LONDONASSEMBLY

Health and Environment Committee

Air pollution in London

Issues paper

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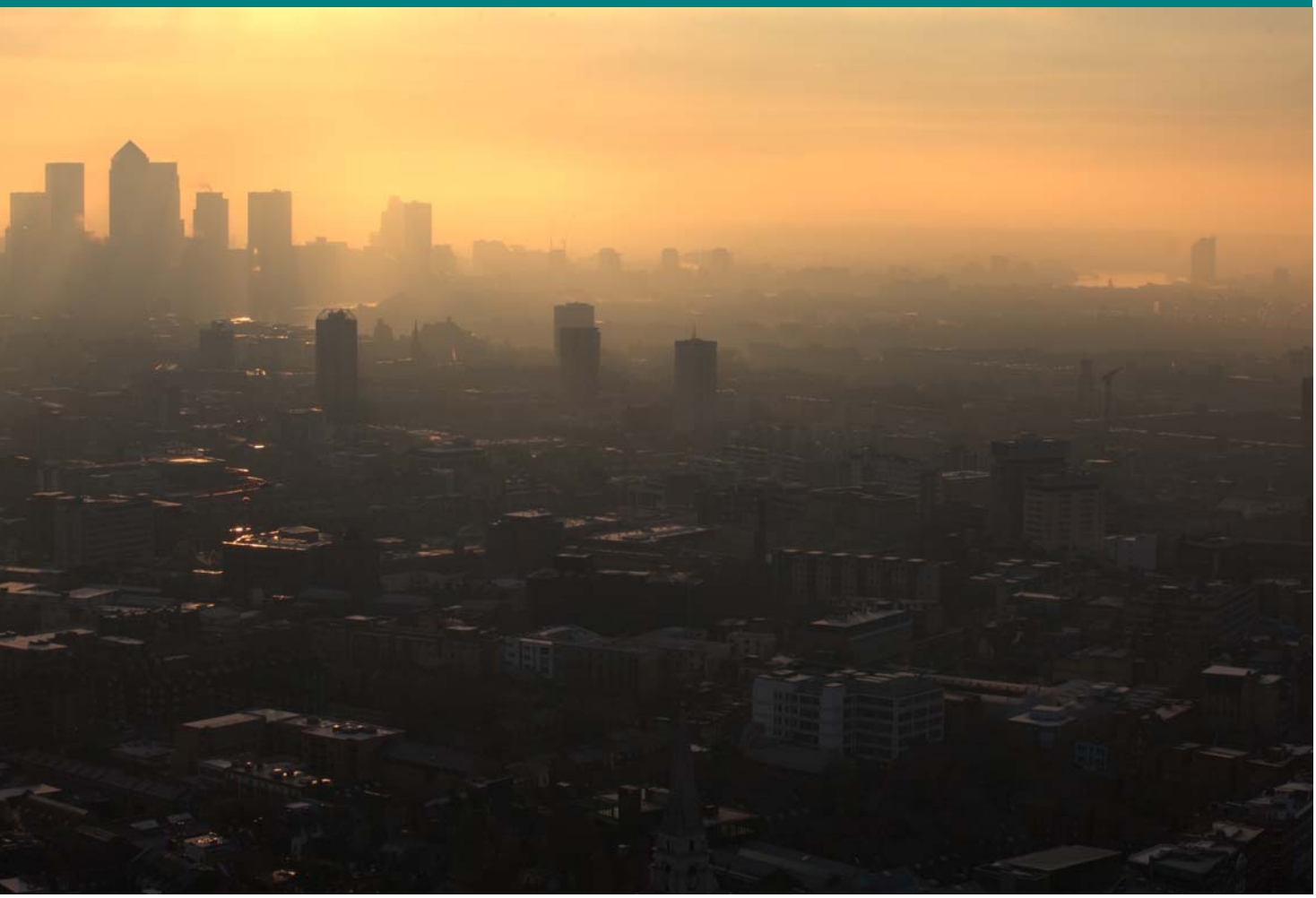

This paper provides a summary of the Health and Environment Committee's work on tackling air pollution in London, identifies a number of pressing issues, and considers options for possible future policy development.

It builds on a body of previous work by the Environment Committee over a number of years,[1] including input to the Mayor's Air Quality Strategy,[2] reports on air quality issues around Heathrow[3] and discussion of proposals for a stricter Clean Air Zone in central London.[4] It particularly draws on work by the Health and Environment Committee in summer 2012.[5]

Air pollution in London – the nature of the problem

It is well-recognised across the relevant stakeholder groups that air pollution in London is a significant problem. The primary issue is the health effects of toxic pollutants. Driven by these health effects, there are binding targets to reduce pollution, and work to measure and monitor pollution concentrations.

Health impacts

Air pollution is a major public health issue in London. Following the Great Smog of 1952 and the ensuing clean air measures, obvious smoke and sulphur dioxide pollution was greatly reduced in urban areas, reducing mortality from short-term exposure. However, in the last ten to fifteen years it has become apparent that the long-term impacts of less visible pollutants are much more significant that previously realised.

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[1] Early work included *Assembly Scrutiny of the Mayor's Air Quality Strategy*, April 2001 http://legacy.london.gov.uk/assembly/reports/environment/air_qual_may01.pdf, *London Low Emission Zone*, March 2006 http://legacy.london.gov.uk/assembly/reports/environment/lez.pdf and responses to consultations on the expansion of Heathrow Airport in October 2005 http://legacy.london.gov.uk/assembly/reports/plansd/heathrow_expansion.pdf and February 2008 http://legacy.london.gov.uk/assembly/reports/environment/heathrow-response.pdf

[2] Beginning with the report *Every Breath You Take* in May 2009 http://www.london.gov.uk/archive/assembly/reports/environment/air-quality-report-200904.pdf, and continuing with responses to draft or final versions of the strategy in December 2009 http://www.london.gov.uk/who-runs-london/the-london-assembly/publications/environment/response-mayors-draft-air-quality-strategy, August 2010 http://www.london.gov.uk/sites/default/files/Air%20Quality%20second%20response%20-%20August%202010.doc and June 2011 http://www.london.gov.uk/publication/assembly-response-mayor%E2%80%99s-final-air-quality-strategy

