timetable and plan for emissions reduction to show the steps that the Mayor, along with the boroughs, will take in order to meet the EU limit values, is needed.[105] **The Committee would like to see this information set out in an accessible way, containing both emissions reduction and timescales for achievement. One method would be to represent the impact on a graph as shown in figure 1.8 below.**

Figure 1.8 to represent the estimated impact of actions put forward by the Committee on air quality in London FOR ILLUSTRATION ONLY



Note: *Assessments of the likely impact of policy measures are derived from discussions with experts at Committee meetings. Although they are based on scientific assessments and evidence from how these measures have worked in other cities, they are indications of likely impact and not a definitive judgement.*

The timing of the strategy and implementation is also important. The Mayor intends to publish a draft Air Quality Strategy for consultation with the Assembly and GLA group in summer 2009. This would be followed by consultation with the public and stakeholders towards the

[105] Evidence from Dr. Iarla Kilbane-Dawe, AEA, Environment Committee meeting, February 2009

end of the year, with publication of the final strategy by summer 2010 (when EU NO_2 targets have to be reached and just before PM targets have to be met in 2011). Therefore, policies need to be implemented well before this time to meet EU targets. **The strategy should include a timetable for implementation and a plan, clearly stating the short, medium and long-term actions and their impacts.**

The Mayor has a unique opportunity to coordinate his response to London's air quality issues in his forthcoming strategies, linking not just air quality and transport[106], but also planning, economic development, climate change and energy. The focus through all the strategies should be on improving air quality and **reducing all emissions, not just CO_2 emissions**. This should also happen at a national and local level.

To conclude, experts at the Committee meetings stated that the following elements need to be in place to ensure sustained improvement in London's air quality: **political will** to implement policies to improve air quality, including **technological solutions** that are working in other cities, ensuring that government action does not make it worse. The Mayor should ensure **information about air quality is accessible** to allow Londoners to make informed choices. Information around the impacts of poor air quality, causes, costs, benefits and EU targets needs to be made easier to access. Once people understand the cause and effect of air pollution better, they will begin to understand the impacts of their choices, which might influence **a change in behaviour**, which is vital for long-term improvements in air quality.

[106] Evidence from Isabel Dedring, Environment Committee meeting, March 2009

Appendix 1 Summary of pollutants

Appendix table A1 Pollutants that currently fail EU limit values

Taken from information provided by King's College London

Brief description of EU limit values	Degree of failure	Ability to control by London measures	Trends
Nitrogen Dioxide (NO_2) - main source is road transport, and gas combustion, including domestic boilers			
EU Limit Values come into force in 2010[107]	A national and widespread problem which affects large areas of central and inner London, parts of suburban London and all busy roads. Measurements in 2007 suggest breaches of the 2010 NO_2 limit value alongside almost all main roads and at background locations across inner London and parts of east and west London.	The majority is emitted in London and therefore can be controlled by London-wide measures.	NO_2 concentrations at some roadside sites have not shown any overall improvements since 1997. If trends in concentrations continue in the same way as present then recent exceedences of the EU limit values will also occur in future years and by a wide margin. The European Commission states that high concentrations of NO_2 in ambient air indicate that the annual NO_2 limit value will be very hard to achieve once it enters into force in 2010. NO_2 is widely exceeded and is projected to exceed in some parts of London for a few more years (e.g. Heathrow).[108]

[107] When the annual mean concentration should not exceed 40 µg m^{-3} and an hourly mean concentration of 200 µg m^{-3} should not be exceeded more than 17 times a year. It is generally accepted that the annual mean Limit Value is harder to achieve than hourly mean Limit Value.