[3] *Flights of Fancy* January 2010 http://www.london.gov.uk/who-runs-london/the-london-assembly/publications/environment/flights-fancy-can-expanded-heathrow-meet-its-environmental-targets and *Plane Speaking* March 2012 http://www.london.gov.uk/publication/tackling-air-and-noise-pollution-around-heathrow

[4] Environment Committee meeting of 23 June 2011 – transcript http://www.london.gov.uk/moderngov/mgConvert2PDF.aspx?ID=10960 and graphic referred to in discussion http://www.london.gov.uk/moderngov/mgConvert2PDF.aspx?ID=10961

[5] Meeting of 3 July 2012, transcript at http://www.london.gov.uk/moderngov/documents/b6810/Minutes%20-%20Transcript%20-%20Appendix%201%20Tuesd.pdf?T=9 and *Air Quality in London – briefing note to London Assembly Health and Environment Committee*, Kings College London, July 2012 (hereafter referred to as KCL briefing) http://www.london.gov.uk/moderngov/documents/b6813/Minutes%20-%20KCL%20Report%20-%20Appendix%204%20Tuesd.pdf?T=9

It is now known that thousands of Londoners per year die early as a result of long-term exposure to air pollution – a recent study commissioned by the Mayor estimated that over 4000 extra deaths each year in London are attributable to one kind of pollutant, microscopic airborne particles.[6] Another study estimates that the man-made majority of these particles is responsible for a proportion of all deaths in London boroughs ranging from around 6% in the least polluted outer suburbs to over 8% in the most polluted boroughs of inner London.[7] Air pollution contributes to a range of life-shortening lung and heart conditions; it can also impair lung development in children.[8] Links have also been reported to breast cancer, diabetes and premature and low birth weight babies.[9] The health costs of air pollution in the UK have been estimated at up to £20 billion a year[10] – twice as much as obesity.[11] Research is ongoing into both the short- and long-term effects of air pollution.[12]

Targets

London (and national and EU) targets

The European Commission sets a range of limit values for the concentrations[13] of different air pollutants.[14] These are included as objectives in the UK National Air Quality Strategy and the Mayor's Air Quality Strategy (MAQS). London policy discussions focus on the two pollutants where London emissions are a major source of the pollutants in London's air, and where London is most at risk of missing its air quality targets.[15] The

[6] *Report on estimation of mortality impacts of particulate air pollution in London*, Dr Brian G Miller, Institute of Occupational Medicine, June 2010 (hereafter referred to as IOM report) http://www.london.gov.uk/sites/default/files/Health_Study_%20Report.pdf

[7] Defra figures on the proportion of all mortality attributable to long-term exposure to anthropogenic $PM_{2.5}$, in 2010 by borough, published by the Public Health Observatory: http://www.phoutcomes.info/public-health-outcomes-framework/domain/4 (at web page click on indicator 3.01 and set region to London)

[8] Environmental Audit Committee air quality follow-up report, October 2011 http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenvaud/1024/102402.htm

[9] Clientearth website http://www.clientearth.org/health-environment/clean-air/the-health-impacts-of-air-pollution-1427

[10] http://archive.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-qualitystrategy-vol1.pdf - see page 3;

[11] *Europe refuses UK air pollution reprieve*, BBC News website 28 June 2012 http://www.bbc.co.uk/news/uk-18617815

[12] Some specific work is detailed in the KCL briefing, pages 15-16

[13] It is important to bear in mind the distinction between pollutant emissions (what is put into the air from various sources in a given time and area) and concentrations (the level of pollutants built up in the air at a given time and place, which may come from local emissions or may have blown in from elsewhere).

[14] Under the Air Quality Directive 2008/50/EC http://ec.europa.eu/environment/air/quality/legislation/existing_leg.htm. There is a complex set of limit values including hourly, daily and/or annual average levels of different pollutants; the hourly or daily limits are permitted a certain number of exceedences per year. Specific relevant limits are detailed in this report; full details are available in the Mayor's Air Quality Strategy (hereafter referred to as MAQS) page 8 http://www.london.gov.uk/publication/mayors-air-quality-strategy .

[15] MAQS, pages 3-6

two are fine particulate matter (generally PM, specifically PM_{10} or the finer-still $PM_{2.5}$)[16], and nitrogen dioxide (NO_2).[17]

WHO targets and health benefits

The World Health Organisation (WHO) also recommends maximum pollutant concentrations for human health. In the case of PM_{10}, the recommended limit[18] is half that enforced by the EU and so London has much further to go to reach this standard.

Generally, scientists estimate that every reduction in PM concentration results in a proportionate reduction in excess deaths[19], so there is a health benefit of progress towards or beyond the limit values, as well as the legal benefit of meeting the enforceable targets.

London's air quality - monitoring

London's air quality is monitored by a network of instruments at over 100 locations across London – including kerbside, roadside and urban background.[20] Dr Gary Fuller, who leads the unit at Kings College London that brings together data from these instruments, contributed views and information to the Committee's work for this paper.

London's air quality - measurements and trends up to 2012

Air pollution is a problem in large cities worldwide, but London's is among the worst in Europe, particularly for nitrogen dioxide.[21]

There has been a long-term trend to better air quality in London, though the pace of improvement has slowed in recent years.[22] Shorter-term variations in London's air quality are to some extent weather-dependent.[23]

Particulates

Concentrations of airborne particulates in London have not fallen greatly since 2004, and in some locations provisional data for 2011 indicate that they may remain above the UK and EU limit values.[24]

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[16] The number after PM refers to the maximum size of the particles in question, in micrometres (millionths of a metre). PM_{10} therefore includes $PM_{2.5}$

[17] When discussing concentrations, the pollutant of concern is nitrogen dioxide, NO_2. However, emissions also include nitric oxide, NO, which tends to convert in the atmosphere to NO_2. Therefore when discussing emissions reference is often made to NO_X, meaning both NO and NO_2. See KCL briefing p7.

[18] See WHO factsheet http://www.who.int/mediacentre/factsheets/fs313/en/index.html

[19] IOM report, page 3

[20] For further detail on the monitoring network see *Review of the air quality monitoring network in London*, April 2011 http://www.london.gov.uk/sites/default/files/Air%20Quality%20Review%20Final%20Report.pdf. The number of sites monitoring each pollutant in each location category, and the meanings of the location categories, are given on pages 18-20. Maps of the overall network are on pages 34-35

[21] See discussion of this issue at http://fullfact.org/factchecks/london_2012_does_london_have_the_worst_air_quality_in_europe-24372 and http://cleanairinlondon.org/hot-topics/highest-no2-in-europe/. See also the answer to Mayoral Question 1991/2012, asked by Stephen Knight AM on 4 July 2012 http://mqt.london.gov.uk/mqt/public/question.do?id=41747

[22] MAQS, page 25

[23] 3 July meeting, transcript page 2; see also discussion in many editions of http://www.guardian.co.uk/environment/series/pollutionwatch

The most stringent of the EU limits for PM_{10} is the daily mean limit (50μg/m^3).[25] It is recognised that there will be short-term peaks, and so there are allowed to be up to 35 days with mean concentrations in excess of the limit. There were (on provisional figures) more than 35 exceedences in 2011 at six monitoring stations in London – one industrial, two kerbside and three roadside monitoring.[26]

Initial monitoring figures for 2012 showed that two sites (Neasden Lane, an industrial site, and Upper Thames Street, a central London roadside site) had already exceeded the allowable number of daily limit breaches by July. A small number of others were nearly at the allowable number.[27]

The Committee was told that an alternative measurement of particulate pollution concentrations (particle numbers, rather than total particle mass), which might reflect more closely the effect on people's health, fell significantly from late 2007 in urban roadside locations, perhaps due to the introduction of ultra low sulphur diesel.[28]

Nitrogen dioxide

Nitrogen dioxide (NO_2) levels remain significantly above the limit values. NO_2 pollution is widespread in large cities with busy roads throughout the world, but London's levels are higher than for other UK cities or European capitals, and are reportedly comparable to those suffered by Beijing before the clean-up associated with the 2008 Olympic and Paralympic Games.[29]

The Committee heard from Kings College London that the limit (40μg/m^3) for the annual mean NO_2 concentration is being exceeded at the large majority of roadside and kerbside locations in London. Some kerbside locations and busy street canyons[30] are exceeding the annual mean by a factor of two or three. Five background (away from main roads) locations, in inner London, suburban centres and in the Heathrow/M4 area, are also exceeding the annual mean.[31]

There is also a much higher limit (200μg/m^3) for the mean NO_2 concentration over an hour. This is sometimes exceeded at all London's kerbside monitoring stations, some of the roadside locations, and provisionally in 2011 at one urban background location. As with the PM_{10} daily mean limit, it is recognised that there will be short-term peaks in pollution and so it is permitted for this limit to be exceeded for 18 hours total in the course of the year. There were more than 18 hours of exceedence in 2011 at 9 kerbside or roadside monitoring stations near busy roads.[32]

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[24] 3 July meeting, transcript pages 2-3 and KCL briefing pages 10-12
[25] μg/m^3 stands for micrograms of particles per cubic metre of air. A microgram is a millionth of a gram.
[26] KCL briefing pages 10-11. Note that the figures quoted do not necessarily reflect those that will be submitted to the EC under the Air Quality Directive – that submission is partly based on modelling to interpolate between monitoring stations, and also is allowed to take into account natural sources of particulates.
[27] 3 July meeting, transcript page 5
[28] 3 July meeting, transcript page 3 and KCL briefing pages 12- 13
[29] 3 July meeting, transcript page 18
[30] A street canyon is a street mainly enclosed on either side by tall buildings, limiting the dispersal of polluted air.
[31] 3 July meeting, transcript pages 1-2 and KCL briefing pages 5-10
[32] 3 July meeting, transcript page 1 and KCL briefing pages 6-7

Current action and areas for further Committee work

Overview of action at different levels of government

National action

National legislation, and the work of the Department for Environment, Food and Rural Affairs (Defra) enshrine the EU limit values as targets for the UK and support the local air quality management work described below. Defra also co-ordinates national submissions to the EU, setting out plans for achieving the limit values, and as part of this has begun to investigate a national framework for low emission zones.[33]

Local action

Under the Local Air Quality Management (LAQM) framework, local authorities are required to assess their air quality and implement an action plan where national targets are not yet being achieved. Local authorities are also required to consider air quality in other local policies such as Local Transport Plans.[34]

Mayoral strategy.

The Mayor's Air Quality Strategy (MAQS)[35] seeks to reduce the concentrations of both NO_2 and PM. The strategy includes:

- measures to reduce transport-related emissions
- measures on other sources of pollution (such as construction and energy generation)
- measures to take pollutants out of the air (such as green infrastructure or road surface treatment)
- measures to reduce human exposure (such as warnings of high pollution days)

The need for further action

As shown above, concentrations of both PM and NO_2 remain too high in London. It remains unclear whether PM_{10} concentrations in 2012 will be judged to comply with EU regulations, and further reductions would be of significant public health benefit in any case. However, as there is no strong downward trend in PM, further policy action will be needed to achieve sustainable reductions. It is clear that NO_2 concentrations are well in excess of EU limit values and UK targets, and that they are not expected to come within these limits until at least 2020 – this means that the UK could be liable to large fines, that many Londoners are exposed to excess concentrations of harmful NO_2, and that this is expected to continue.

Dr Gary Fuller, of Kings College London, said that there should be better feedback from real-world measurements of air pollution to technology development and to strategy.[36]

The Committee and other stakeholders are looking for policy responses to this situation. The Leaders of Westminster City Council and Camden Borough Council, and the Chairman of the Policy and Resources Committee of the City of London Corporation,

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[33] For national strategy see http://www.defra.gov.uk/environment/quality/air/air-quality/approach/
[34] For LAQM see http://www.defra.gov.uk/environment/quality/air/air-quality/laqm/
[35] The web page http://www.london.gov.uk/airquality introduces the strategy and GLA's air quality work.
[36] 3 July meeting, transcript pages 26-27

wrote to the Mayor in June saying that further action needs to be taken urgently to reduce NO_X and PM_{10} emissions in their areas, which cover most of central London.[37] The Clean Air in London campaign also told the Committee that there had been a disappointing lack of new actions on air pollution in the UK government's plans submitted to the EC in September 2011, and in the 2012 manifesto of the Mayor.[38]

Similarly, the House of Commons Environmental Audit Committee (EAC) has recently said that no actions relating to air quality appear in the Defra business plan, that the 2007 Defra Air Quality Strategy is out of date and not seen as fit for purpose, and that actions agreed by the Government following a previous EAC report have not been implemented. It characterised the Government's approach as shifting responsibility onto local authorities, and called for more action at the national level, including an action plan across government, support for local government, public awareness, a national framework for low emission zones, and action through public health reforms. It also found that many local authorities consider air quality to be a low priority, and that this is reinforced by the attitude of national government.[39]

Defra is reviewing the Clean Air Act as part of the national Red Tape Challenge, which will go to public consultation in February 2013.[40] Air quality stakeholders are likely to lobby for the legal framework to be improved, rather than reduced.