[108] Written evidence from the European Commission

Brief description of EU limit values	Degree of failure	Ability to control by London measures	Trends
Particulate matter (PM_{10}) – main source in London from road transport (mainly diesel vehicles)			
EU Limit Values came into force in 2005[109] and the UK has been exceeding EU air quality limits on particulate matter since then. PM_{10} consists mostly of particles less than 10 µm in diameter. These small particles are of most concern due to their ability to penetrate into the lungs with harmful health effects.	PM_{10} is a localised problem to the busiest roads in London, rather than a widespread problem. Recent work has suggested that in years with extreme weather (e.g. 2003) widespread exceedences occur throughout London. The European Commission states that the annual report on air quality submitted by Defra shows that concentration levels in the Greater London Area were exceeding the daily and annual PM_{10} limit values in 2007.[110] There are additional local problems on residential streets close to waste management sites.	PM_{10} is difficult to control as a large proportion comes from outside London. However, of the PM from London, road traffic is the major source and is related to both exhaust and tyre and brake wear, hence it is important to consider controlling traffic flow in addition to exhaust emissions.	There was an increase in the concentration of primary PM_{10} emissions in London between 1999 and 2004, most likely due to increases in emissions from road transport. If trends in PM_{10} concentrations continue in the same way as present then recent exceedences of the EU limit values will also occur in future years.

[109] From this time the annual mean concentration must not exceed 40 µg m^{-3} and a daily mean concentration of 50 µg m^{-3} must not be exceeded on more than 35 days per year. It is generally accepted that the daily mean Limit Value is harder to achieve than annual mean Limit Value.
[110] Written evidence from the European Commission

Brief description of EU limit values	Degree of failure	Ability to control by London measures	Trends
Ozone (O_3) Produced when sunlight reacts with vehicle and industrial emissions			
UK objectives are more stringent than EU Limit Values.[111] Ozone is a complex secondary pollutant, determined by the combination of local, regional, European and global emissions plus sunshine and temperature. Pollution episodes occur during prolonged periods of warm, sunny weather.	UK objectives are exceeded each year throughout suburban London. During 'heat wave' years almost all London exceeds UK objectives.	Owing to the regional and global determinants of O_3 there is little scope for effective London-wide measures to control O_3 in the capital. Reduction of relevant emissions (NOx, CO, hydrocarbons, etc) from London have a role to play in UK and European wide O_3 control.	Continues to rise and there is increasing concern over its health impacts. Analysis of peak concentrations between 1997 and 2003 suggests that they are increasing at some London sites. The recent Royal Society report on Ground Level Ozone highlights concerns about future concentrations globally due to the effects of climate change and increased emissions from the developing world.[112]
Particulate matter ($PM_{2.5}$)			
Not yet in UK legislation. Is included in the new EU Directive.	Not applicable	More closely associated with emissions from within London than PM_{10}. As a consequence measures applied in London will have an important role to play in the new exposure reduction target for $PM_{2.5}$.	The new EU Directive now includes the requirement to reduce $PM_{2.5}$ concentrations by up to 20 per cent between 2010 and 2020.

[111] The UK objectives came into force in 2005 and require that eight-hour mean O_3 concentrations should not exceed 100 µg m^{-3} on more than 10 days per year. The EU Limit Value for O_3 requires that eight-hour mean O_3 concentrations should not exceed 120 µg m^{-3} on more than 25 days per year, averaged over three years.