The Mayor is in principle committed to further action. As well as the actions that the Mayor is already taking, the Mayor's environment adviser acknowledged to the Committee that more needs to be done. He said that further measures, including measures towards compliance with the NO_2 limits, would be published in the autumn under the Mayor's '2020 Vision'.[41] Transport for London has recently announced, as part of its draft business plan a £20 million fund to support local air quality projects.[42]

However, the Mayoral adviser also said that the GLA and TfL were doing as much as they reasonably could and that the need for the GLA was to engage with the local, national and European tiers of government.[43] This is a theme that the GLA has put forward in response to previous scrutiny of its Air Quality Strategy.[44]

A general focus for the Committee's next work on air quality could be to seek to bring together the Mayor and other tiers of government, to hold them to account collectively for action on air pollution in London and seek a combined programme to meet the agreed targets for London's air quality.

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[37] Letter from Cllrs Philippa Roe, Sarah Hayward and Mark Boleat to the Mayor of London, 15 June 2012
[38] 3 July meeting, transcript page 21
[39] Environmental Audit Committee air quality follow-up report, October 2011 http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenvaud/1024/102402.htm
[40] Defra Red Tape Challenge publication, page 7 http://www.defra.gov.uk/publications/files/pb13728-red-tape-environment.pdf; see also http://www.redtapechallenge.cabinetoffice.gov.uk/environment/air-quality/
[41] 3 July meeting, transcript pages 13 and 33.
[42] http://www.tfl.gov.uk/corporate/media/newscentre/26396.aspx
[43] 3 July meeting, transcript pages 15-16
[44] http://www.london.gov.uk/sites/default/files/12a%20Air%20Quality%20Response%20to%20London%20Assembly.pdf

Measures to reduce emissions from vehicles

Measures in the Mayor's air quality strategy to reduce transport emissions include:

- securing a cleaner set of vehicles on London's roads
- promoting zero-emission transport such as walking and cycling
- investment in public transport
- promotion of smooth and steady traffic flow
- efficient freight distribution
- road maintenance
- reducing emissions from aeroplanes on the ground at London airports, particularly Heathrow

Cleaner vehicles – diesel vehicle emissions

The main emission reductions are expected from measures to promote modern, cleaner vehicles and exclude the most polluting vehicles from London. The majority of the most polluting vehicles on London's roads are diesel vehicles.

Diesel engines are a leading source of NO_X and especially NO_2 emissions, and of PM and especially $PM_{2.5}$ emissions, and diesel fumes have recently been confirmed as a carcinogen.[45] Therefore, there is a need to look at several aspects of reducing emissions from diesel vehicles.[46]

Depending on the size and ownership of the vehicle, and the size and rapidity of emissions reductions sought, there are different measures underway and proposed, including discouraging the oldest and most polluting vehicles from London, procuring cleaner modern vehicles for the public fleet, and incentivising cleaner modern vehicles in the private fleet. These are therefore dealt with separately in the following sections on Euro standards, the Low Emission Zone, a potential Clean Air Zone, bus emissions, and diesel cars and vans.

Euro standards and NO_X and NO_2 emissions from diesel vehicles

The main framework for driving down vehicle emissions is the European Union's Euro standards. There are serious questions, however, about the effectiveness of current Euro standards for reducing diesel NO_X emissions. Furthermore, a rise in NO_2 concentrations at London kerbside and roadside locations around 2003 to 2005 is ascribed to an increase in NO_2 emissions from newer diesel vehicles.[47] The Euro standards allow this because they regulate total NO_X rather than NO_2 itself.[48]

Possible future Committee work could assess whether future Euro standards should regulate direct NO_2 emissions as well as overall NO_X.

The Low Emission Zone

The most polluting individual vehicles are heavy vehicles such as vans, lorries and buses, and especially those that are older and conforming only to outdated emissions standards. The Low Emission Zone (LEZ) therefore excludes these from Greater

[45] 3 July meeting, transcript pages 10-11; see also http://press.iarc.fr/pr213_E.pdf
[46] The Clean Air in London campaign urged that this be a priority – 3 July meeting, transcript pages 24-25
[47] KCL briefing, pages 7-9
[48] 3 July meeting, transcript page 27

London[49]. It is being tightened in stages: as of 2012, vans and minibuses are required to meet Euro 3 standards for PM emissions (a standard which will be met by vehicles manufactured since 2002), and HGVs and coaches Euro IV (2006).[50] This phase required 150,000 more vehicles to take action to comply.[51]

Kings College London said it was difficult to say that there had been an effect of the LEZ on PM_{10} emissions, but found evidence of a beneficial effect on $PM_{2.5}$ emissions in outer London, and on black carbon, which is a particle type characteristic of traffic emissions.[52]

The Clean Air in London campaign argued that the LEZ should impose stricter standards for diesel particulate emissions and that it should apply to diesel cars as well as heavy vehicles, making London's zone more like that in Berlin.[53]

Currently, the LEZ does not include any standards for NO_X. There will be NO_X standards from 2015, but at the Euro IV level.[54] The Committee heard that the emissions reductions expected under Euro IV from HGVs may not be achieved in urban driving, as it has been shown that the selective catalytic reduction (SCR) technology involved is ineffective under urban (low speed, low engine temperature) driving conditions.[55] Therefore, a more stringent phase of the LEZ may be required to sufficiently reduce NO_X emissions.

The City of London Corporation expressed interest in still-further LEZ phase, addressing NO_X, $PM_{2.5}$ and black carbon.[56]

Possible future Committee work could assess the air quality benefits of the LEZ. What benefits can be expected from future stages? What changes to the LEZ could increase the benefits?

[49] Some main roads near the Greater London boundary are additionally in or out of the zone – see http://www.tfl.gov.uk/roadusers/lez/17678.aspx#tkt-tab-panel-2
[50] Details on the LEZ are given in the MAQS, pages 99-100 and at http://www.tfl.gov.uk/roadusers/lez/default.aspx
[51] 3 July meeting, transcript page 12
[52] KCL briefing pages 13-14, and 3 July meeting, transcript page 3
[53] 3 July meeting, transcript pages 24-25
[54] Details on the LEZ are given in the MAQS, pages 99-100
[55] KCL briefing, page 10
[56] 3 July meeting, transcript page 16

Clean Air Zone

There have been proposals to establish a more stringent version of the Low Emission Zone (perhaps called a Clean Air Zone) in the most polluted parts of London. The Mayor's air quality strategy said that the feasibility of such restrictions in the central Congestion Charging Zone would be investigated, but the current position is that the easiest way to implement this would be through a national system for visibly badging vehicles by their emissions, such as exists in Germany but not yet in the UK. Defra is investigating a national framework for low emission zones.[57]

Possible future Committee work could assess how tighter emissions standards could be applied in Central London. On what timescale could this be feasible? What would be the costs and benefits?

Bus emissions

Transport for London is taking a multi-track approach to reducing bus emissions. On some older buses (up to 1000, or 11 per cent of the fleet of 8700), especially vehicles serving pollution hotspots, it is retrofitting emissions reduction technology expected to cut NO_X emissions by more than 70 per cent.[58] It is also procuring new buses to replace those at the end of their service lives (up to 14 years, which is about 620 buses, or 7 per cent of the fleet, on average per year). Many of these are to be hybrid buses (about a further 1000 over the next four years in addition to the 300 currently in service). The rest will be at the mandatory standard for new heavy diesel vehicles, which from 2014 will be Euro VI. Hydrogen buses have also been trialled and the Mayor is looking to increase their numbers.[59]

Some Members of the Committee argued that TfL should do more to find innovative and bold solutions to emissions from its fleet. The Committee heard that it would be a better use of TfL's resources to retrofit a larger number of its older and more polluting buses than to procure a relatively small number of hybrids instead of new conventional buses. The Committee was told that emissions can be reduced by 60 to 80 per cent at a cost of £10,000 per bus by retrofitting.[60] However, the Mayor's adviser told the Committee that bus retrofitting was going as fast as was reasonable without making bus or taxi fares too expensive.[61]

TfL figures for emissions from the planned hybrids indicate that all are more carbon-efficient than conventional diesel double-deckers, and that they have comparable or lower NO_X emissions (especially the New Bus for London) but that PM emissions are in

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[57] See Defra submission to the EU on NO_2 reduction, page 27 http://uk-air.defra.gov.uk/library/no2ten/documents/110921_UK_overview_document.pdf; see also meeting of the London Assembly Environment Committee, 23 June 2011(transcript at http://www.london.gov.uk/moderngov/documents/s4491/Minutes%20-%20Appendix%203%20-%20Transcript%20Clean.pdf and http://www.london.gov.uk/moderngov/documents/s4492/Minutes%20-%20Appendix%204%20-%20NOx%20concentration.pdf)

[58] 3 July meeting, transcript pages 13, 18, 22-23 and 34

[59] 3 July meeting, transcript pages 13, 17-18 and 25-26

[60] 3 July meeting, transcript pages 16-17 and 25. The Committee notes that this reduction is a figure obtained by TfL in test drives in urban conditions, not a laboratory result.

[61] 3 July meeting, transcript page 34

the same range as conventional buses and therefore that some hybrids, including the New Bus for London, generate more PM than some conventional diesel double-deckers.[62]

Possible future Committee work could assess how London can best reduce bus emissions. Is it more effective, and more cost-effective (in the short, medium and long terms) to retrofit the existing fleet or to procure hybrids when renewing the fleet?

What scope could there be for TfL to procure Euro VI buses during 2013, when the standard will be in operation though not mandatory? What would be the costs and benefits?

Diesel cars and vans

Even with Euro standards intended to regulate them, there has been little change in NO_X emissions from diesel cars and vans in the past 15-20 years. The Euro 3, Euro 4 and Euro 5 standards actually can result in cars emitting twice as much NO_X under higher engine load conditions than older vehicles, perhaps because of increased use of turbo-charging. Also, the average engine power of diesel cars has increased.[63]

At the car and light van end of the market, petrol is an immediate alternative to diesel. Euro 5 diesel vehicles emit approximately as much NO_X as the petrol vehicles without catalytic converters which were normal before the introduction of the Euro standards. Euro 5 petrol vehicles emit about 96 per cent less.[64]

However, diesel has increased its share of the car market dramatically in recent years (from under 15 per cent of new car sales in 2000 to over 50 per cent in 2011).[65] This is partly driven by incentives for vehicles rated lower for carbon emissions, which often favour diesel engines over petrol equivalents.

Incentives for lower carbon emissions include the Greener Vehicle Discount (GVD) in the Congestion Charge, as well as the carbon-emissions tiers in the national Vehicle Excise Duty, and fuel duty which taxes carbon motor fuel directly. The Mayoral adviser told the Committee that it is now emerging in many countries that the shift to diesel may have been a mistake.[66] The Clean Air in London campaign also argued that dieselisation is a problem.[67] TfL is now consulting on proposals to replace the GVD with a more stringent Ultra Low Emission Discount, which it expects diesel cars will be unlikely to qualify for in the foreseeable future.[68]

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[62] Presentation from TfL to the Hybrid User Forum, 31 May 2012 http://wp1173759.wp202.webpack.hosteurope.de/www/wordpress/wp-content/uploads/2012/06/London-update-Mike-Weston.pdf

[63] KCL briefing, page 10

[64] KCL briefing, page 10 and 3 July meeting, transcript page 11 (though emissions from Euro 1-3 petrol vehicles are higher than previously thought, suggesting that the older petrol engine catalysts may be deteriorating faster than expected)

[65] Society of Motor Manufacturers and Traders data http://www.smmt.co.uk/co2report#co2trendsfuel

[66] 3 July meeting, transcript page 13

[67] 3 July meeting, transcript page 27

[68] See TfL press release 19 November 2012 http://www.tfl.gov.uk/corporate/media/newscentre/26274.aspx

However, some stakeholders argue that the debate between petrol and diesel engines is not forward-looking and that attention should focus on technologies with lower emissions than conventional engines running on either petrol or diesel, such as electric and hybrid drives.[69]

Possible future Committee work could assess whether there should be additional or different incentives to encourage petrol engines over diesel in the urban light vehicle fleet. What difference would this make, on what timescale and at what cost? How would lower-carbon vehicles still be incentivised? To what extent might such a policy hinder the adoption of cleaner technologies in the longer term?