[112] http://royalsociety.org/document.asp?tip=0&id=8039

Appendix table A2 Pollutants that currently pass EU limit values

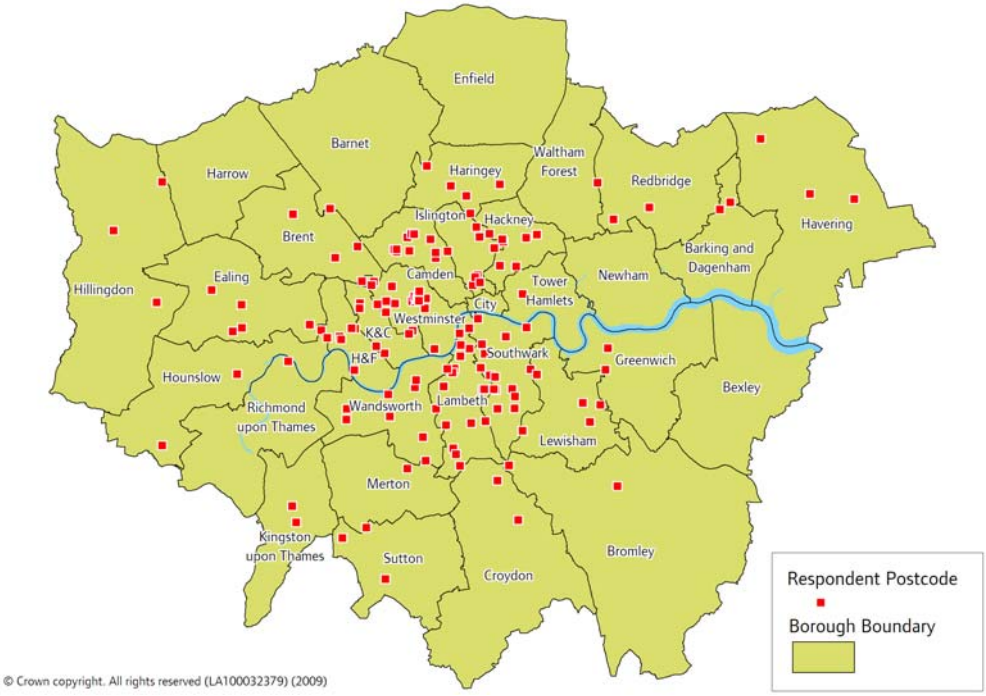
Taken from information provided by King's College London

Pollutant	Source	Trends
Sulphur dioxide (SO_2) UK objectives are more stringent than EU limit values.	Power stations, industry, vehicle fuel combustion	UK objectives have been met in London since 1998, but episodes still occur (2006). **SO_2** Abatement has a role to play in regional **PM_{10}** and **$PM_{2.5}$** control. The World Health Organisation has recently substantially reduced its limit guidelines for SO_2. It is unclear whether these guidelines will be adopted as EU limit values, but these new guidelines are not fully attained in London.
Carbon monoxide (CO)	Petrol vehicles, domestic boilers, industry	EU limit values have been met since 2000. CO abatement has a role to play in regional O_3 control.

Appendix 2 The views of Londoners

The Assembly is always keen to hear the views of Londoners. As part of its investigation, the Environment Committee opened a web-based survey to find out what Londoners thought about air pollution. The survey received 161 responses. This was not a scientific survey, and as the map below shows, the majority of responses came from pollution hotspot areas in central and inner London. Below are the questions, plus a sample of responses.

Map to show where respondents to our survey live



1. Do you or your family suffer any effects from air pollution?

Of those that answered this question, 57 per cent said they did suffer effects from air pollution, and 43 per cent did not. Common effects of those who did included sore eyes and throat, coughs and respiratory problems, and asthma. 'I have started to suffer from asthma since moving [into London]. I've lived outside London previously and never had asthma or breathing problems before.' Some respondents stated air pollution made existing illnesses worse.

People also stated that their quality of life was reduced due to air pollution.

Factors that make air quality worse included traffic fumes from buses, lorries and cars and warm and dry weather conditions.

2. What do you think should be done to improve air pollution in London?

Responses were direct – 'whatever it takes to meet the legal standards'. Strategic measures such as a planned, integrated transport system need to be introduced. 'Spending money on measures to improve air quality now will mean saving money in other areas like health services.' Timing is an issue: 'Technology exists for vehicles to be powered cleanly. Modal shift to clean modes and technological shift needs to be much faster and bolder.'

The majority of suggested solutions concerned road transport including:

Traffic reduction

- to reduce both the number of vehicles and our dependence on them
- reduce congestion by increasing congestion charge for most polluting vehicles
- car free zones and car free days in central London
- tighter regulation of diesel vehicles, from outright ban to schemes to scrap older vehicles
- school buses replacing school run where journeys are beyond walking distance
- stop 'idling' vehicles – e.g. buses with engines running when not moving
- park and ride
- car sharing.

Emissions reduction

- only low emission vehicles to travel in central London, including buses, taxis, trains and delivery vehicles – either through technological solutions or replacing older, most polluting vehicles with clean models
- tax should relate to vehicle emission levels: penalise high emission vehicles, reward low emission vehicles

- only allow electric vehicles in central zone
- all vehicles subject to the Low Emission Zone, not just larger vehicles.