Cleaner vehicle technology

Beyond the use of fossil fuels, whether in conventional or hybrid engines, there are engine technologies with far lower tailpipe emissions, including externally-charged electric motors and hydrogen power. The Committee heard that these should, in the longer-term, be the main power source for London's motor traffic, especially cars and lighter vehicles.[70]

As noted above, the Committee heard about TfL's work to introduce cleaner buses in its fleet. Regarding the wider vehicle fleet on London's roads, the Mayor has an Electric Vehicle Delivery Plan; TfL told the Committee that London is recognised globally as very successful in creating an environment where electric vehicles are attractive, through measures such as public charging infrastructure, discounts on the Congestion Charge, and policy support and information. However, TfL wished to stress that the electric vehicles market is new and currently very small, and that due to limitations in global manufacturing capacity vehicle numbers would remain small in the medium term, and would not have a significant impact on air quality to 2015.[71]

This represents a change of tone compared to the Mayor's Electric Vehicle Delivery Plan.[72] The former Environment Committee reported on the plan in 2011, finding that progress was slow, jeopardising environmental benefits. It recommended an updated delivery plan with clearer targets and timescales, and specific measures including a focus on more polluting vehicle types such as taxis and goods and passenger vehicles, and to get more electric vehicles in the GLA fleet.[73]

Possible future Committee work could revisit the Mayor's EVDP to assess what more he can do to promote the development of clean vehicle technology across the whole public and private vehicle fleet.

Non-motor travel

The GLA and TfL promote zero-emission modes such as walking and cycling. The Committee heard about research into people's reasons for mode choice, and work to

[69] 3 July meeting, transcript page 30
[70] 3 July meeting, transcript page 30
[71] 3 July meeting, transcript pages 23-24
[72] http://www.london.gov.uk/archive/mayor/publications/2009/docs/electric-vehicles-plan.pdf
[73] *Charging ahead*, London Assembly February 2012 http://www.london.gov.uk/publication/electric-vehicles-london

promote the continuation of travel options people may have used during the Olympic Games. As with electric vehicles, TfL says that London has an improved model for these modes, which is 'unprecedented for a major city around the world'.[74] In a letter to the Committee,[75] TfL gave details of its work to promote cycling through the Barclays Cycle Hire Scheme and the Barclays Cycle Superhighways. It said that the aim is for cycling trips per year to increase by 400% between 2000 and 2026.[76] There are also actions in the Mayor's Transport Strategy to promote walking.

However, the increase in cycling was from a low base, and was not expected to change the overall prevalence of motor transport. As shown in the table below, TfL's expectation is for 70% of trips still to be motorised in 2031, compared to 74% in 2006.[77]

Mode	Share 2006	Share 2031
Cycling	2%	5%
Walking	24%	25%
Public transport	31%	34%
Private motor	43%	37%

The Assembly has recommended that the Mayor's cycling target be doubled to 10% of journeys, with appropriate resources and policies to deliver this aim.[78] The Mayor has since said he will produce a 'cycling vision', doubling investment in cycle infrastructure to 2015 and, if government grant allows, trebling it over the next ten years. This accompanies a general increase in investment in roads.[79]

What could be the air quality and public health benefits of a greater modal shift to non-polluting forms of transport?

Reducing non-transport emissions

Other sources of air pollution include construction and demolition work (generating mainly PM pollution), gas boilers and other combustion-based sources of heating and energy (especially NO_x), and other industrial processes. Current measures to tackle these sources include guidance to the construction industry, planning policies on the air quality impact of new developments, and a programme of schemes to make London's buildings more energy efficient. The retrofit of domestic housing has been accelerating under the Mayor's RE:NEW scheme and others – it is expected that around 300,000 homes will have been fitted by the end of 2012, but as many again must be tackled each year until 2015 (although funding for the Mayor's own RE:NEW programme looks

[74] 3 July meeting, transcript pages 22-23
[75] Letter from Elaine Seagriff, Head of London Wide Policy and Strategy, TfL, to Murad Qureshi AM, 12 October 2012
[76] See also Mayor's transport strategy, http://www.london.gov.uk/publication/mayors-transport-strategy
[77] Mayor's Transport Strategy
[78] *Gearing up*, report of the London Assembly Transport Committee on cycling http://www.london.gov.uk/publication/gearing
[79] http://www.thetimes.co.uk/tto/public/cyclesafety/article3617276.ece

to be scaling down[80]), and all of London by 2030.[81] Private investment is needed to deliver the necessary improvements; for homes the Green Deal is intended to encourage this. For workplaces, the rapid pay-back of the investment is already encouraging many businesses to reduce their energy bills. The Mayor's RE:FIT programme (primarily for public sector workplaces) has 400 projects in its pipeline.[82]

Currently, London's electricity comes mainly from the National Grid, and is generated outside of London. The Mayor's Climate Change Mitigation and Energy Strategy includes a target for 25% of London's energy to be generated in London from decentralised sources by 2025. Some of this would be low-emission sources such as solar, but much of it would be based on combustion plants ranging from small domestic boilers to large multi-district stations. These plants emit air pollution whether using fossil fuels or renewable fuels such as waste and biogas, and would mainly be sited in residential areas to deliver efficient Combined Heat and Power (CHP).[83]

The building standards applicable to large developments require that the development should be air quality neutral, but this would not apply to small to medium developments or retrofit projects involving microgeneration. Concern was expressed to the Committee about the trend to solid fuel burners for home heating.[84]

Taking pollutants out of the air

Part of the GLA's strategy is to take pollutants out of the air. The Mayor has a commitment to increase tree cover across London by a quarter, the equivalent of two million trees. Some of these trees, and other vegetation, are to be in key roadside locations and other public spaces where the leaf surface removes from the air pollutants that would otherwise be breathed by many people.[85] Evidence has emerged in recent years demonstrating these benefits and starting to indicate how to plant for them.[86]

Also, there is a programme (by TfL, part-funded by the Department for Transport, as are some green infrastructure measures)[87] of treating roads in pollution hotspots (including arterial through-routes such as Upper Thames Street, Marylebone Road and Blackwall Tunnel corridor[88]) with a substance that makes PM adhere to the surface rather than circulate in the atmosphere. Initial trials suggested that local PM concentrations were reduced by about 10% in the 24 hours following application.[89]

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[80] The Committee is investigating the prospects for domestic energy efficiency separately – see http://www.london.gov.uk/publication/correspondence-fuel-poverty-action-london

[81] Mayor's Climate Change Mitigation and Energy Strategy (CCMES) pages 124-128 http://www.london.gov.uk/sites/default/files/Energy-future-oct11.pdf and answers given by the Mayor to MQs 2068/2012, 2193/2012 and 2194/2012, asked by Murad Qureshi AM on 4 July 2012 http://mqt.london.gov.uk/mqt/public/question.do?id=41950, http://mqt.london.gov.uk/mqt/public/question.do?id=41949, http://mqt.london.gov.uk/mqt/public/question.do?id=41824 (and supplementaries)

[82] 3 July meeting, transcript page 31

[83] CCMES, pages 86-105

[84] 3 July meeting, transcript pages 31- 32

[85] MAQS, pages 129-130

[86] See for example http://www.ciria.org/SERVICE/Home/core/orders/product.aspx?catid=2&prodid=2005

[87] 3 July meeting, transcript page 13

[88] 3 July meeting, transcript page 33

[89] TfL website http://www.tfl.gov.uk/corporate/projectsandschemes/17246.aspx and http://www.tfl.gov.uk/corporate/media/newscentre/archive/22163.aspx

However, there are concerns that if this is applied too narrowly it may leave a wider problem unchecked, and particularly that it may mask that problem if it is targeted at air quality monitoring stations.

The Committee could review the effect of dust suppressant application on air quality over a wider area and longer period. How cost-effective is it as a measure to protect human health?

EU enforcement action and negotiations

As noted above, the Air Quality Directive limits the concentrations of various pollutants. After given deadlines, if air quality breaches these limits, there is a multi-stage enforcement process, which can ultimately result in fines to Member States, which for persistent breaches could be hundreds of millions of pounds, with no upper limit. These fines can now potentially be passed by the UK government to other responsible authorities, including the GLA, under the Localism Act 2011. The Mayor's office thinks that this would be very unlikely in this case, because of provisions in the Act protecting authorities that have taken 'reasonable steps' to avoid the fine.[90]

Particulate Matter

The EC began action several years ago over London's PM_{10} levels, but this was halted in 2011 after the UK government, supported by the GLA, presented a PM_{10} strategy that met conditions for an extension to 2011, satisfying the EC that the limit had been achieved in London in 2010. However, PM_{10} levels have remained close to the limit since 2010 and limits could be breached in future.[91]

$PM_{2.5}$ limits will also come into force in 2015 and be tightened in 2020[92] – further air quality improvements are likely to be needed to meet these limits.

The Committee could investigate what further measures may be needed to meet $PM_{2.5}$ limits.

NO_2

Although the latest deadline for compliance with NO_2 limit values is 2015, the government expects many UK regions to comply only during 2015-2020 and, in London's case, 2020-2025. This date for London means that a fine is likely; the EC has already taken a firm line on applications for deadline extensions in UK regions with considerably better air quality.[93]

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[90] 3 July meeting, transcript page 22

[91] Written evidence to EFRA Committee June 2012, by CAL referring to analysis by Kings College London, and by DEFRA. Available at http://www.publications.parliament.uk/pa/cm201213/cmselect/cmenvfru/writev/air/contents.htm

[92] MAQS page 8

[93] *Europe refuses UK air pollution reprieve*, BBC News 28 June 2012 http://www.bbc.co.uk/news/uk-18617815

Out of 43 air quality zones in the UK:[94]

- 3 are already compliant with NO2 limits.
- 12 are expected (by the EC) to comply in or before 2015, and have received deadline extensions to the relevant dates.
- 12 are not expected (by the EC) to comply by 2015 and so have had deadline extension applications rejected.
- 16 were not expected by the UK government to comply by 2015, and did not have an extension applied for. The EC is considering infraction action for breaches since 2010.
- London, with the worst NO2 pollution in the UK, is in the last category.

The EC is reviewing air quality policy; London and other European city-regions are seeking effective EU policies to support their action, most especially Euro emissions standards that achieve significant NO_2 reductions per vehicle (see above). The city-regions also seek a simplification in the list of targeted pollutants to reduce conflicting incentives and imperatives, and make it easier to tackle the biggest health threats. Their position is that 'where all reasonable and proportionate action has been taken this should be reflected in the compliance process. For NO_2 this should reflect the failure of recent Euro standards…'. An answer from the EC is not expected in the near future.[95]

Should the Committee support the city-regions' position in lobbying the EC?

Transboundary issues

As polluted air moves across regional and national boundaries, there are controversies around which tiers and areas of government are responsible for air quality, and about targets and penalties. As the prevailing winds over London are from west to east, it is likely that London contributes more to pollution in other European cities than it receives from them. But the highest peaks in particulate concentrations in London include times when London's emissions are added to already-polluted air from elsewhere, and so the days when London exceeds particulate limit values can often be described in a sense as caused or contributed to by transboundary pollution.

This factor contributes to the GLA's position that action on air pollution should be in partnership across governmental tiers and regions.[96] However, others argue that London must act to reduce emissions whatever is done elsewhere, for the benefit of Londoners as well as people in neighbouring regions.[97]

Does the issue of transboundary pollution make a difference to the steps London should take to reduce its emissions?