Modal shift

- from cars to public transport, walking and cycling
- encourage cycling by improving safety – both whilst cycling on the road and measures to reduce theft
- encourage use of public transport especially in outer London.

Non-road transport measures

- no third runway at Heathrow
- insulate homes and buildings
- tighter regulations for construction and building works
- measures against incinerators and bonfires
- plant more trees and increase the number of green spaces.

3. Who do you think is / should be responsible for improving air quality in London?

The majority of responses believe that the Mayor is responsible for air quality in London, with a strategic overview, providing practical guidance and coordinating action. In addition, most respondents thought that government, both central and local, should also be working to improve air quality in London. 'Only political leaders can put in place the regulations and frameworks that can instigate and enforce rapid change… ultimately [the Mayor of London] needs to lead [this process]'.

Almost ten per cent of respondents think that it is up to all of us to improve the air we breathe and stated that individuals have an important part to play through their behaviour.

Appendix 3 Abbreviations and glossary of terms[113]

Air quality review and assessment	Reviewing current and likely future air quality and assessing whether air quality objectives are currently being achieved or are likely to achieved.
Air quality objective	Policy targets generally expressed as a maximum ambient concentration to be achieved, either without exception or with a permitted number of exceedences within a specified timescale (see also air quality standard).
Air quality standard	The concentration of a pollutant, and associated averaging period, which is without significant effect on human health at a population level.
Annual mean	The average over a year of concentrations measured (or predicted) for a pollutant, usually relates to a calendar year.
AQMA (Air Quality Management Area)	An area which a local authority has designated for action, based upon predicted exceedences of air quality objectives.
CO_2	Carbon dioxide, a greenhouse gas that contributes to global warming.
Concentration	The amount of a (polluting) substance in a volume (of air), typically expressed as a mass of pollutant per unit volume of air (eg, micrograms per cubic metre, μgm^{-3}) or a volume of gaseous pollutant per unit volume of air (parts per million, ppm).
Congestion charging	Applying charges to reduce the number of vehicles and level of congestion in congested areas within a defined area of central London.[114]
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
Emission	The amount of a (polluting) substance emitted in a certain amount of time, typically expressed as a mass of pollutant per unit time (for example, grams per second, or tonnes per year for a single source). May also be expressed per unit length of a road (for example, $g\ s^{-1}\ m^{-1}$), or per unit area of an urban area (for example, $t\ a^{-1}\ km^{-2}$).

[113] Taken from LAEI 2004 Report http://www.london.gov.uk/mayor/environment/air_quality/docs/laei-2004-full-report-dec08.pdf and http://www.defra.gov.uk/ENVIRONMENT/airquality/publications/nitrogen-dioxide/nd-glossaryapp.pdf unless specified.
[114] For more information, see http://www.tfl.gov.uk/tfl/cclondon/cc_intro.shtml

Emissions inventory	A quantification and compilation of emission sources by geography and time, usually including data covering one or several years.
European emission standards (Euro standard)	Defined by the EU providing acceptable limits for exhaust emissions of all new vehicles that are sold in the EU, set at different levels for different vehicles types.
Euro I	Europe-wide vehicle standard that required vehicles manufactured after 1992 to achieve set emissions limits. For petrol cars this was achieved by the fitting of three way catalysts.
Euro II, III, IV & V	Europe-wide vehicle standards that have become progressively stricter, for years 1996, 2001, 2006 and 2009 respectively.[115]
EU Directive	Europe-wide legislation, which is incorporated into British law by Acts of Parliament or statutory instruments.
European Commission (EC)	The body of the EU, which proposes legislation (following requests by the Council and/or Parliament, or by own initiative). When passed into member state law, the EC implements legislation. It is also enforces treaties and laws. A new European air quality directive came into force in June 2008 and will be transposed into national legislation by June 2010[116].
Exceedence	When an air quality objective or limit value is not achieved.
Greater London	As defined by the GLA Act 1999, contains 32 boroughs and the City of London.
London Atmospheric Emissions Inventory (LAEI)	An inventory of sources of air pollutants within Greater London.
London Air Quality Network (LAQN)	A network of air pollution measurement sites owned by the London boroughs.