[94] http://uk-air.defra.gov.uk/library/no2ten/documents/110921_UK_overview_document.pdf; see also 3 July meeting, transcript page 33

[95] 3 July meeting, transcript pages 19-20; also Air Quality Initiative of Regions (AIR) Position Paper June 2012

[96] 3 July meeting, pages 15 and 21-22

[97] 3 July meeting, page 20

Avoiding exposure

Harm can also potentially be reduced by informing people about air quality so that they can avoid the times and places with the worst pollution. There is air quality information available online,[98] and there are services such as AirText that alert subscribers to specific days of likely high air pollution.[99] Major episodes also sometimes receive media coverage, but after the event.

There have been calls for more action to help people reduce their exposure to polluted air, mainly through improving access to advance or real-time alerts of high pollution levels in particular places. There has been some new action recently, including Defra's new UK Daily Air Quality Index, communicating real-time pollution information and forecasts to the public, with revised health advice.[100] London also has Kings College London's LondonAir website and smartphone app, and the airTEXT borough-by-borough alerts. However, it is not clear that these sources are widely-used. The Environmental Audit Committee has recommended a public awareness campaign on reducing exposure as well as reducing emissions, which was endorsed by Kings College London and the City of London Corporation.[101] Suggestions to the Committee included:[102]

- more consistent use of the Defra index across communication channels
- the inclusion of more specific behavioural advice, such as using alternative walking routes away from busy roads, alongside the pollution information and health advice
- the Mayor should issue a press release or other announcement to bring attention to serious pollution incidents; simply placing information on a web page does not draw enough web traffic
- installing displays on air quality monitoring points so that people on the streets in question can see monitoring results directly

The Committee also welcomes research underway involving KCL which aims to model exposure to air pollution across different population groups and by activity, drawing on Oyster card information and data from GPS devices. The aim is to be able to advise people on behaviour change to reduce exposure, and to inform health studies (which need to take into account people's exposure but currently mainly rely on concentrations at the person's home address as a proxy for their real exposure).[103]

The Committee could review how Londoners can be empowered to make choices about their own exposure to air pollution.

The role of public health authorities

Under NHS reforms, a new institutional structure for public health will be set up. In each local authority there will be a Director of Public Health, and a Health and Wellbeing Board, responsible for a Health and Wellbeing Strategy. Directors of Public

[98] For example at http://www.londonair.org.uk/LondonAir/Default.aspx and http://uk-air.defra.gov.uk/
[99] http://www.airtext.info/
[100] See Defra website http://uk-air.defra.gov.uk/air-pollution/daqi
[101] http://www.publications.parliament.uk/pa/cm201012/cmselect/cmenvaud/1024/1024.pdf pages 18-20, KCL briefing pages 16-17; 3 July meeting, transcript page 35
[102] 3 July meeting, transcript pages 37 and 39 and KCL briefing page 15
[103] KCL briefing, page 15

Health will have duties to protect and improve public health. The Boards will bring in partners from different parts of the local authority and other organisations.

Supporting these and taking forward national policy there will be a body called Public Health England, which will have four regional 'hubs', of which one will cover London only.[104] Additionally, at the London level, the Mayor is looking to establish a London Health Improvement Board to bring together partners from several sectors. This is expected to begin work in 2013, but not to have its statutory footing until 2014.

Priorities will be set locally, but Health and Wellbeing Strategies will be required to have reference to air quality. Also, air quality is to be one of the indicators in the national public health outcomes framework.

Air quality is a GLA and Mayoral priority for public health, and the Mayor is to seek to use the London Health Improvement Board (LHIB) as a way of raising awareness and taking action. To support this, the GLA environment team has been leading work to develop guidance and information by borough for joint strategic needs assessments by Health and Well-being Boards. The GLA is also beginning to work directly with frontline medical practitioners, including about air quality information to help patients manage exposure.[105] However, currently the three identified priorities for LHIB are alcohol abuse, childhood obesity and cancer prevention and early diagnosis.[106]

There was a consensus at the Committee's meeting that air quality should be a priority for the LHIB, which could help to communicate the issue to borough Directors of Public Health, and Health and Well-being Boards. At the borough level, each area will conduct its own needs analysis and consult with residents, and will weigh competing priorities, before allocating funding and engaging in activities and partnerships. [107]

The Committee could investigate what support public health authorities need, to play a leading role in tackling air pollution.

Next steps

The Committee wishes to consider further work on air quality as part of its ongoing work programme discussions. This report is designed to inform those discussions. A large number of possible questions for scrutiny have been identified in the body of this report. The Committee may wish to engage further in policy development on some of these over the next few years.

Comments and contributions on the issues identified in this paper would be welcomed from interested organisations and individuals. These will help to inform the Committee's work programme discussions and any further investigations. Please contact the Committee's scrutiny manager Ian Williamson on 020 7983 5641 or ian.williamson@london.gov.uk

[104] Department of Health factsheet on Public Health England, pages 14-17
[105] 3 July meeting, transcript page 41
[106] LHIB press release 17 January 2012 http://www.lhib.org.uk/component/content/article/14-sample-data-articles/98
[107] 3 July meeting, transcript pages 35 and 40-42

The Health and Environment Committee

Murad Qureshi (Chair)	Labour
Jenny Jones (Deputy Chair)	Green
Andrew Boff	Conservative
James Cleverly	Conservative
Nicky Gavron	Labour
Stephen Knight	Liberal Democrat
Kit Malthouse	Conservative
Onkar Sahota	Labour
Fiona Twycross	Labour

Views and information

The Committee met the following guests on 3 July 2012:

- Matthew Pencharz, Mayoral Adviser, Environment and Political Affairs
- Elaine Seagriff and Samantha Kennedy, Transport for London
- Elliot Treharne, GLA
- Dr Gary Fuller, King's College London
- Simon Birkett, Clean Air in London
- Jon Averns, City of London Corporation

The transcript of the discussion is available at:
http://www.london.gov.uk/moderngov/documents/b6810/Minutes%20-%20Transcript%20-%20Appendix%201%20Tuesd.pdf?T=9

The Committee also received a written briefing from Dr Gary Fuller; a copy is available at
http://www.london.gov.uk/moderngov/documents/b6813/Minutes%20-%20KCL%20Report%20-%20Appendix%204%20Tuesd.pdf?T=9

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