[115] See TfL's report for more information http://www.tfl.gov.uk/assets/downloads/roadusers/lez/lez-impacts-monitoring-baseline-report-appendix-1.pdf
[116] http://ec.europa.eu/environment/air/quality/legislation/existing_leg.htm

Local air quality management (LAQM)	A government policy framework (from the UK government's National Air Quality Strategy) which requires local authorities periodically to review and assess the current and future air quality in their areas.
London boroughs	Used when referring to the 32 London boroughs and the Corporation (City) of London.
Low Emission Zone (LEZ)	A defined area from which polluting vehicles that do not comply with set emissions standards are barred from entering.[117]
Microgramme (µg)	One millionth of a gramme.
-µg m^{-3}	Micrograms per cubic metre of air. A unit for describing the concentration of air pollutants in the atmosphere, as a mass of pollutant per unit volume of clean air.
National Atmospheric Emissions Inventory (NAEI)	An inventory of sources of air pollutants for the whole of the UK, on a 1x1 km square basis.[118]
National Air Quality Strategy (NAQS)	Published by the (former) Department of the Environment, Transport and the Regions as The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, January 2000. Originally published in 1997, latest version is 2007.[119] This sets out the government's medium-term air quality policy for the UK and describes current and projected air quality.[120]
NO	Nitrogen monoxide formed from nitrogen in the atmosphere during high temperature combustion, and the main constituent of NOx, also commonly known as nitric oxide.
NO_2	Nitrogen dioxide small amounts are formed from nitrogen in the atmosphere during high temperature combustion but the majority is formed in the atmosphere through the conversion of nitric oxide (NO) in the presence of ozone (O_3).

[117] http://www.tfl.gov.uk/tfl/low-emission-zone/default.asp for more information
[118] http://www.naei.org.uk/ for more information
[119] http://www.defra.gov.uk/environment/airquality/strategy/
[120] http://www.defra.gov.uk/environment/airquality/strategy for more information

NOx	Oxides of nitrogen includes both NO and NO_2 – see above.
O_3	Ozone - a complex secondary pollutant. The concentrations of O_3 in London are determined by the combination of local, regional, European and global emissions and meteorological effects such as sunshine and temperature[121].
PM_{10}	Particulate matter with an equivalent aerodynamic diameter of ten microns (10µm) or less, small enough to penetrate the lungs.
$PM_{2.5}$	Particulate matter with a mean effective aerodynamic diameter of 2.5 microns (2.5µm) or less.
ppb	Parts per billion. This is a unit for describing the concentration of air pollutants in the atmosphere, as a volume ratio of pollutant per unit clean air, only suitable for gaseous pollutants (and hence not used as a unit for particles). This unit is one thousand times smaller than the ppm unit (described below).
ppm	Parts per million. This is a unit for describing the concentration of air pollutants in the atmosphere, as a volume ratio of pollutant per unit clean air, only suitable for gaseous pollutants (and hence not used as a unit for particles).
Transport for London (**TfL**)	A functional body of the GLA, accountable to the Mayor, with responsibility for delivering an integrated and sustainable transport strategy for London.[122]
Western Extension to the Congestion Charge	On 27 November 2008 the Mayor announced that, based on the results of the public consultation, he will begin the legal process required to remove the Western Extension of the Congestion Charging zone. The original central London Congestion Charging scheme had been extended westwards in February 2007.

[121] http://www.londonair.org.uk/london/reports/AirqualityinLondon2005.pdf
[122] http://www.tfl.gov.uk/ for more information

Appendix 4 Views and information

Oral and written information at Committee meetings

Dr. Iarla Kilbane-Dawe and Gwyn Jones AEA*

Professor Frank Kelly, Sean Beevers and Gary Fuller, King's College

Professor John Whitelegg

Sheila Keating, Energy Saving Trust*

Simon Birkett, The Campaign for Clean Air in London

Martin Williams, Defra*

Peter Daw, GLA

Nick Fairholme, Charles Buckingham, Nicola Cheetham, TfL

Ruth Calderwood, City of London

Mike LeRoy, City of Westminster

* oral information only

Written information from organisations (for a full list of information, please see our website)

European Commission

The Campaign for Clean Air in London

Environmental Industries Commission

Environmental Protection UK

King's College London

City of Westminster

City of London

Transport for London

Greater London Authority

Sustraco Ltd

Appendix 5 Orders and translations

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Email 与我们联系。

Hindi

यदि आपको इस दस्तावेज का सारांश अपनी भाषा में
चाहिए तो उपर दिये हुए नंबर पर फोन करें या उपर दिये
गये डाक पते या ई मेल पते पर हम से संपर्क करें।

Vietnamese

Nếu ông (bà) muốn nội dung văn bản này được dịch sang
tiếng Việt, xin vui lòng liên hệ với chúng tôi bằng điện
thoại, thư hoặc thư điện tử theo địa chỉ ở trên.

Bengali

আপনি যদি এই দলিলের একটা সারাংশ নিজের ভাষায় পেতে চান,
তাহলে দয়া করে ফো করবেন অথবা উল্লেখিত ডাক ঠিকানায় বা
ই-মেইল ঠিকানায় আমাদের সাথে যোগাযোগ করবেন।

Greek

*Εάν επιθυμείτε περίληψη αυτού του κειμένου στην γλώσσα
σας, παρακαλώ καλέστε τον αριθμό ή επικοινωνήστε μαζί
μας στην ανωτέρω ταχυδρομική ή την ηλεκτρονική διεύθυνση.*

Urdu

اگر آپ کو اس دستاویز کا خلاصہ اپنی زبان میں
درکار ہو تو، براہ کرم نمبر پر فون کریں
یا مذکورہ بالا ڈاک کے پتے یا ای میل
پتے پر ہم سے رابطہ کریں۔

Turkish

Bu belgenin kendi dilinize çevrilmiş bir özetini
okumak isterseniz, lütfen yukarıdaki telefon
numarasını arayın, veya posta ya da e-posta
adresi aracılığıyla bizimle temasa geçin.

Arabic

الحصول على ملخص لهذا المستند بلغتك،
فرجاء الاتصال برقم الهاتف أو الاتصال على
العنوان البريدي العادي أو عنوان البريد
الإلكتروني أعلاه.

Punjabi

ਜੇ ਤੁਸੀਂ ਇਸ ਦਸਤਾਵੇਜ਼ ਦਾ ਸੰਖੇਪ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਲੈਣਾ
ਚਾਹੋ, ਤਾਂ ਕਿਰਪਾ ਕਰਕੇ ਇਸ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ
ਉਪਰ ਦਿੱਤੇ ਡਾਕ ਜਾਂ ਈਮੇਲ ਪਤੇ 'ਤੇ ਸਾਨੂੰ ਸੰਪਰਕ ਕਰੋ।

Gujarati

જો તમારે આ દસ્તાવેજનો સાર તમારી ભાષામાં
જોઈતો હોય તો ઉપર આપેલ નંબર પર ફોન કરો
અથવા ઉપર આપેલ ટપાલ અથવા ઈ-મેઈલ સરનામા
પર અમારો સંપર્ક કરો.

Appendix 6 Principles of scrutiny

An aim for action

An Assembly scrutiny is not an end in itself. It aims for action to achieve improvement.

Independence

An Assembly scrutiny is conducted with objectivity; nothing should be done that could impair the independence of the process.

Holding the Mayor to account

The Assembly rigorously examines all aspects of the Mayor's strategies.

Inclusiveness

An Assembly scrutiny consults widely, having regard to issues of timeliness and cost.

Constructiveness

The Assembly conducts its scrutinies and investigations in a positive manner, recognising the need to work with stakeholders and the Mayor to achieve improvement.

Value for money

When conducting a scrutiny the Assembly is conscious of the need to spend public money effectively.

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